Informed Consent, Shared-Decision Making and a Reasonable Patient's Wishes Based on a National Survey in the United States

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Informed Consent, Shared-Decision Making and a Reasonable Patient's Wishes Based on a National Survey in the United States

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Abstract

Objective: In approximately half the states in the U.S., and more recently in the U.K., informed consent has been legally defined as what a reasonable patient would wish to know. Our objective was to discern the information needs of a hospitalized, “reasonable patient” during the informed-consent process.

Design: Survey the intensity using a 5-point scale (4 indicates “probably yes,” and 5 indicates “definitely yes”) by which individuals wish to know specific information if placed in a hypothetical scenario where an invasive procedure may be an option.

Setting: A 10-question survey was administered to three groups: nursing students (n=76), health professions educators (n=63), and a U.S. national population (n=1067).

Primary and secondary outcome measures: The primary outcome measure was the average intensity, on a 5-point scale, by which survey groups wished to have each of 10 questions answered. The secondary outcome was to discern relationships between survey demographics and the intensity by which participants wanted an answer.

Results: Despite substantial demographic differences in the nursing-student group and health-professions-educator group, the average intensity scores were within 0.2 units on 9 of 10 questions. The national survey revealed a strong desire to have an answer to each question (range 3.98 to 4.60 units). It showed that women desired answers more than men and older adults desired answers more than younger adults.

Conclusions: Based on responses to 10 survey questions regarding wishes of people in a situation where an invasive procedure may be necessary, the vast majority want an answer to each question. They wanted to know about all treatment options, risky drugs, decision aids, who

will perform the procedure, and the cost. They wanted their advocate present, periodic review of their medical record, a full day to review documents, and expected outcomes and restrictions after the procedure.

Key Words: Informed consent, shared-decision making, reasonable patient, overuse of procedures

Strengths and limitations of this study:

- Based on two targeted surveys and a national survey, findings are consistent across demographic groups and across the United States, making our conclusions robust.
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- The survey questions had to be limited to be practical, so in any specific, real-life situation additional questions may be asked by a reasonable patient.
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Funding statement: The study was supported by Patient Safety America, Houston, TX USA

Competing interests: none

Author's contribution: JTJ conceived the study and developed the questions. DJE formed the survey instrument to suit each of the situations where questions were to be presented to a survey audience. JTJ analyzed the data and wrote most of the paper in close consultation with DJE. Both authors agreed to be accountable for accuracy of the work.

Data sharing statement: National survey data are available at:

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https://www.surveymonkey.com/analyze/jmYrcXlIAMk17hFhaVo4UpuCTnh4_2BlXkVDe_2FdYMHiZMUZ_2FkOoWEoDM7zLcCamK8G (use djeakins, password C0nstance$)

Introduction

While the idea of shared-decision making between patient and clinician has been around many decades, based on PubMed citations, the concept has gained momentum since 2012.[1] The culmination of shared-decision making is that the patient consents to the mutually-agreed procedures to be performed or not performed. The old standard calling for information that "reasonable clinicians" feel their patients need to know is giving way to the new standard defined by what a reasonable patient wishes to know. However, a study of recorded conversations between clinicians and a patients that may need percutaneous coronary intervention (PCI) found that only 3% of the patients received all 8 elements necessary for informed decision making.[2] A recent court ruling in the U.K has upheld the patient-centered, informed-consent standard and about half of the United States use "reasonable patient" as the basis for administering informed consent.[3]

The question then becomes, "What does a reasonable patient wish to know?" Typically, that is answered after the fact in specific cases where a patient may allege that he was not given sufficient information to make an informed decision.[4] One example involved a case where a man's family was not given enough information about his defibrillator replacement to make an informed decision.[5] Patient preferences were not elicited by the clinician. A court in the U.K. decided that a woman was not given sufficient information on the 1% risk of shoulder dystocia from a vaginal vs. a Caesarian delivery to make an informed decision.[6] To our knowledge, no investigators have attempted to define the information needs of a reasonable patient in a general way that applies to care during hospitalization. To some extent the survey was driven by stories of patient advocates who have experienced harm and, in retrospect, wish they had known more about the risks of their treatment, device, or medication. We hypothesized that such wishes could be generalized into information a "reasonable patient' would want to know.

Goal

Our primary goal was to establish the descriptive intensity (scale of 1 to 5, with 1 being "definitely no" and 5 being "definitely yes") by which answers to general questions are desired by a reasonable patient before giving consent for an invasive procedure, prescription drugs, or medical devices that could pose a risk of avoidable harm. Our secondary goal was to characterize heterogeneity, such as gender and age, in the survey groups that may be associated with intensity variations in what a reasonable patient wishes to know.

Methods

Our survey study was approved by the Galveston College Institutional Review Board. Our search of PubMed using "reasonable patient survey" (15 November 2018) discovered only 2 partially relevant articles. One involved wishes of patients about anesthesia risks in a Singapore hospital.[7] Another surveyed patients' opinions about pre-surgical informed-consent in a Jamaica teaching hospital.[8] We created a statement of a generic situation in which a hospitalized patient must make choices about their care after being stabilized upon entry via the emergency department: *You are hospitalized in a large, urban, teaching hospital after being brought into its emergency room last night. The condition that brought you to the ER has been stabilized, but additional procedures may be necessary. The following 10 questions determine what you would like to know as a reasonable patient.* We developed a 10-question survey based on adverse experiences reported by members of the Patient Safety Action Network (formerly members of the Safe

Patient Project of Consumers Union) and our knowledge of shortcomings with current informed consent practices as reflected in medical literature.

The survey was developed in two forms. The first employed demographics to include age, gender, education level, race or ethnicity, and whether the survey taker has worked in a hospital. This survey was administered via cell phone to nursing students (and a few faculty) on April 19, 2018 at Galveston College, Galveston Texas during a presentation by Dr. James. It was also administered to participants in the Health Professions Educators Summer Symposium (HPESS) Community via email request on June 8, 2018. The latter included primarily mature academics involved in educating physicians, nurses, and health-care administrators.

The second form of the survey, which was used for the U.S. national survey, employed an identical scenario and questions, but the demographics were adapted to those offered by SurveyMonkey® (SM) for a national survey. These included age, gender, household income level, and region of the United States. The national platform included survey takers across the U.S. that had been previously recruited by SM. The vast majority of the national survey takers used cell phones to answer the questions. The third survey was administered to the national audience on October 22, 2018.

Each of the 10 questions could be answered at one of 5 intensity levels indicating the degree to which an answer is desired by the person taking the survey. The responses were as follows: definitely no (1.0), probably no (2.0), neutral (3.0), probably yes (4.0), and definitely yes (5.0). Formal statistical analyses were deemed unsuited to the qualitative nature of our study design. Final conclusions are word descriptions of the intensity of desire of a reasonable patient to have answers such as “probably yes” or “definitely yes.” Obvious trends in the data were captured graphically.

Patient and Public Involvement

The research development of the present study was a direct result of patient advocates' experiences with failed informed consent or lack of provider solicitation of patient preferences. These led to formulation of many of the questions posed in our survey. The study leaders are patient safety advocates. The outcome measures were a direct result of the reactions of putative patients as "reasonable patients" to the survey questions. We intentionally involved providers by surveying the HPESS community that consists of clinicians, nurses, and hospital administrators dedicated to educating the next generation of leaders in their respective disciplines. They were asked to assume the role of a patient as they completed our survey.

Our results will be disseminated to the HPESS community once the study has been published, and we will ask that our findings be presented during the summer symposium in July, 2019. The theme of that symposium is how to best educate millennials. Our national survey data provided a category specifically for responses by millennials. Results will be disseminated to nursing students at Galveston College through a presentation this spring. Our findings and suggested actions from our findings will be disseminated to patient advocates whose shared ideas and experiences powered this study. Those groups include the following: Patient Council of the Right Care Alliance, Patient Safety Action Network, and members of Patient Safety America. We expect to widely share our findings with the general public (represented by our national survey) through media outlets such as ProPublica, with physicians through KevinMD and Veritas Health Care, and with nurses through Quality and Safety Education for Nurses (QSEN).

Results

We targeted two groups from which to obtain responses because of the access we had to them and the expectation that their demographics would be different. The response rate from the nursing students was 99% (76/77) because it was taken during a lecture in which support was available if anyone had difficulty. Only one did. The response rate of the HPESS Community to the email request was 63/146 = 43%. The low response is likely due to busy professionals not having time to read and respond to all emails sent to them. Combined, the response rate of the two targeted studies was 62%. Table 1 shows the diversity of demographics in the two groups that took initial surveys. The primary differences were in age, education level, race or ethnic origin, and hospital work experience.

Table 1. Comparative demographics of targeted groups

Demographic measure	Nursing students (n = 76)	HPESS Community (n = 63)
Under 35 years of age	77%	3%
Female	78%	70%
High school graduate	34%	2%
College graduate	65%	5%
Advanced degree	1%	93%
White or Caucasian	51%	84%
Black or African American	16%	3%
Hispanic or Latino	26%	2%
Asian	4%	6%
Have worked in a hospital	35%	86%

The national survey included 1211 persons who entered the survey and 1067 who completed it for a response rate of 88%. Nine participants did not answer location questions. The combined results of our three surveys consistently showed that a “reasonable patient” would want to know an answer to each of the 10 questions presented in our survey (table 2).

Table 2. Average response levels in three surveys. 4.0 indicates the person "probably" wants an answer, and 5.0 indicates the person "definitely" wants an answer. The percentage of the 5.0 responses are shown in bold red. In the national survey, 71 % of the reported income levels were from $10,000 to $99,000. Of the 9 geographic regions of the U.S., 54% of responses were from 3 of those – east north central, south Atlantic, and Pacific. Footnotes: [a]n=75, [b]n=62

Number and description of survey question	Nursing students (n = 76) **[% 5.0]**	HPESS Group (n = 63) **[% 5.0]**	National Group (n = 1067) **[%5.0]**	National ranges over 10 income Groups	National ranges over 9 regions of the U.S.
1. Would you like to know all your treatment choices, including alternatives and risks and benefits of each choice for a patient like you. Your choices may include invasive procedures (surgery, endoscopic procedures, insertion of a medical device), non-invasive treatments, and what happens if you do nothing?	4.92 **[92%]**	4.94 **[95%]**	4.58 **[75%]**	4.33-4.97	4.51-4.65
2. Drugs that have not been approved by the Food and Drug Administration for your condition are off-label for you. Drugs prescribed off-label are about twice as likely to cause serious side-effects as drugs prescribed on-label. Would you like to know if any drugs prescribed to you are off-label, and what their side effects may be?	4.89[a] **[89%]**	4.51 **[67%]**	4.40 **[67%]**	4.07-4.71	4.26-4.57
3. Drugs assigned a "black box" warning by the FDA pose an especially serious risk of harm. If you are prescribed such a drug, would you want to know the reasons for the black box warning and if there are alternatives before you take it?	4.83 **[83%]**	4.67 **[79%]**	4.57 **[78%]**	4.27-4.92	4.43-4.69
4. Decision aids are created to assist patients with complex medical decisions and to help them understand the risks and benefits of treatment options. If there is a decision-aid available for your illness, would you like to review it?	4.66 **[73%]**	4.65 **[70%]**	4.41 **[61%]**	4.07-4.69	4.28-4.57
5. If you are considering an invasive procedure, would you like to know who will be performing it, their skill level, and how trainee doctors, if any, will be involved?	4.83 **[84%]**	4.78 **[84%]**	4.49 **[68%]**	4.34-4.82	4.41-4.63
6. Assuming you have decided on a procedure or treatment, would you like to know what your total, out-of-pocket costs will be?	4.71 **[79%]**	4.60[b] **[68%]**	4.48 **[69%]**	4.21-4.76	4.41-4.52
7. You have a trusted family member that is willing to act as your advocate. Would you like for that person to be present during shared-decision-making about your medical care?	4.65[a] **[73%]**	4.54 **[62%]**	4.31 **[54%]**	4.09-4.69	4.20-4.43
8. If you are well enough, would you like to be offered a chance to review and make entries in your medical records each day while you are hospitalized?	4.07 **[47%]**	4.06 **[48%]**	3.98 **[38%]**	3.41-4.23	3.89-4.11
9. Before signing any documents permitting invasive, non-emergency procedures would you like to review these at least one full day in advance of the procedure?	4.29 **[49%]**	4.19 **[52%]**	4.18 **[47%]**	3.91-4.41	3.87-4.34
10. If you are considering an invasive procedure, would you like to know your expected difficulties, recovery times, pain management, and restrictions after the procedure while hospitalized and after discharge from the hospital? This includes the risk of infection from the invasive procedure.	4.84 **[86%]**	4.89 **[90%]**	4.60 **[76%]**	4.32-4.85	4.49-4.70

Discussion

The three distinct surveys compare well regarding the wishes of patients. The highest intensity of desire to have an answer was to question 1 (know all treatment choices) in all three surveys (range 4.58-4.94). In all three surveys, the lowest intensity of desire to have an answer was to question 8 (medical record access) (range 3.98-4.07), and the second lowest intensity was to question 9 (advanced review of documents) (range 4.18-4.29). Even the lowest intensity desire for an answer was near 4.0, which implies that on weighted-average basis, the putative reasonable patient would *probably* want to have access to his medical record and be able to make entries.

Despite the different demographics in the two targeted surveys (table 1), especially in age, education level and hospital work experience, the responses were comparable in the two groups (table 2). Only one of the 10 questions (number 2) had a response level that differed by more than 0.20 units. This was the question of whether a reasonable patient would want to know about any off-label drugs prescribed. The difference was 0.38 units. The higher education level and more hospital experience of the HPESS Community may have made this group slightly less concerned about the additional risk that may be associated with off-label prescriptions.

The results of the national survey regarding demographics of gender (figure 1) and age (figure 2) demonstrated distinct trends for all 10 questions. Without exception, women wanted more information than men, and older adults wanted more information than younger adults. The former may be due to women being higher users of hospital care and hospitals tending to offer many more services targeted to women than to men.[9] Older adults may be more likely to be cautious compared to younger adults because of more lifetime hospital experiences.

Our survey provides insight into some patient concerns that are not typically part of informed consent. In the wake of the opioid epidemic, the public is more aware of the potential dangers of prescription drugs. Thus, it should not be surprising that patients would want to know if the drugs prescribed to them are off-label or have a black-box warning. The U.S. Food and Drug Administration assigned “black box” warnings to immediate-release opioids in 2016.[10] There is also growing attention to surprise medical bills in the U.S., so a reasonable patient would likely to want an estimate of his out-of-pocket costs. Inordinate out-of-pocket costs, especially those that lead to bankruptcy, may have an adverse effect on clinical outcomes.[11] Hospital administration staff could assist with providing cost information. The opportunity to review and make entries in one’s medical record, while not part of the informed consent process, may relate. Many patients want to ensure that the data being recorded are accurate and complete; moreover, many desire access to their data as a means of gaining a better understanding of their condition and engaging with their providers. Encouraging this access can convey strong support for the view that the patient is an integral part of his care team.

There is an important connection between informed consent and the overuse of medical procedures. The overuse of PCI in the U.S. is a prime example. Patients that may need PCI were less likely to choose this invasive option when they were better informed about their care options during hospitalization.[12] A study of patients in Northern England that may need PCI concluded that there is “a mismatch between legal and ethical principles of informed consent and current practice. The variation in patients’ experiences of the current place of informed consent in service delivery represents a missed opportunity for cardiologists to work in decision-making partnerships with patients. In light of recent changes in the law [to the reasonable patient standard], a new approach to informed consent is required.”[13]

Limitations

In order to respect the time of responders to our survey, we limited it to 10 questions applicable to an informed consent discussion in a hypothetical situation. In real clinical settings, it is likely that our "template" will need to be augmented with questions specific to the situation the patient faces. These should be designed to elicit the patient's preferences. We also recognize that some of the answers are out of the clinician's hands; for example, clinicians in the U.S. are seldom going to know the patient's out-of-pocket costs. We also recognize that clinicians may need the assistance of pharmacists in conveying the benefits, risks, and alternatives to off-label or black-box-warning drugs.

Conclusions

Through two targeted surveys and a U.S. national survey, we have affirmed that a reasonable patient will want to know far more information than is generally conveyed during typical shared-decision making that leads to no more than a partly informed decision by the patient. Survey respondents wanted to know risks and benefits of all treatment options, the risks and benefits of off-label and box-warning drugs. They wished to view decision aids, know precisely who will perform the procedure, and their anticipated out-of-pocket costs. Their desire was for an advocate to be present during shared-decision making, have periodic opportunities to review their medical record, have a full day to review informed-consent documents, and to be made aware of expected outcomes and restrictions after the procedure. We expect our findings to have implications for what defines a reasonable patient standard for informed consent.

Figure 1. National intensity scores above 4.0 vs. question number for gender differences in the national survey. Responses came from 497 males and 570 females.

Figure 2. National intensity scores above 4.0 vs. question number for age differences in the national survey. Responses came from 297, 230, 343, and 197 people in the four respective age groups.

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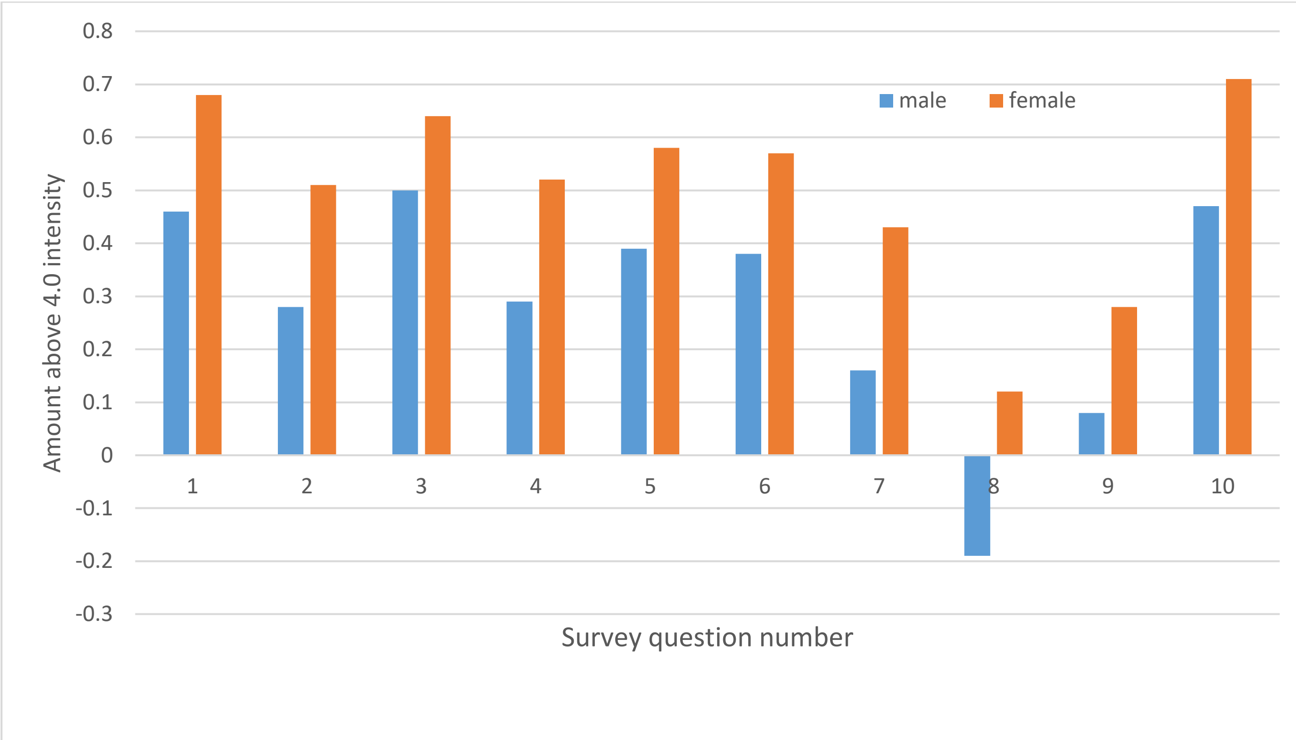
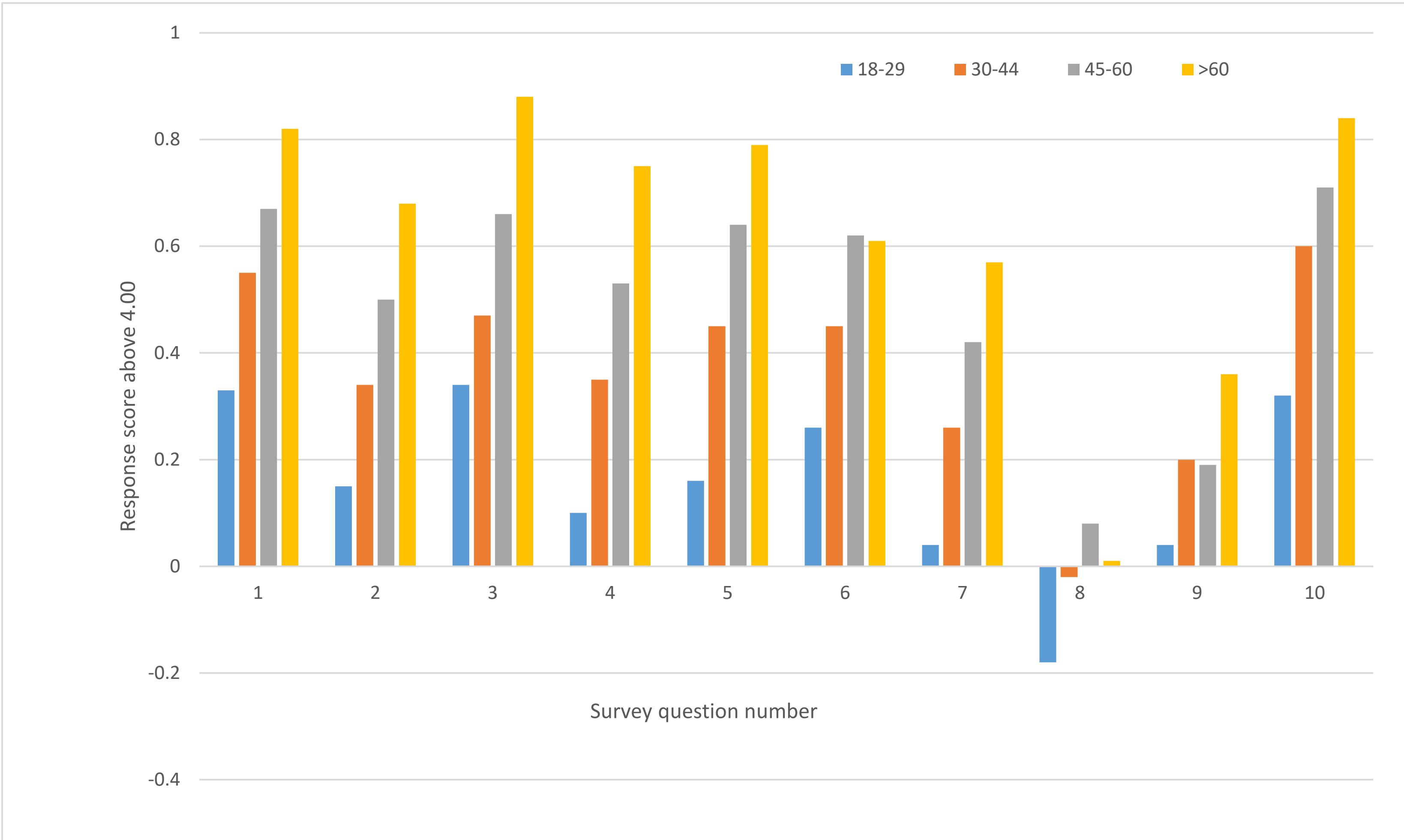
Figure 1. Effect of gender on survey responses

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-0.4
Response score above 4.00
18-29
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45-60
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1
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9
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Survey question number

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Competing interests: none

Author's contribution: JTJ conceived the study and developed the questions. DJE formed the survey instrument to suit each of the situations where questions were to be presented to a survey audience. JTJ and RRS analyzed the data. JTJ wrote most of the paper in close consultation with coauthors. All authors agreed to be accountable for accuracy of the work.

Data sharing statement: National survey data are available at:

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Nursing-student survey available at:

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Introduction

The human right to self-determination in healthcare is a hallmark of instruments promulgated by the United Nations. Rights are specifically described for children, persons with disabilities and older persons. These call for the highest standards attainable for children's health,[1] for treatment of illness or rehabilitation of the disabled,[2] and for maintenance of optimum health as people age.[3] The patient's right to know certainly extends to knowing the risks and benefits of prescription medications. For example, based on a recent court decision in the U.K. involving off label and unlicensed medication prescribing, consent laws now call for patients to receive all information that a patient deems important, and not just what the physician thinks is important.[4] However, unless the patient is harmed by denial of sufficient information to exercise their rights to make an informed decision about off-label prescriptions, there is no legal standing for compensation. In our opinion, the human rights of patients to self-determination in healthcare can only be attained through a balanced process of shared-decision making between patient and clinician.

While the idea of shared-decision making between patient and clinician has been around many decades, based on PubMed citations, the concept has gained momentum since 2012.[5] The culmination of shared-decision making is that the patient consents to the mutually-agreed procedures to be performed or not performed. The old standard calling for information that "reasonable clinicians" feel their patients need to know is giving way to the new standard defined by what a reasonable patient wishes to know. However, a study of recorded conversations between clinicians and a patients that may need percutaneous coronary intervention (PCI) found that only 3% of the patients received all 8 elements necessary for informed decision making.[6] A recent court ruling in the U.K has upheld the patient-centered, informed-consent standard and about half of the United States use "reasonable patient" as the basis for administering informed consent.[7] In the past, the "reasonable patient" standard has been ill-defined and abstract; our intent is to better-define the information wishes of a reasonable person when facing the possibility of an invasive procedure.[8] There is a natural conflict between respect for patient autonomy in making an informed decision and the practical aspects of how a clinician delivers information to a "reasonable patient" to fulfill the ethical principle of autonomy.

The question then becomes, "What does a reasonable patient wish to know?" Typically, that is answered after the fact in specific cases where a patient may allege that he was not given sufficient information to make an informed decision.[9] One example involved a case where a man's family was not given enough information about his defibrillator replacement to make an informed decision.[10] Patient preferences were not elicited by the clinician. A court in the U.K. decided that a woman was not given sufficient information on the 1% risk of shoulder dystocia from a vaginal vs. a Caesarian delivery to make an informed decision.[11] To our knowledge, no investigators have attempted to define the information needs of a reasonable patient in a general way that applies to care during hospitalization. To some extent the survey was driven by stories of patient advocates who have experienced harm and, in retrospect, wish they had known more about the risks of their treatment, device, or medication. We hypothesized that such wishes could be generalized into information a "reasonable patient' would want to know.

Goal

Our primary goal was to establish the descriptive intensity (scale of 1 to 5, with 1 being "definitely no" and 5 being "definitely yes") by which answers to general questions are desired by a reasonable patient before giving consent for an invasive procedure, prescription drugs, or medical devices that could pose a risk of avoidable harm. Our secondary goal was to characterize heterogeneity, such as gender and age, in the survey groups that may be associated with intensity variations in what a reasonable patient wishes to know.

Methods

Our survey study was approved by the Galveston College Institutional Review Board. Our search of PubMed using "reasonable patient survey" (15 November 2018) discovered only 2 partially relevant articles. One involved wishes of patients about anesthesia risks in a Singapore hospital.[12] Another surveyed patients' opinions about pre-surgical informed-consent in a Jamaica teaching hospital.[13] In the latter study, 67% of the surveyed patients described their consent process as 'unsatisfactory.' We created a statement of a generic situation in which a hospitalized patient must make choices about their care after being stabilized upon entry via the emergency department: *You are hospitalized in a large, urban, teaching hospital after being brought into its emergency room last night. The condition that brought you to the ER has been stabilized, but additional procedures may be necessary. The following 10 questions determine what you would like to know as a reasonable patient.* We developed a 10-question survey based on adverse experiences reported by members of the Patient Safety Action Network (formerly members of the Safe Patient Project of Consumers Union) and our knowledge of shortcomings with current informed consent practices as reflected in medical literature.

The survey was developed in two forms. The first employed demographics to include age, gender, education level, race or ethnicity, and whether the survey taker has worked in a hospital. This survey was administered via cell phone to student nurses (and a few faculty) on April 19, 2018 at Galveston College, Galveston Texas during a presentation by Dr. James. It was also administered to participants in the Health Professions Educators Summer Symposium (HPESS) Community via email request on June 8, 2018. The latter included primarily mature academics involved in educating physicians, nurses, and health-care administrators.

The second form of the survey, which was used for the U.S. national survey, employed an identical scenario and questions, but the demographics were adapted to those offered by SurveyMonkey® (SM) for a national survey. These included age, gender, household income level, and region of the United States. The national platform included survey takers across the U.S. that had been previously recruited by SM. The vast majority of the national survey takers used cell phones to answer the questions. The third survey was administered to the national audience on October 22, 2018.

Each of the 10 questions could be answered at one of 5 intensity levels indicating the degree to which an answer is desired by the person taking the survey. The responses were as follows: definitely no (1.0), probably no (2.0), neutral (3.0), probably yes (4.0), and definitely yes (5.0). Formal statistical analyses were deemed unsuited to the qualitative nature of our study design. Final conclusions are word descriptions of the intensity of desire of a reasonable patient to have answers such as "probably yes" or "definitely yes." Obvious trends in the data were captured graphically.

Statistics and Factor Analyses

The data subjected to analyses were collected in three surveys (student nurses, HPESS, and the national survey). For each survey, descriptive statistics were obtained and analyses of the results were performed using Stata (version 14.0; Stata Corp., College Station, TX). The means of the responses of the various groups for each subject category (e.g., age, gender, etc.)

were tested for differences using methods that are appropriate for these categorical variables, which are not normally distributed. The nonparametric Kruskal–Wallis one-way analysis of variance by ranks was performed to test for differences between means and the Dunn test was used to identify pairs that differed significantly. Statistical significance, adjusted for false discovery, was established with $p < 0.025$.

Factor analysis with principal component factoring was utilized in all surveys to determine components that can explain the greatest portions of the total variance in responses among the questions. The goal of a factor analysis is to reduce the number of variables to explain and to interpret the results. Factor loadings was achieved by regression of scoring coefficients obtained with varimax rotation. The loaded factors (principal components) generated were analyzed as described above for other variables.

Patient and Public Involvement

The research development of the present study was a direct result of patient advocates' experiences with failed informed consent or lack of provider solicitation of patient preferences. These led to formulation of many of the questions posed in our survey. The study leaders are patient safety advocates. The outcome measures were a direct result of the reactions of putative patients as "reasonable patients" to the survey questions. We intentionally involved providers by surveying the HPESS community that consists of clinicians, nurses, and hospital administrators dedicated to educating the next generation of leaders in their respective disciplines. They were asked to assume the role of a patient as they completed our survey.

Our results will be disseminated to the HPESS community once the study has been published, and we will ask that our findings be presented during the summer symposium in July,

2019. The theme of that symposium is how to best educate millennials. Our national survey data provided a category specifically for responses by millennials. Results will be disseminated to student nurses at Galveston College through a presentation this spring. Our findings and suggested actions from our findings will be disseminated to patient advocates whose shared ideas and experiences powered this study. Those groups include the following: Patient Council of the Right Care Alliance, Patient Safety Action Network, and members of Patient Safety America. We expect to widely share our findings with the general public (represented by our national survey) through media outlets such as ProPublica, with physicians through KevinMD and Veritas Health Care, and with nurses through Quality and Safety Education for Nurses (QSEN).

Results

We targeted two groups from which to obtain responses because of the access we had to them and the expectation that their demographics would be different. The response rate from the student nurses was 99% (76/77) because it was taken during a lecture in which support was available if anyone had difficulty. Only one did. The response rate of the HPESS Community to the email request was 63/146 = 43%. The low response is likely due to busy professionals not having time to read and respond to all emails sent to them. Combined, the response rate of the two targeted studies was 62%. Table 1 shows the diversity of demographics in the two groups that took initial surveys. The primary differences were in age, education level, race or ethnic origin, and hospital work experience.

Table 1. Comparative demographics of targeted groups (2 sample test of proportions)

Demographic measure	Student Nurses (n = 76)	HPESS Community (n = 63)	P values
Under 35 years of age	77%	3%	<0.0001
Female	78%	70%	0.2755
High school graduate	34%	2%	<0.0001
College graduate	65%	5%	<0.0001
Advanced degree	1%	93%	<0.0001
White or Caucasian	51%	84%	<0.0001
Black or African American	16%	3%	0.0151
Hispanic or Latino	26%	2%	0.0001
Asian	4%	6%	0.5161
Have worked in a hospital	35%	86%	<0.0001

The national survey included 1211 persons who entered the survey and 1067 who completed it for a response rate of 88%. Nine participants did not answer location questions. The combined results of our three surveys consistently showed that a "reasonable patient" would want to know an answer to each of the 10 questions presented in our survey (table 2).

Table 2 allows the reader to view the results in two ways for each of the 10 questions. The first, shown in bracketed, red highlight, is the fraction of responders that indicated that they definitely wanted to know information (5.0 response) or have a certain right to access (e.g. medical record access). The second way to view results, in black lettering, indicates the numerical mean of all responses in each of the 3 surveys and the ranges of the means sorted by income groups and regions of the U.S. in the national survey. We used ranges as a measure of dispersion around the national means because it is likely lay readers will understand this more readily than the results of our formal statistical analysis. The three distinct surveys compare well regarding the wishes of patients. The highest intensity of desire to have an answer was to question 1 (know all treatment choices) in all three surveys (range 4.58-4.94). In all three surveys, the lowest intensity of desire to have an answer was to question 8 (medical record access) (range 3.98-4.07), and the second lowest intensity was to question 9 (advanced review of documents) (range 4.18-4.29). Even the lowest intensity desire for an answer was near 4.0, which implies that on weighted-average basis, the putative reasonable patient would *probably* want to have access to his medical record and be able to make entries.

Table 2. Average response levels in three surveys. 4.0 indicates the person "probably" wants an answer, and 5.0 indicates the person "definitely" wants an answer. The percentage of the 5.0 responses are shown in bold red. In the national survey, 71 % of the reported income levels were from \$10,000 to \$99,000. Of the 9 geographic regions of the U.S., 54% of responses were from 3 of those – east north central, south Atlantic, and Pacific. Footnotes: [a]n=75, [b]n=62

Number and description of survey question **The percentages of individuals that 'definitely' (5.0) wanted an answer to each question below is shown in bold red in the columns.**	Student Nurses (n = 76) **[% 5.0]**	HPESS Group (n = 63) **[% 5.0]**	National Group (n = 1067) **[%5.0]**	National ranges over 10 income Groups	National ranges over 9 regions of the U.S.
1. Would you like to know all your treatment choices, including alternatives and risks and benefits of each choice for a patient like you. Your choices may include invasive procedures (surgery, endoscopic procedures, insertion of a medical device), non-invasive treatments, and what happens if you do nothing?	4.92 **[92%]**	4.94 **[95%]**	4.58 **[75%]**	4.33-4.97	4.51-4.65
2. Drugs that have not been approved by the Food and Drug Administration for your condition are off-label for you. Drugs prescribed off-label are about twice as likely to cause serious side-effects as drugs prescribed on-label. Would you like to know if any drugs prescribed to you are off-label, and what their side effects may be?	4.89[a] **[89%]**	4.51 **[67%]**	4.40 **[67%]**	4.07-4.71	4.26-4.57
3. Drugs assigned a "black box" warning by the FDA pose an especially serious risk of harm. If you are prescribed such a drug, would you want to know the reasons for the black box warning and if there are alternatives before you take it?	4.83 **[83%]**	4.67 **[79%]**	4.57 **[78%]**	4.27-4.92	4.43-4.69
4. Decision aids are created to assist patients with complex medical decisions and to help them understand the risks and benefits of treatment options. If there is a decision-aid available for your illness, would you like to review it?	4.66 **[73%]**	4.65 **[70%]**	4.41 **[61%]**	4.07-4.69	4.28-4.57
5. If you are considering an invasive procedure, would you like to know who will be performing it, their skill level, and how trainee doctors, if any, will be involved?	4.83 **[84%]**	4.78 **[84%]**	4.49 **[68%]**	4.34-4.82	4.41-4.63
6. Assuming you have decided on a procedure or treatment, would you like to know what your total, out-of-pocket costs will be?	4.71 **[79%]**	4.60[b] **[68%]**	4.48 **[69%]**	4.21-4.76	4.41-4.52
7. You have a trusted family member that is willing to act as your advocate. Would you like for that person to be present during shared-decision-making about your medical care?	4.65[a] **[73%]**	4.54 **[62%]**	4.31 **[54%]**	4.09-4.69	4.20-4.43
8. If you are well enough, would you like to be offered a chance to review and make entries in your medical records each day while you are hospitalized?	4.07 **[47%]**	4.06 **[48%]**	3.98 **[38%]**	3.41-4.23	3.89-4.11
9. Before signing any documents permitting invasive, non-emergency procedures would you like to review these at least one full day in advance of the procedure?	4.29 **[49%]**	4.19 **[52%]**	4.18 **[47%]**	3.91-4.41	3.87-4.34
10. If you are considering an invasive procedure, would you like to know your expected difficulties, recovery times, pain management, and restrictions after the procedure while hospitalized and after discharge from the hospital? This includes the risk of infection from the invasive procedure.	4.84 **[86%]**	4.89 **[90%]**	4.60 **[76%]**	4.32-4.85	4.49-4.70

Below we provide brief descriptions of the statistical analyses and factor analyses for each of the 3 surveys. The details of these analyses are in 'additional files.' Question numbers are found in table 2. Statistical analysis of the responses to survey questions obtained from student nurses revealed no significant differences among age groups, level of education, experience working in a hospital, or between genders, in their responses to any of the 10 questions. Not considering 'another race' as a response suitable for comparisons, the only differences in pairs were for question 1. 'White or Caucasian' was different from 'Black or African American' ($p = 0.011$) and 'Black or African American' was different from 'Asian or Asian American' ($p = 0.020$).

Factor analysis with principal component factoring identified 3 factors each with Eigenvalues greater than 1, which cumulatively accounted for 64% of total variance among responses provided by the student nurses. Varimax factor loading of 3 factor variables labeled as "knowledge", "participation", and "total cost" were generated and analyzed as above for differences in responses among groups. No significant differences were found among age groups, levels of education, or between genders, in their responses to any of the factor variables. The only significant differences, again disregarding comparisons to 'Another race,' existed among races and ethnicities in their responses associated with "knowledge" ($p = 0.0091$) where 'White or Caucasian' differed from 'Black or African American' ($p = 0.0211$).

The responses of the HPESS survey did not differ significantly between genders, or among various ethnicities for any of the ten questions. Responses differed significantly among age groups only for questions 1 ($p = 0.0171$) and 2 ($p = 0.0024$). Responses differed significantly by education level for questions 1 ($p = 0.0015$), 2 ($p = 0.0139$), 3 ($p = 0.0170$) and 10 ($p = 0.0347$). Among respondents to the HPESS survey, significant differences in responses to questions 1 (p = 0.003), 2 (p = 0.0024), and 5 (p = 0.0002) were provided by respondents who differed according to their employment as hospital workers.

Factor analysis of the HPESS data with principal component factoring identified no statistically significant differences for either of two factor variables "knowledge" and "participation" when responses were compared by age, gender, or level of education. A significant difference among ethnic groups was found for "knowledge" (p = 0.0394) but post hoc analysis with Dunn's test failed to identify any pairs of groups that differed significantly.

In the national survey responses differed significantly for all questions among age groups (p = 0.001 for questions 1 - 7 and 10; p = 0.0041 and 0.0052 for questions 8 and 9 respectively), between genders (p = 0.001 for questions 1, 2, 4, 7, 8 and 10; p = 0.0043, 0.0002, 0.0030 and 0.0014 for questions 3, 5, 6 and 9, respectively). Significant differences for questions 1 (p = 0.0001), 2 (p = 0.0384), 3 (p =0.0047), 4 (p = 0.0037), and 6 (p = 0.0190) were found among groups that differed by income level. Question 9 (p = 0.0473) was the only question for which responses differed significantly among regions of the U.S. Several salient generalizations from these comparisons are apparent. When comparing responses among various age groups, differences were found among all ages groups for most questions. When significant differences were found among response of groups of differing income levels the differences, most often, were between group 1 and the other groups. Differences between regions, in response to question 9, were most often between regions 1 and 2 and the other regions.

Factor analysis of the national data with principal component factoring demonstrated significant differences among the age categories for both factor variables ("knowledge", and "other", p = 0.0001 for both variables). All groups differed significantly from each other, with the exception of group 4 vs group 5 for the factor variable "other". For both factor variables the differences in responses of the genders are very highly significantly different ($p < 0.0001$). When considering responses from groups of differing income levels, significant differences were found for the variable "knowledge" ($p = 0.0005$). Most of the differences among pairs are between group 1 and other groups and between group 3 and other groups. There were no significant differences in responses to factor variables among regions.

Discussion

Despite the different demographics in the two targeted surveys (table 1), especially in age, education level and hospital work experience, the responses were comparable in the two groups (table 2). Only one of the 10 questions (number 2) had a response level that differed by more than 0.20 units. This was the question of whether a reasonable patient would want to know about any off-label drugs prescribed. The difference was 0.38 units. The higher education level and more hospital experience of the HPESS Community may have made this group slightly less concerned about the additional risk that may be associated with off-label prescriptions. Statistical analysis of the nurse-student survey revealed two paired demographic differences. Two race/ethnic pairs (white vs. black and black vs. Asian) were associated with differences in intensity of response to question 1, which is about knowing all choices for treatment including risks and benefits. Statistical analysis of the HPESS community survey disclosed differences between pairs in the age, education-level and hospital-work-experience groups. While these statistical findings may be interesting, the reality is that the core message remains unchanged: patients of all types studied wish to know many details about their care choices when facing the possibility of an invasive procedure.

The results of the national survey regarding demographics of gender (figure 1) and age (figure 2) demonstrated distinct trends for all 10 questions. Without exception, women wanted more information than men, and older adults wanted more information than younger adults. Similarly, statistical analysis supported associations between age and gender on the intensity of responses to most questions, and it revealed an effect of income for some of the survey questions. The gender associations may be due to women being higher users of hospital care and hospitals tending to offer many more services targeted to women than to men.[14] Older adults may be more likely to be cautious compared to younger adults because of more lifetime hospital experiences.

Our survey provides insight into some patient concerns that are not typically part of informed consent. In the wake of the opioid epidemic, the public is more aware of the potential dangers of prescription drugs. Thus, it should not be surprising that patients would want to know if the drugs prescribed to them are off-label or have a black-box warning. The U.S. Food and Drug Administration assigned “black box” warnings to immediate-release opioids in 2016.[15] There is also growing attention to surprise medical bills in the U.S., so a reasonable patient would likely to want an estimate of his out-of-pocket costs. Inordinate out-of-pocket costs, especially those that lead to bankruptcy, may have an adverse effect on clinical outcomes.[16] Hospital administration staff could assist with providing cost information. The opportunity to review and make entries in one’s medical record, while not part of the informed consent process, may relate. Many patients want to ensure that the data being recorded are accurate and complete; moreover, many desire access to their data as a means of gaining a better understanding of their condition and engaging with their providers. Encouraging this access can convey strong support for the view that the patient is an integral part of his care team.

There is an important connection between informed consent and the overuse of medical procedures. The overuse of PCI in the U.S. is a prime example. Patients that may need PCI were less likely to choose this invasive option when they were better informed about their care options during hospitalization.[17] A study of patients in Northern England that may need PCI concluded that there is "a mismatch between legal and ethical principles of informed consent and current practice. The variation in patients' experiences of the current place of informed consent in service delivery represents a missed opportunity for cardiologists to work in decision-making partnerships with patients. In light of recent changes in the law [to the reasonable patient standard], a new approach to informed consent is required."[18]

The history of legally-defined informed consent for invasive procedures has evolved from a totally physician-centered concept (before the Era of Enlightenment) in which deception of the patient was deemed necessary, to the point where the process has now become patient-centered, in principle. A brief summary of some of the court decisions pertinent to involvement of the patient points to the next step in informed consent, which we feel we have defined with our survey.[19] As early as 1914, a New York court established that an "adult in sound mind has the right to determine what shall be done with his own body." This was reinforced in 1960 by the decision of a court in Kansas that the patient, not the physician, must make the final decision about any operation. Of course, the patient's decision may be biased by receiving limited information from the physician. Two court decisions in 1972, one in California and the other in Washington, D.C., determined that the patient must be informed of pertinent risks of surgery and have the alternatives revealed to him or her. In 1983, a New Jersey court ruled that if a surgeon, other than the one the patient selected, performs the surgery, then the surgeon that obtained consent, but did not perform the surgery is liable for malpractice. The surgeon performing the surgery is liable for battery. The importance of the side effects of a drug (prednisone) came to a Massachusetts court's attention in 1986 when a patient suffered serious adverse effects of this drug used after eye surgery. It seems there was controversy about whether the physician should have known about the possible side effects, and then disclosed this potential complication of the drug to the patient.

While our survey questions originated primarily from adverse experiences of patients, it is clear that court decisions have pointed the way to a new era of the patient's voice being heard in the context of shared-decision making and informed consent. That voice says to clinicians who would perform an invasive procedure, "We patients want to know more than you have been telling us." We want to know all of our choices and their risks and benefits, we want to know the risks and benefits of drugs prescribed to us and devices placed in us, we want to view decision aids when available, we want to know the skill level of the physician(s) performing our procedure, and we want to know our costs. Moreover, we want an advocate present during shared-decision making, we want full access to our medical records, we want to review consent documents at least 24 hours before signing them, and we want to know the expected outcomes of the invasive procedure to include recovery times, pain management, and infection risks.

Limitations

In order to respect the time of responders to our survey, we limited it to 10 questions applicable to an informed consent discussion in a hypothetical situation. In real clinical settings, it is likely that our "template" will need to be augmented with questions specific to the situation the patient faces. These should be designed to elicit the patient's preferences. We also recognize that some of the answers are out of the clinician's hands; for example, clinicians in the U.S. are seldom going to know the patient's out-of-pocket costs. We also recognize that clinicians may need the assistance of pharmacists in conveying the benefits, risks, and alternatives to off-label or black-box-warning drugs. Surveys like ours involving a hypothetical scenario may be limited because in a real and stressful situation a patient may simply want to trust doctors' recommendations or may be afraid to ask too many questions. In a sense, our hypothetical "reasonable patient" has become a "frightened patient" when placed in a real situation, but that does not mean that he or she does not want to know answers to the all the questions in our survey.

Conclusions

Through two targeted surveys and a U.S. national survey, we have affirmed that a reasonable patient will want to know far more information than is generally conveyed during typical shared-decision making that leads to no more than a partly informed decision by the patient. Survey respondents wanted to know risks and benefits of all treatment options, the risks and benefits of off-label and box-warning drugs. They wished to view decision aids, know precisely who will perform the procedure, and their anticipated out-of-pocket costs. Their desire was for an advocate to be present during shared-decision making, have periodic opportunities to review their medical record, have a full day to review informed-consent documents, and to be made aware of expected outcomes and restrictions after the procedure. We expect our findings to have implications for what defines a reasonable patient standard for informed consent.

Figure 1. National intensity scores above 4.0 vs. question number for gender differences in the national survey. Responses came from 497 males and 570 females.

Figure 2. National intensity scores above 4.0 vs. question number for age differences in the national survey. Responses came from 297, 230, 343, and 197 people in the four respective age groups.

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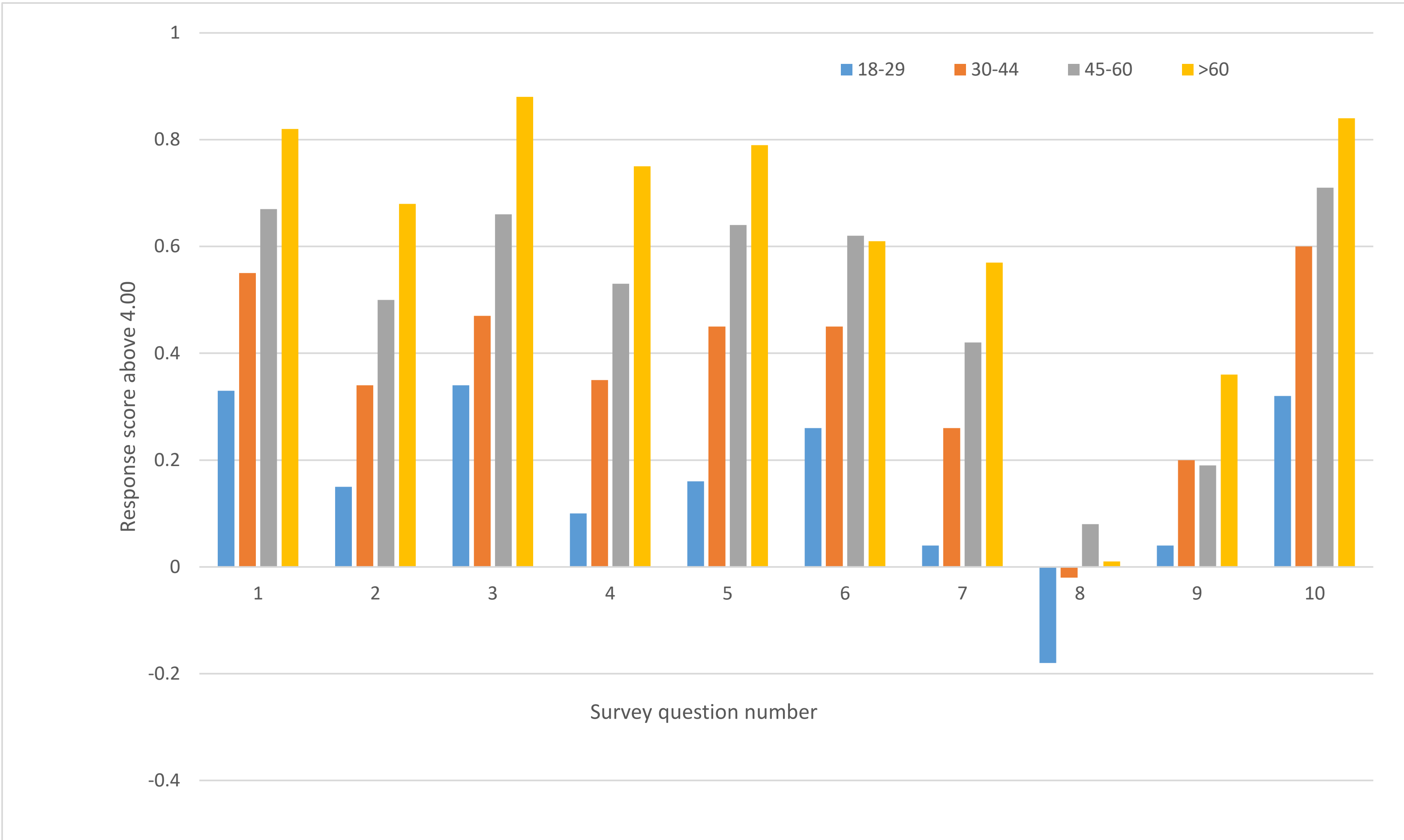
Figure 1. Effect of gender on survey responses


1
0.8
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-0.2
-0.4
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30-44
45-60
>60
Response score above 4.00
1
2
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Survey question number

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Informed Consent, Shared-Decision Making and a Reasonable Patient's Wishes Based on a National Survey in the United States Using a Hypothetical Scenario

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Abstract

Objective: In approximately half the states in the U.S., and more recently in the U.K., informed consent is legally defined as what a reasonable patient would wish to know. Our objective was to discern the information needs of a hospitalized, "reasonable patient" during the informed-consent process.

Design: Survey the intensity using a 5-point scale (4 indicates "probably yes," and 5 indicates "definitely yes") by which individuals wish to know specific information if placed in a hypothetical scenario where an invasive procedure may be an option.

Setting: A 10-question survey was administered from April 19 through October 22, 2018 to three groups: student nurses (n=76), health professions educators (n=63), and a U.S. national population (n=1067).

Primary and secondary outcome measures: The primary outcome measure was the average intensity, on a 5-point scale, by which survey groups wished to have each of 10 questions answered. The secondary outcome was to discern relationships between survey demographics and the intensity by which participants wanted an answer.

Results: Despite substantial demographic differences in the nursing-student group and health-professions-educator group, the average intensity scores were within 0.2 units on 9 of 10 questions. The national survey revealed a strong desire to have an answer to each question (range 3.98 to 4.60 units). It showed that women desired answers more than men and older adults desired answers more than younger adults.

Conclusions: Based on responses to 10 survey questions regarding wishes of people in a situation where an invasive procedure may be necessary, the vast majority want an answer to

each question. They wanted to know about all treatment options, risky drugs, decision aids, who will perform the procedure, and the cost. They wanted their advocate present, periodic review of their medical record, a full day to review documents, and expected outcomes and restrictions after the procedure.

Key Words: Informed consent, shared-decision making, reasonable patient, overuse of procedures

Strengths and limitations of this study:

- Based on two targeted surveys and a national survey, findings are consistent across demographic groups and across the United States, making our conclusions robust.
- The findings form a template that could be used by clinicians when engaged in shared-decision making to elicit truly informed consent from the patient.
- The survey questions had to be limited to be practical, so in any specific, real-life situation additional questions may be asked by a reasonable patient.
- Findings about the out-of-pocket costs of a procedure probably apply only to patients in the United States where out-of-pocket costs may be enormous.

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Competing interests: Dr. James founded Patient Safety America as a no-budget organization dedicated to educating people about problems in the U.S. healthcare industry. He serves as its unpaid CEO and leader. He has no conflicts of interest, advocating only for improved care.

Author's contribution: JTJ conceived the study and developed the questions. DJE formed the survey instrument to suit each of the situations where questions were to be presented to a survey audience. JTJ and RRS analyzed the data. JTJ wrote most of the paper in close consultation with coauthors. All authors agreed to be accountable for accuracy of the work.

Data sharing statement: National survey data at: http://patientsafetyamerica.com/survey-data/.

Health-Professions-Educator survey at: https://www.surveymonkey.com/results/SM-DQJDBBQ7L/

Nursing-student survey available at: https://www.surveymonkey.com/results/SM-5F2SX9W3V/

Available 'Supplementary files' include the research proposal, 2 forms of the survey, and 6 statistical analysis files.

Introduction

The human right to self-determination in healthcare is a hallmark of instruments promulgated by the United Nations. Rights are specifically described for children, persons with disabilities and older persons. These call for the highest standards attainable for children's health,[1] for treatment of illness or rehabilitation of the disabled,[2] and for maintenance of optimum health as people age.[3] The patient's right to know certainly extends to knowing the risks and benefits of prescription medications. For example, based on a recent court decision in the U.K. involving off label and unlicensed medication prescribing, consent laws now call for patients to receive all information that a patient deems important, and not just what the physician thinks is important.[4] However, unless the patient is harmed by denial of sufficient information to exercise their rights to make an informed decision about off-label prescriptions, there is no legal standing for compensation. In our opinion, the human rights of patients to self-determination in healthcare can only be attained through a balanced process of shared-decision making between patient and clinician.

While the idea of shared-decision making between patient and clinician has been around many decades, based on peer-reviewed citations, the concept has gained momentum since 2012.[5] The culmination of shared-decision making is that the patient consents to the mutually-agreed procedures to be performed or not performed. The old standard calling for information that "reasonable clinicians" feel their patients need to know is giving way to the new standard defined by what a reasonable patient wishes to know. However, a study of recorded conversations between clinicians and a patients that may need percutaneous coronary intervention (PCI) found that only 3% of the patients received all 8 elements necessary for informed decision making.[6] A recent court ruling in the U.K has upheld the patient-centered, informed-consent standard and about half of the United States use "reasonable patient" as the basis for administering informed consent.[7] In the past, the "reasonable patient" standard has been ill-defined and abstract; our intent is to better-define the information wishes of a reasonable person when facing the possibility of an invasive procedure.[8] There is a natural conflict between respect for patient autonomy in making an informed decision and the practical aspects of how a clinician delivers information to a "reasonable patient" to fulfill the ethical principle of autonomy.

The question then becomes, "What does a reasonable patient wish to know?" Typically, that is answered after the fact in specific cases where a patient may allege that he was not given sufficient information to make an informed decision.[9] One example involved a case where a man's family was not given enough information about his defibrillator replacement to make an informed decision.[10] Patient preferences were not elicited by the clinician. A court in the U.K. decided that a woman was not given sufficient information on the 1% risk of shoulder dystocia from a vaginal vs. a Caesarian delivery to make an informed decision.[11] To our knowledge, no investigators have attempted to define the information needs of a reasonable patient in a general way that applies to care during hospitalization. To some extent the survey was driven by stories of patient advocates who have experienced harm and, in retrospect, wish they had known more about the risks of their treatment, device, or medication. We hypothesized that such wishes could be generalized into information a "reasonable patient' would want to know.

Goal

Our primary goal was to establish the descriptive intensity (scale of 1 to 5, with 1 being "definitely no" and 5 being "definitely yes") by which answers to general questions are desired by a reasonable patient before giving consent for an invasive procedure, prescription drugs, or medical devices that could pose a risk of avoidable harm. Our secondary goal was to characterize heterogeneity, such as gender and age, in the survey groups that may be associated with intensity variations in what a reasonable patient wishes to know.

Methods

Our survey-study proposal (Supplementary file 1) was approved by the Galveston College Institutional Review Board. Our search of peer-reviewed literature using "reasonable patient survey" (15 November 2018) discovered only 2 partially relevant articles. One involved wishes of patients about anesthesia risks in a Singapore hospital.[12] Another surveyed patients' opinions about pre-surgical informed-consent in a Jamaica teaching hospital.[13] In the latter study, 67% of the surveyed patients described their consent process as 'unsatisfactory.' We created a statement of a generic situation in which a hospitalized patient must make choices about their care after being stabilized upon entry via the emergency department: *You are hospitalized in a large, urban, teaching hospital after being brought into its emergency room last night. The condition that brought you to the ER has been stabilized, but additional procedures may be necessary. The following 10 questions determine what you would like to know as a reasonable patient.* We developed a 10-question survey based on adverse experiences reported by members of the Patient Safety Action Network (formerly members of the Safe Patient Project of Consumers Union) and our knowledge of shortcomings with current informed consent practices as reflected in medical literature.

The survey was developed in two forms. The first employed demographics to include age, gender, education level, race or ethnicity, and whether the survey taker has worked in a hospital (Supplementary file 2). This survey was administered via cell phone, without any means of coercion, to student nurses (and a few faculty) on April 19, 2018 at Galveston College, Galveston Texas during a presentation by Dr. James. It was also administered to participants in the Health Professions Educators Summer Symposium (HPESS) Community via email request on June 8, 2018. The latter included primarily mature academics involved in educating physicians, nurses, and health-care administrators.

The second form of the survey, which was used for the U.S. national survey, employed an identical scenario and questions, but the demographics were adapted to those offered by SurveyMonkey® (SM) for a national survey (Supplementary file 3). These included age, gender, household income level, and region of the United States. The national platform included survey takers across the U.S. that had been previously recruited by SM. The vast majority of the national survey takers used cell phones to answer the questions. The third survey was administered to the national audience on October 22, 2018.

Each of the 10 questions could be answered at one of 5 intensity levels indicating the degree to which an answer is desired by the person taking the survey. The responses were as follows: definitely no (1.0), probably no (2.0), neutral (3.0), probably yes (4.0), and definitely yes (5.0). Formal statistical analyses were deemed unsuited to the qualitative nature of our study design. Final conclusions are word descriptions of the intensity of desire of a reasonable patient to have answers such as “probably yes” or “definitely yes.” Obvious trends in the data were captured graphically.

Statistics and Factor Analyses

The data subjected to analyses were collected in three surveys (student nurses, HPESS, and the national survey). For each survey, descriptive statistics were obtained and analyses of the results were performed using Stata (version 14.0; Stata Corp., College Station, TX). The means of the responses of the various groups for each subject category (e.g., age, gender, etc.) were tested for differences using methods that are appropriate for these categorical variables, which are not normally distributed. The nonparametric Kruskal–Wallis one-way analysis of variance by ranks was performed to test for differences between means and the Dunn test was used to identify pairs that differed significantly. Statistical significance, adjusted for false discovery, was established with $p < 0.025$.

Factor analysis with principal component factoring was utilized in all surveys to determine components that can explain the greatest portions of the total variance in responses among the questions. The goal of a factor analysis is to reduce the number of variables to explain and to interpret the results. Factor loadings was achieved by regression of scoring coefficients obtained with varimax rotation. The loaded factors (principal components) generated were analyzed as described above for other variables.

Patient, Public, and Provider Involvement

The research development of the present study was a direct result of patient advocates' experiences with failed informed consent or lack of provider solicitation of patient preferences. These led to formulation of many of the questions posed in our survey. The study leaders are patient safety advocates. The outcome measures were a direct result of the reactions of putative patients as "reasonable patients" to the survey questions. We intentionally involved providers by surveying the HPESS community that consists of clinicians, nurses, and hospital administrators dedicated to educating the next generation of leaders in their respective disciplines. They were asked to assume the role of a patient as they completed our survey.

Our results will be disseminated to the HPESS community once the study has been published, and we will ask that our findings be presented during the summer symposium in July, 2019. The theme of that symposium is how to best educate millennials. Our national survey data provided a category specifically for responses by millennials. Results will be disseminated to student nurses at Galveston College through a presentation this spring. Our findings and suggested actions from our findings will be disseminated to patient advocates whose shared ideas and experiences powered this study. Those groups include the following: Patient Council of the Right Care Alliance, Patient Safety Action Network, and members of Patient Safety America. We expect to widely share our findings with the general public (represented by our national survey) through media outlets such as ProPublica, with physicians through KevinMD and Veritas Health Care, and with nurses through Quality and Safety Education for Nurses (QSEN).

Results

We targeted two groups from which to obtain responses because of the access we had to them and the expectation that their demographics would be different. The response rate from the student nurses was 99% (76/77) because it was taken during a lecture in which support was available if anyone had difficulty. Only one did. The response rate of the HPESS Community to the email request was 63/146 = 43%. The low response is likely due to busy professionals not having time to read and respond to all emails sent to them. Combined, the response rate of the two targeted studies was 62%. Table 1 shows the diversity of demographics in the two groups that took initial surveys. The primary differences were in age, education level, race or ethnic origin, and hospital work experience (Supplemental file 4).

Table 1. Comparative demographics of targeted groups (2 sample test of proportions)

Demographic measure	Student Nurses (n = 76)	HPESS Community (n = 63)	P values
Under 35 years of age	77%	3%	<0.0001
Female	78%	70%	0.2755
High school graduate	34%	2%	<0.0001
College graduate	65%	5%	<0.0001
Advanced degree	1%	93%	<0.0001
White or Caucasian	51%	84%	<0.0001
Black or African American	16%	3%	0.0151
Hispanic or Latino	26%	2%	0.0001
Asian	4%	6%	0.5161
Have worked in a hospital	35%	86%	<0.0001

The national survey included 1211 persons who entered the survey and 1067 who completed it for a response rate of 88%. Nine participants did not answer location questions. The combined results of our three surveys consistently showed that a “reasonable patient” would want to know an answer to each of the 10 questions presented in our survey (table 2).

Table 2 allows the reader to view the results in two ways for each of the 10 questions. The first, shown in bracketed, red highlight, is the fraction of responders that indicated that they definitely wanted to know information (5.0 response) or have a certain right to access (e.g. medical record access). The second way to view results, in black lettering, indicates the numerical mean of all responses in each of the 3 surveys and the ranges of the means sorted by income groups and regions of the U.S. in the national survey. We used ranges as a measure of dispersion around the national means because it is likely lay readers will understand this more readily than the results of our formal statistical analysis. The three distinct surveys compare well regarding the wishes of patients. The highest intensity of desire to have an answer was to question 1 (know all treatment choices) in all three surveys (range 4.58-4.94). In all three surveys, the lowest intensity of desire to have an answer was to question 8 (medical record access) (range 3.98-4.07), and the second lowest intensity was to question 9 (advanced review of documents) (range 4.18-4.29). Even the lowest intensity desire for an answer was near 4.0, which implies that on weighted-average basis, the putative reasonable patient would *probably* want to have access to his medical record and be able to make entries.

Table 2. Average response levels in three surveys. 4.0 indicates the person "probably" wants an answer, and 5.0 indicates the person "definitely" wants an answer. The percentage of the 5.0 responses are shown in bold red. In the national survey, 71 % of the reported income levels were from $10,000 to $99,000. Of the 9 geographic regions of the U.S., 54% of responses were from 3 of those – east north central, south Atlantic, and Pacific. Footnotes: [a]n=75, [b]n=62

Number and description of survey question **The percentages of individuals that 'definitely' (5.0) wanted an answer to each question below is shown in bold red in the columns.**	Student Nurses (n = 76) **[% 5.0]**	HPESS Group (n = 63) **[% 5.0]**	National Group (n = 1067) **[%5.0]**	National ranges over 10 income Groups	National ranges over 9 regions of the U.S.
1. Would you like to know all your treatment choices, including alternatives and risks and benefits of each choice for a patient like you. Your choices may include invasive procedures (surgery, endoscopic procedures, insertion of a medical device), non-invasive treatments, and what happens if you do nothing?	4.92 **[92%]**	4.94 **[95%]**	4.58 **[75%]**	4.33-4.97	4.51-4.65
2. Drugs that have not been approved by the Food and Drug Administration for your condition are off-label for you. Drugs prescribed off-label are about twice as likely to cause serious side-effects as drugs prescribed on-label. Would you like to know if any drugs prescribed to you are off-label, and what their side effects may be?	4.89[a] **[89%]**	4.51 **[67%]**	4.40 **[67%]**	4.07-4.71	4.26-4.57
3. Drugs assigned a "black box" warning by the FDA pose an especially serious risk of harm. If you are prescribed such a drug, would you want to know the reasons for the black box warning and if there are alternatives before you take it?	4.83 **[83%]**	4.67 **[79%]**	4.57 **[78%]**	4.27-4.92	4.43-4.69
4. Decision aids are created to assist patients with complex medical decisions and to help them understand the risks and benefits of treatment options. If there is a decision-aid available for your illness, would you like to review it?	4.66 **[73%]**	4.65 **[70%]**	4.41 **[61%]**	4.07-4.69	4.28-4.57
5. If you are considering an invasive procedure, would you like to know who will be performing it, their skill level, and how trainee doctors, if any, will be involved?	4.83 **[84%]**	4.78 **[84%]**	4.49 **[68%]**	4.34-4.82	4.41-4.63
6. Assuming you have decided on a procedure or treatment, would you like to know what your total, out-of-pocket costs will be?	4.71 **[79%]**	4.60[b] **[68%]**	4.48 **[69%]**	4.21-4.76	4.41-4.52
7. You have a trusted family member that is willing to act as your advocate. Would you like for that person to be present during shared-decision-making about your medical care?	4.65[a] **[73%]**	4.54 **[62%]**	4.31 **[54%]**	4.09-4.69	4.20-4.43
8. If you are well enough, would you like to be offered a chance to review and make entries in your medical records each day while you are hospitalized?	4.07 **[47%]**	4.06 **[48%]**	3.98 **[38%]**	3.41-4.23	3.89-4.11
9. Before signing any documents permitting invasive, non-emergency procedures would you like to review these at least one full day in advance of the procedure?	4.29 **[49%]**	4.19 **[52%]**	4.18 **[47%]**	3.91-4.41	3.87-4.34
10. If you are considering an invasive procedure, would you like to know your expected difficulties, recovery times, pain management, and restrictions after the procedure while hospitalized and after discharge from the hospital? This includes the risk of infection from the invasive procedure.	4.84 **[86%]**	4.89 **[90%]**	4.60 **[76%]**	4.32-4.85	4.49-4.70

Below we provide brief descriptions of the statistical analyses and factor analyses for each of the 3 surveys. The details of these analyses are in supplementary files. Question numbers are found in table 2. Statistical analysis of the responses to survey questions obtained from student nurses (Supplementary file 5) revealed no significant differences among age groups, level of education, experience working in a hospital, or between genders, in their responses to any of the 10 questions. Not considering 'another race' as a response suitable for comparisons, the only differences in pairs were for question 1. 'White or Caucasian' was different from 'Black or African American' ($p = 0.011$) and 'Black or African American' was different from 'Asian or Asian American' ($p = 0.020$).

Factor analysis with principal component factoring identified 3 factors each with Eigenvalues greater than 1, which cumulatively accounted for 64% of total variance among responses provided by the student nurses. Varimax factor loading of 3 factor variables labeled as "knowledge", "participation", and "total cost" were generated and analyzed as above for differences in responses among groups (Supplementary file 6). No significant differences were found among age groups, levels of education, or between genders, in their responses to any of the factor variables. The only significant differences, again disregarding comparisons to 'Another race,' existed among races and ethnicities in their responses associated with "knowledge" ($p = 0.0091$) where 'White or Caucasian' differed from 'Black or African American' ($p = 0.0211$).

The responses of the HPESS survey did not differ significantly between genders, or among various ethnicities for any of the ten questions (Supplementary file 7). Responses differed significantly among age groups only for questions 1 ($p = 0.0171$) and 2 ($p = 0.0024$). Responses differed significantly by education level for questions 1 ($p = 0.0015$), 2 ($p = 0.0139$), 3 (p = 0.0170) and 10 (p = 0.0347). Among respondents to the HPESS survey, significant differences in responses to questions 1 (p = 0.003), 2 (p = 0.0024), and 5 (p = 0.0002) were provided by respondents who differed according to their employment as hospital workers.

Factor analysis of the HPESS data with principal component factoring identified no statistically significant differences for either of two factor variables "knowledge" and "participation" when responses were compared by age, gender, or level of education (Supplementary file 8). A significant difference among ethnic groups was found for "knowledge" (p = 0.0394) but post hoc analysis with Dunn's test failed to identify any pairs of groups that differed significantly.

In the national survey, responses differed significantly for all questions among age groups (p = 0.001 for questions 1 - 7 and 10; p = 0.0041 and 0.0052 for questions 8 and 9 respectively), between genders (p = 0.001 for questions 1, 2, 4, 7, 8 and 10; p = 0.0043, 0.0002, 0.0030 and 0.0014 for questions 3, 5, 6 and 9, respectively) (Supplementary file 9). Significant differences for questions 1 (p = 0.0001), 2 (p = 0.0384), 3 (p =0.0047), 4 (p = 0.0037), and 6 (p = 0.0190) were found among groups that differed by income level. Question 9 (p = 0.0473) was the only question for which responses differed significantly among regions of the U.S. Several salient generalizations from these comparisons are apparent. When comparing responses among various age groups, differences were found among all ages groups for most questions. When significant differences were found among response of groups of differing income levels the differences, most often, were between group 1 and the other groups. Differences between regions, in response to question 9, were most often between regions 1 and 2 and the other regions.

Factor analysis of the national data with principal component factoring demonstrated significant differences among the age categories for both factor variables ("knowledge", and "other", p = 0.0001 for both variables) (Supplementary file 10). All groups differed significantly from each other, with the exception of group 4 vs group 5 for the factor variable "other". For both factor variables the differences in responses of the genders are very highly significantly different (p <0.0001). When considering responses from groups of differing income levels, significant differences were found for the variable "knowledge" (p = 0.0005). Most of the differences among pairs are between group 1 and other groups and between group 3 and other groups. There were no significant differences in responses to factor variables among regions.

Discussion

Despite the different demographics in the two targeted surveys (table 1), especially in age, education level and hospital work experience, the responses were comparable in the two groups (table 2). Only one of the 10 questions (number 2) had a response level that differed by more than 0.20 units. This was the question of whether a reasonable patient would want to know about any off-label drugs prescribed. The difference was 0.38 units. The higher education level and more hospital experience of the HPESS Community may have made this group slightly less concerned about the additional risk that may be associated with off-label prescriptions. Statistical analysis of the nurse-student survey revealed two paired demographic differences. Two race/ethnic pairs (white vs. black and black vs. Asian) were associated with differences in intensity of response to question 1, which is about knowing all choices for treatment including risks and benefits. Statistical analysis of the HPESS community survey disclosed differences between pairs in the age, education-level and hospital-work-experience groups. While these statistical findings may be interesting, the reality is that the core message remains unchanged: patients of all types studied wish to know many details about their care choices when facing the possibility of an invasive procedure.

The results of the national survey regarding demographics of gender (figure 1) and age (figure 2) demonstrated distinct trends for all 10 questions. Without exception, women wanted more information than men, and older adults wanted more information than younger adults. Similarly, statistical analysis supported associations between age and gender on the intensity of responses to most questions, and it revealed an effect of income for some of the survey questions. The gender associations may be due to women being higher users of hospital care and hospitals tending to offer many more services targeted to women than to men.[14] Older adults may be more likely to be cautious compared to younger adults because of more lifetime hospital experiences.

Our survey provides insight into some patient concerns that are not typically part of informed consent. In the wake of the opioid epidemic, the public is more aware of the potential dangers of prescription drugs. Thus, it should not be surprising that patients would want to know if the drugs prescribed to them are off-label or have a black-box warning. The U.S. Food and Drug Administration assigned “black box” warnings to immediate-release opioids in 2016.[15] There is also growing attention to surprise medical bills in the U.S., so a reasonable patient would likely to want an estimate of his out-of-pocket costs. Inordinate out-of-pocket costs, especially those that lead to bankruptcy, may have an adverse effect on clinical outcomes.[16] Hospital administration staff could assist with providing cost information. The opportunity to review and make entries in one’s medical record, while not part of the informed consent process, may relate. Many patients want to ensure that the data being recorded are accurate and complete;

moreover, many desire access to their data as a means of gaining a better understanding of their condition and engaging with their providers. Encouraging this access can convey strong support for the view that the patient is an integral part of his care team.

There is an important connection between informed consent and the overuse of medical procedures. The overuse of PCI in the U.S. is a prime example. Patients that may need PCI were less likely to choose this invasive option when they were better informed about their care options during hospitalization.[17] A study of patients in Northern England that may need PCI concluded that there is "a mismatch between legal and ethical principles of informed consent and current practice. The variation in patients' experiences of the current place of informed consent in service delivery represents a missed opportunity for cardiologists to work in decision-making partnerships with patients. In light of recent changes in the law [to the reasonable patient standard], a new approach to informed consent is required."[18]

The history of legally-defined informed consent for invasive procedures has evolved from a totally physician-centered concept (before the Era of Enlightenment) in which deception of the patient was deemed necessary, to the point where the process has now become patient-centered, in principle. A brief summary of some of the court decisions pertinent to involvement of the patient points to the next step in informed consent, which we feel we have defined with our survey.[19] As early as 1914, a New York court established that an "adult in sound mind has the right to determine what shall be done with his own body." This was reinforced in 1960 by the decision of a court in Kansas that the patient, not the physician, must make the final decision about any operation. Of course, the patient's decision may be biased by receiving limited information from the physician. Two court decisions in 1972, one in California and the other in

Washington, D.C., determined that the patient must be informed of pertinent risks of surgery and have the alternatives revealed to him or her. In 1983, a New Jersey court ruled that if a surgeon, other than the one the patient selected, performs the surgery, then the surgeon that obtained consent, but did not perform the surgery is liable for malpractice. The surgeon performing the surgery is liable for battery. The importance of the side effects of a drug (prednisone) came to a Massachusetts court's attention in 1986 when a patient suffered serious adverse effects of this drug used after eye surgery. It seems there was controversy about whether the physician should have known about the possible side effects, and then disclosed this potential complication of the drug to the patient.

While our survey questions originated primarily from adverse experiences of patients, it is clear that court decisions have pointed the way to a new era of the patient's voice being heard in the context of shared-decision making and informed consent. That voice says to clinicians who would perform an invasive procedure, "We patients want to know more than you have been telling us." We want to know all of our choices and their risks and benefits, we want to know the risks and benefits of drugs prescribed to us and devices placed in us, we want to view decision aids when available, we want to know the skill level of the physician(s) performing our procedure, and we want to know our costs. Moreover, we want an advocate present during shared-decision making, we want full access to our medical records, we want to review consent documents at least 24 hours before signing them, and we want to know the expected outcomes of the invasive procedure to include recovery times, pain management, and infection risks.

Limitations

In order to respect the time of responders to our survey, we limited it to 10 questions applicable to an informed consent discussion in a hypothetical situation. In real clinical settings, it is likely that our "template" will need to be augmented with questions specific to the situation the patient faces. These should be designed to elicit the patient's preferences. We also recognize that some of the answers are out of the clinician's hands; for example, clinicians in the U.S. are seldom going to know the patient's out-of-pocket costs. We also recognize that clinicians may need the assistance of pharmacists in conveying the benefits, risks, and alternatives to off-label or black-box-warning drugs. Surveys like ours involving a hypothetical scenario may be limited because in a real and stressful situation a patient may simply want to trust doctors' recommendations or may be afraid to ask too many questions. In a sense, our hypothetical "reasonable patient" has become a "frightened patient" when placed in a real situation, but that does not mean that he or she does not want to know answers to the all the questions in our survey.

Conclusions

Through two targeted surveys and a U.S. national survey, we have affirmed that a reasonable patient will want to know far more information than is generally conveyed during typical shared-decision making that leads to no more than a partly informed decision by the patient. Survey respondents wanted to know risks and benefits of all treatment options, the risks and benefits of off-label and box-warning drugs. They wished to view decision aids, know precisely who will perform the procedure, and their anticipated out-of-pocket costs. Their desire was for an advocate to be present during shared-decision making, have periodic opportunities to review their medical record, have a full day to review informed-consent documents, and to be made aware of expected outcomes and restrictions after the procedure. We expect our findings to have implications for what defines a reasonable patient standard for informed consent.

Figure 1. National intensity scores above 4.0 vs. question number for gender differences in the national survey. Responses came from 497 males and 570 females.

Figure 2. National intensity scores above 4.0 vs. question number for age differences in the national survey. Responses came from 297, 230, 343, and 197 people in the four respective age groups.

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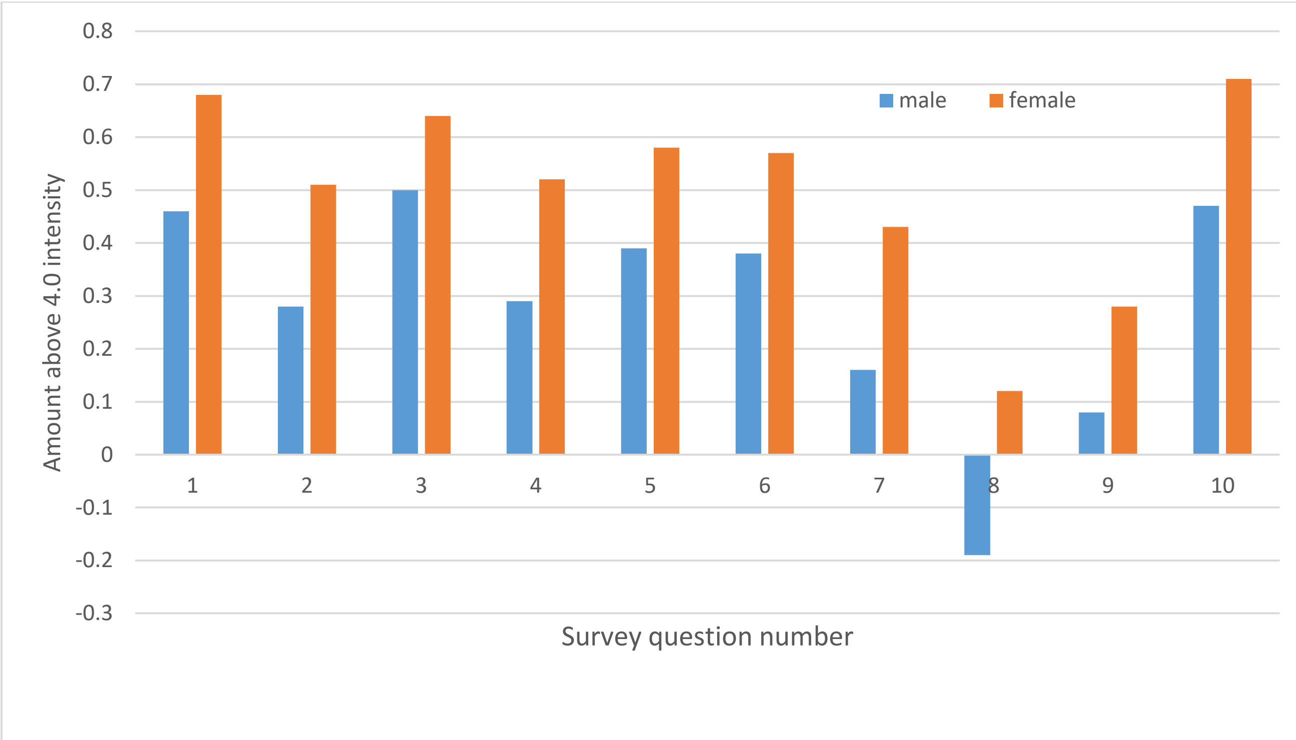
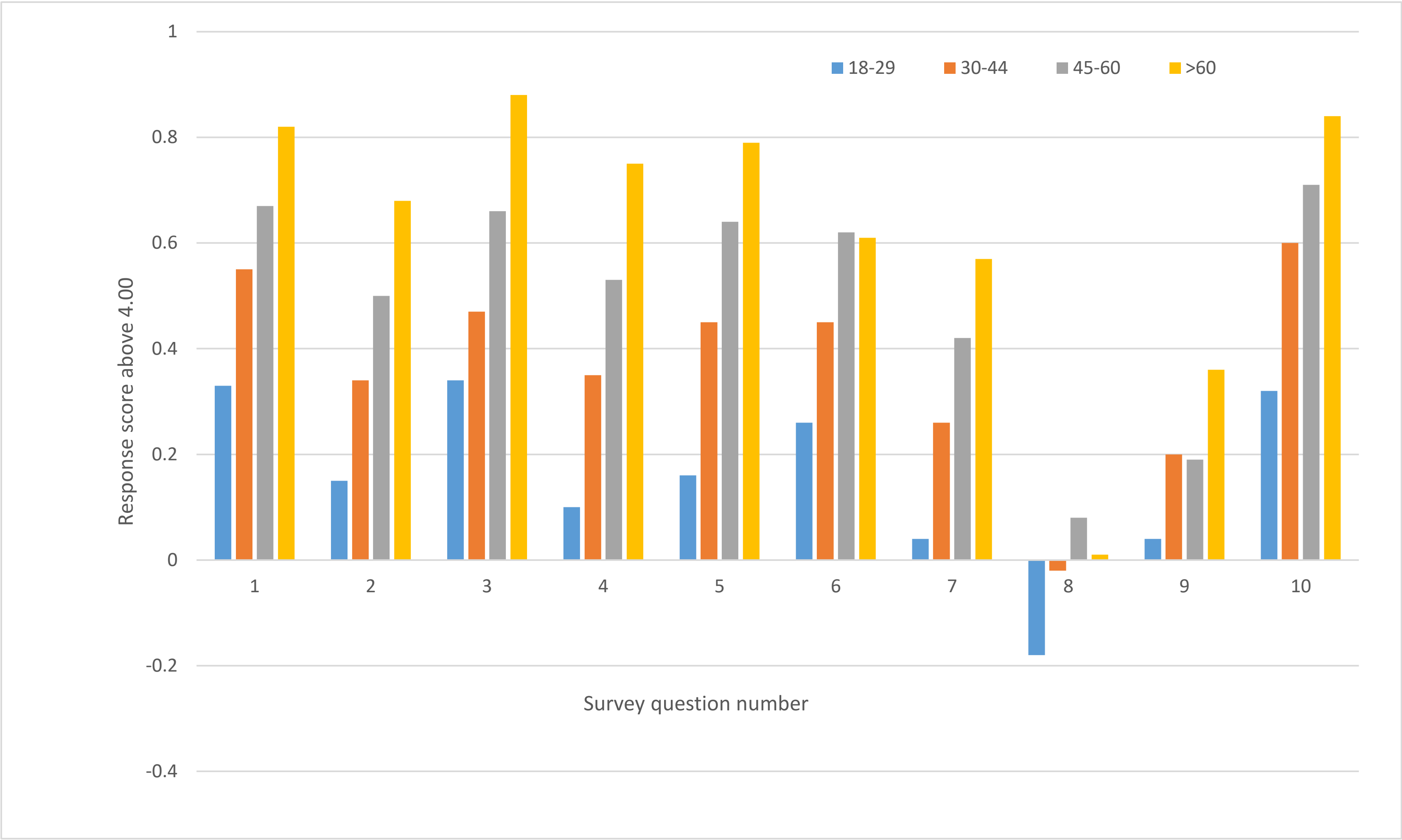
Figure 1. Effect of gender on survey responses




1
0.8
0.6
0.4
0.2
0
-0.2
-0.4
18-29
30-44
45-60
>60
Response score above 4.00
1
2
3
4
5
6
7
8
9
10
Survey question number

A Baseline for the "Reasonable Patient Standard"

Investigators: John T. James, PhD, Patient Safety America, Houston, TX (retired NASA Chief Toxicologist) and Darwin J. Eakins, MS, (retired statistical expert, University of Kansas), Survey Consultant, Lawrence, KS

Background: Recent changes in the law on informed consent in the U.K. to favor a "reasonable patient standard" over a "reasonable clinicians' standard" prompted experts on informed consent to survey the situation in the U.S. Laws defining informed consent vary from state to state. Laws in half the states favor the reasonable-patient-standard (RPS) and others favor the reasonable-clinicians-standard.[i] A debate ensued about the problems with the RPS because it is going to vary from patient to patient. As part of the debate, an opponent of the RPS stated that perhaps a baseline RPS could be formulated.[ii] It is our intent to begin to define a general baseline for the RPS. This is essential if patient-centered-care and shared-decision making are to become a reality. Texas is a RPS state.[iii] Please note that for our purposes a "reasonable person" and a "reasonable patient" are identical.

Methods: We will use the Survey Monkey Platform to capture the demographics of each survey participant, and then they will answer 10 questions related to what they would like to know when facing the possibility of an invasive procedure while hospitalized. There are two identical versions of the survey, one intended to be taken simultaneously by an audience, and the other to be taken by individuals to whom the survey-link is sent via email. The survey platform prevents individuals from taking the survey more than once from their electronic device or computer. A link to the beta-version of the survey is given here: https://www.surveymonkey.com/r/8Y5Q3MF. Those taking the survey have 5 choices to express the degree to which they would like to know an answer to the question posed in the survey. Those responses range in 5 levels from "Definitely no" to "Definitely yes."

Recruitment: Our plan is to survey up to 1,000 adults in a variety of categories. These have not been fully fixed at this point, but our target groups are as follows: students of nursing, mature and retired nurses, health professions educators, retired individuals, people with knowledge of patient safety issues, and a nationally representative group of adults. Subjects will be recruited vis email or at presentations to groups, such as nursing students (see below). Our **primary hypothesis** is that across the survey groups and for most of the questions the participants will answer either "probably yes" or "definitely yes" to the questions. Our secondary goal is to discover groups that differ significantly from the overall average. We will use t-tests to determine statistical ($P<0.05$) differences between groups for selected questions that seem worth exploring.

Results: At this point the survey has been administered to nursing students attending a lecture on informed consent at Galveston College (April 19, 2018). There were 77 respondents to the survey, which was taken early in the lecture. Later in the lecture, the results of the survey were presented to the group of students. The data were readily available in graphical and numerical form to the audience. This was done to prove-out our ability to capture data in near-real time.

Funding: The research is being funding by Patient Safety America, Houston, TX. This will be less than $1,000 for the survey platform and additional costs if we choose to survey a nationally representative group to which we purchase access.

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[i] https://jamanetwork.com/journals/jama/fullarticle/2516469

[ii] https://jamanetwork.com/journals/jama/article-abstract/2547748?redirect=true

[iii] CIVIL PRACTICE AND REMEDIES CODE
TITLE 4. LIABILITY IN TORT
CHAPTER 74. MEDICAL LIABILITY
SUBCHAPTER C. INFORMED CONSENT
Sec. 74.101. THEORY OF RECOVERY. In a suit against a physician or health care provider involving a health care liability claim that is based on the failure of the physician or health care provider to disclose or adequately disclose the risks and hazards involved in the medical care or surgical procedure rendered by the physician or health care provider, the only theory on which recovery may be obtained is that of negligence in failing to disclose the risks or hazards that could have influenced a reasonable person in making a decision to give or withhold consent.

Reasonable Patient Care - Phone

You are hospitalized in a large, urban, teaching hospital after being brought into its emergency room last night. The condition that brought you to the ER has been stabilized, but additional procedures may be necessary. The following 10 questions determine what you would like to know as a reasonable patient. The survey should take no more than 5 minutes. There are only sixteen (16) items.

Reasonable Patient Care - Phone

Age

Page 1 of 16

1. Age

- Under 18
- 18-24
- 25-34
- 35-44
- 45-54
- 55-64
- 65+

Reasonable Patient Care - Phone

Gender

Page 2 of 16

2. Gender

- Male
- Female

Reasonable Patient Care - Phone

Education

Page 3 of 16

3. Education

- HS Grad
- Advance Degree
- College Grad

Reasonable Patient Care - Phone

Race/Ethnicity

Page 4 of 16

4. Race/Ethnicity

- White or Caucasian
- American Indian or Alaska Native
- Black or African American
- Native Hawaiian or other Pacific Islander
- Hispanic or Latino
- Another race
- Asian or Asian American

Reasonable Patient Care - Phone

Worked in Hospital

Page 5 of 16

5. Have you worked in a hospital?

- Yes
- No
- If Yes, your job was:

Reasonable Patient Care - Phone

Alternatives/Risks/Benefits

Page 6 of 16

6. Would you like to know all your treatment choices, including alternatives and risks and benefits of each choice for a patient like you. Your choices may include invasive procedures (surgery, endoscopic procedures, insertion of a medical device), non-invasive treatments, and what happens if you do nothing?

- Definitely no
- Probably no
- Neutral
- Probably yes
- Definitely yes

Reasonable Patient Care - Phone

Drugs

Page 7 of 16

7. Drugs that have not been approved by the Food and Drug Administration for your condition are off-label for you. Drugs prescribed off-label are about twice as likely to cause serious side-effects as drugs prescribed on-label. Would you like to know if any drugs prescribed to you are off-label, and what their side effects may be?

- Definitely no
- Probably no
- Neutral
- Probably yes
- Definitely yes

Reasonable Patient Care - Phone

Drugs Assigned “Black Box” Warning

Page 8 of 16

8. Drugs assigned a “black box” warning by the FDA pose an especially serious risk of harm. If you are prescribed such a drug, would you want to know the reasons for the black box warning and if there are alternatives before you take it?

- Definitely no
- Probably no
- Neutral
- Probably yes
- Definitely yes

Reasonable Patient Care - Phone

Decisions Aids

Page 9 of 16

9. Decision aids are created to assist patients with complex medical decisions and to help them understand the risks and benefits of treatment options. If there is a decision-aid available for your illness, would you like to review it?

- ○ Definitely no
- ○ Probably no
- ○ Neutral
- ○ Probably yes
- ○ Definitely yes

Reasonable Patient Care - Phone

Considering Invasive Procedure

Page 10 of 16

10. If you are considering an invasive procedure, would you like to know who will be performing it, their skill level, and how trainee doctors, if any, will be involved?

- ○ Definitely no
- ○ Probably no
- ○ Neutral
- ○ Probably yes
- ○ Definitely yes

Reasonable Patient Care - Phone

Out-Of-Pocket Costs

Page 11 of 16

11. Assuming you have decided on a procedure or treatment, would you like to know what your total, out-of-pocket costs will be?

- ○ Definitely no
- ○ Probably no
- ○ Neutral
- ○ Probably yes
- ○ Definitely yes

Reasonable Patient Care - Phone

Family Member as Advicate

Page 12 of 16

12. You have a trusted family member that is willing to act as your advocate. Would you like for that person to be present during shared-decision-making about your medical care?

- Definitely no
- Probably no
- Neutral
- Probably yes
- Definitely yes

Reasonable Patient Care - Phone

Make Entries In Medical Records

Page 13 of 16

13. If you are well enough, would you like to be offered a chance to review and make entries in your medical records each day while you are hospitalized?

- Definitely no
- Probably no
- Neutral
- Probably yes
- Definitely yes

Reasonable Patient Care - Phone

Documents Permitting Invasive Procedures

Page 14 of 16

14. Before signing any documents permitting invasive, non-emergency procedures would you like to review these at least one full day in advance of the procedure?

- Definitely no
- Probably no
- Neutral
- Probably yes
- Definitely yes

Reasonable Patient Care - Phone

Expected Difficulties /Recovery Times/Restrictions

Page 15 of 16

15. If you are considering an invasive procedure, would you like to know your expected difficulties, recovery times, pain management options, and restrictions after the procedure while hospitalized and after discharge from the hospital? This includes the risk of infection from the invasive procedure.

- ○ Definitely no
- ○ Probably no
- ○ Neutral
- ○ Probably yes
- ○ Definitely yes

Reasonable Patient Care - Phone

Other Comments

Page 16 of 16

16. What else would you like to know as a reasonable patient?

Reasonable Patient 3

Reasonable Patient Care Survey

You are hospitalized in a large, urban, teaching hospital after being brought into its emergency room last night. The condition that brought you to the ER has been stabilized, but additional procedures may be necessary. The following 10 questions determine what you would like to know as a reasonable patient. The survey should take no more than 5 minutes.

* 1. Would you like to know all your treatment choices, including alternatives and risks and benefits of each choice for a patient like you. Your choices may include invasive procedures (surgery, endoscopic procedures, insertion of a medical device), non-invasive treatments, and what happens if you do nothing?

1=definitely no	2=probably no	3=neutral	4=probably yes	5=definitely yes
◯	◯	◯	◯	◯

* 2. Drugs that have not been approved by the Food and Drug Administration for your condition are off-label for you. Drugs prescribed off-label are about twice as likely to cause serious side-effects as drugs prescribed on-label. Would you like to know if any drugs prescribed to you are off-label, and what their side effects may be?

1-definitely no	2-probably no	3-neutral	4-probably yes	5-definitely yes
◯	◯	◯	◯	◯

* 3. Drugs assigned a “black box” warning by the FDA pose an especially serious risk of harm. If you are prescribed such a drug, would you want to know the reasons for the black box warning and if there are alternatives before you take it?

1-definitely no	2-probably no	3-neutral	4-probably yes	5-definitely yes
◯	◯	◯	◯	◯

* 4. Decision aids are created to assist patients with complex medical decisions and to help them understand the risks and benefits of treatment options. If there is a decision-aid available for your illness, would you like to review it?

1-definitely no	2-probably no	3-neutral	4-probably yes	5-definitely yes
◯	◯	◯	◯	◯

* 5. If you are considering an invasive procedure, would you like to know who will be performing it, their skill level, and how trainee doctors, if any, will be involved?

1-definitely no	2-probably no	3-neutral	4-probably yes	5-definitely yes
◯	◯	◯	◯	◯

* 6. Assuming you have decided on a procedure or treatment, would you like to know what your total, out-of-pocket costs will be?

1-definitely no	2-probably no	3-neutral	4-probably yes	5-definitely yes
○	○	○	○	○

* 7. You have a trusted family member that is willing to act as your advocate. Would you like for that person to be present during shared-decision-making about your medical care?

1-definitely no	2-probably no	3-neutral	4-probably yes	5-definitely yes
○	○	○	○	○

* 8. If you are well enough, would you like to be offered a chance to review and make entries in your medical records each day while you are hospitalized?

1-definitely no	2-probably no	3-neutral	4-probably yes	5-definitely yes
○	○	○	○	○

* 9. Before signing any documents permitting invasive, non-emergency procedures would you like to review these at least one full day in advance of the procedure?

1-definitely no	2-probably no	3-neutral	4-probably yes	5-definitely yes
○	○	○	○	○

* 10. If you are considering an invasive procedure, would you like to know your expected difficulties, recovery times, pain management, and restrictions after the procedure while hospitalized and after discharge from the hospital? This includes the risk of infection from the invasive procedure.

1-definitely no	2-probably no	3-neutral	4-probably yes	5-definitely yes
○	○	○	○	○

Table 1. Comparative demographics of targeted groups

Demographic measure	Student Nurses (n = 77)	HPESS Community (n = 63)	p-Value
Under 35 years of age	76.7%	3.2%	0.0000
Female	77.9%	69.8%	0.2755
High school graduate	33.8%	1.6%	0.0000
College graduate	64.9%	4.8%	0.0000
Advanced degree	1.3%	90.5%	0.0000
White or Caucasian	50.6%	84.1%	0.0000
Black or African American	15.6%	3.2%	0.0151
Hispanic or Latino	26.0%	1.6%	0.0001
Asian	3.9%	6.3%	0.5161
Have worked in a hospital	35.1%	85.7%	0.0000

Under 35 years of age

```
. prtesti 77 .767 63 .032

Two-sample test of proportions                    x: Number of obs =       77
                                                  y: Number of obs =       63
------------------------------------------------------------------------------
    Variable |       Mean   Std. Err.      z    P>|z|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
           x |       .767   .0481759                      .6725769    .8614231
           y |       .032   .0221739                     -.0114601    .0754601
-------------+----------------------------------------------------------------
        diff |       .735    .053034                      .6310553    .8389447
             |  under Ho:    .084248     8.72   0.000
------------------------------------------------------------------------------
        diff = prop(x) - prop(y)                                  z =   8.7242
    Ho: diff = 0

    Ha: diff < 0                 Ha: diff != 0                 Ha: diff > 0
 Pr(Z < z) = 1.0000         Pr(|Z| > |z|) = 0.0000          Pr(Z > z) = 0.0000

.
```

Female.

```
. prtesti 77 .779 63 .698

Two-sample test of proportions                    x: Number of obs =       77
                                                  y: Number of obs =       63
------------------------------------------------------------------------------
    Variable |       Mean   Std. Err.      z    P>|z|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
           x |       .779   .0472846                      .6863239    .8716761
           y |       .698   .0578443                      .5846272    .8113728
-------------+----------------------------------------------------------------
        diff |       .081   .0747114                     -.0654317    .2274317
             |  under Ho:   .0742776     1.09   0.275
------------------------------------------------------------------------------
        diff = prop(x) - prop(y)                                  z =   1.0905
    Ho: diff = 0

    Ha: diff < 0                 Ha: diff != 0                 Ha: diff > 0
 Pr(Z < z) = 0.8623         Pr(|Z| > |z|) = 0.2755          Pr(Z > z) = 0.1377

.
.
```

High school graduate

```
. prtesti 77 .338 63 .016

Two-sample test of proportions                  x: Number of obs =        77
                                                y: Number of obs =        63
------------------------------------------------------------------------------
    Variable |       Mean   Std. Err.      z    P>|z|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
           x |       .338   .0539066                      .232345     .443655
           y |       .016   .0158084                    -.0149838    .0469838
-------------+----------------------------------------------------------------
        diff |       .322   .0561767                      .2118956    .4321044
             |  under Ho:   .0670578     4.80   0.000
------------------------------------------------------------------------------
        diff = prop(x) - prop(y)                                  z =   4.8018
    Ho: diff = 0

    Ha: diff < 0                 Ha: diff != 0                 Ha: diff > 0
 Pr(Z < z) = 1.0000         Pr(|Z| > |z|) = 0.0000          Pr(Z > z) = 0.0000

.
.
```

. College graduate

```
. prtesti 77 .649 63 .048

Two-sample test of proportions                  x: Number of obs =        77
                                                y: Number of obs =        63
------------------------------------------------------------------------------
    Variable |       Mean   Std. Err.      z    P>|z|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
           x |       .649   .0543914                      .5423947    .7556053
           y |       .048    .026932                    -.0047858    .1007858
-------------+----------------------------------------------------------------
        diff |       .601    .060694                      .4820419    .7199581
             |  under Ho:   .0823973     7.29   0.000
------------------------------------------------------------------------------
        diff = prop(x) - prop(y)                                  z =   7.2939
    Ho: diff = 0

    Ha: diff < 0                 Ha: diff != 0                 Ha: diff > 0
 Pr(Z < z) = 1.0000         Pr(|Z| > |z|) = 0.0000          Pr(Z > z) = 0.0000

.
.
```

. Advanced degree

```
. prtesti 77 .013 63 .905

Two-sample test of proportions                  x: Number of obs =        77
                                                y: Number of obs =        63
------------------------------------------------------------------------------
    Variable |       Mean   Std. Err.      z    P>|z|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
           x |       .013   .0129088                    -.0123007    .0383007
           y |       .905   .0369416                     .8325958    .9774042
-------------+----------------------------------------------------------------
        diff |      -.892   .0391321                    -.9686974   -.8153026
             |  under Ho:   .0836872   -10.66   0.000
------------------------------------------------------------------------------
        diff = prop(x) - prop(y)                                  z = -10.6587
    Ho: diff = 0

    Ha: diff < 0                 Ha: diff != 0                 Ha: diff > 0
 Pr(Z < z) = 0.0000         Pr(|Z| > |z|) = 0.0000          Pr(Z > z) = 1.0000

.
.
.
.
```

. **White or Caucasian**

```
. . prtesti 77 .506 63 .841

Two-sample test of proportions                  x: Number of obs =        77
                                                y: Number of obs =        63
------------------------------------------------------------------------------
    Variable |       Mean   Std. Err.      z    P>|z|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
           x |       .506   .0569762                      .3943287    .6176713
           y |       .841   .0460709                      .7507028    .9312972
-------------+----------------------------------------------------------------
        diff |      -.335   .0732722                     -.4786108   -.1913892
             |  under Ho:   .0806592    -4.15   0.000
------------------------------------------------------------------------------
        diff = prop(x) - prop(y)                                  z =  -4.1533
    Ho: diff = 0

    Ha: diff < 0                 Ha: diff != 0                 Ha: diff > 0
 Pr(Z < z) = 0.0000         Pr(|Z| > |z|) = 0.0000          Pr(Z > z) = 1.0000

.
```

. . **Black or African American**

```
. prtesti 77 .156 63 .032

Two-sample test of proportions                  x: Number of obs =        77
                                                y: Number of obs =        63
------------------------------------------------------------------------------
    Variable |       Mean   Std. Err.      z    P>|z|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
           x |       .156   .0413512                      .0749531    .2370469
           y |       .032   .0221739                     -.0114601    .0754601
-------------+----------------------------------------------------------------
        diff |       .124   .0469213                       .032036     .215964
             |  under Ho:     .05101     2.43   0.015
------------------------------------------------------------------------------
        diff = prop(x) - prop(y)                                  z =   2.4309
    Ho: diff = 0

    Ha: diff < 0                 Ha: diff != 0                 Ha: diff > 0
 Pr(Z < z) = 0.9925         Pr(|Z| > |z|) = 0.0151          Pr(Z > z) = 0.0075

.
```

. **Hispanic or Latino**

```
. prtesti 77 .260 63 .016

Two-sample test of proportions                  x: Number of obs =        77
                                                y: Number of obs =        63
------------------------------------------------------------------------------
    Variable |       Mean   Std. Err.      z    P>|z|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
           x |        .26    .049987                      .1620273    .3579727
           y |       .016   .0158084                     -.0149838    .0469838
-------------+----------------------------------------------------------------
        diff |       .244   .0524272                      .1412447    .3467553
             |  under Ho:   .0606934     4.02   0.000
------------------------------------------------------------------------------
        diff = prop(x) - prop(y)                                  z =   4.0202
    Ho: diff = 0

    Ha: diff < 0                 Ha: diff != 0                 Ha: diff > 0
 Pr(Z < z) = 1.0000         Pr(|Z| > |z|) = 0.0001          Pr(Z > z) = 0.0000

.
.
. .
```

.
. **Asian**
```
. prtesti 77 .039 63 .063

Two-sample test of proportions                     x: Number of obs =        77
                                                   y: Number of obs =        63
------------------------------------------------------------------------------
    Variable |       Mean   Std. Err.      z    P>|z|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
           x |       .039   .0220622                     -.0042411    .0822411
           y |       .063   .0306105                      .0030046    .1229954
-------------+----------------------------------------------------------------
        diff |      -.024   .0377325                     -.0979543    .0499543
             |  under Ho:   .0369548    -0.65   0.516
------------------------------------------------------------------------------
        diff = prop(x) - prop(y)                                  z =  -0.6494
    Ho: diff = 0

    Ha: diff < 0                 Ha: diff != 0                 Ha: diff > 0
 Pr(Z < z) = 0.2580         Pr(|Z| > |z|) = 0.5161          Pr(Z > z) = 0.7420
.
.
```
. **Have worked in a hospital**
```
. prtesti 77 .351 63 .857

Two-sample test of proportions                     x: Number of obs =        77
                                                   y: Number of obs =        63
------------------------------------------------------------------------------
    Variable |       Mean   Std. Err.      z    P>|z|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
           x |       .351   .0543914                      .2443947    .4576053
           y |       .857    .044105                      .7705557    .9434443
-------------+----------------------------------------------------------------
        diff |      -.506   .0700263                      -.643249    -.368751
             |  under Ho:   .0838824    -6.03   0.000
------------------------------------------------------------------------------
        diff = prop(x) - prop(y)                                  z =  -6.0323
    Ho: diff = 0

    Ha: diff < 0                 Ha: diff != 0                 Ha: diff > 0
 Pr(Z < z) = 0.0000         Pr(|Z| > |z|) = 0.0000          Pr(Z > z) = 1.0000
```

Nurse-Student Statistics Report

Summary

- Question – For each of the questions, 1-10, is there a difference in the average response by age?

  Answer – NO, there are no significant differences among age groups in their responses to any of the 10 questions.

- Question – For each of the questions, 1-10, is there a difference in the average response by gender?

  Answer – NO, there are no significant differences between the genders in their responses to any of the 10 questions.

- Question – For each of the questions, 1-10, is there a difference in the average response by level of education

  Answer – NO, there are no significant differences among the education levels in their responses to any of the 10 questions.

- Question: For each of the questions, is there a difference in the average response based upon racer or ethnicity

  Answer – YES, for questions 1, 5, and 6,

```
. dunntest iq1, by(ieth) ma(bh) wrap
K-Wallis probability =      0.0038

                  Dunn's Pairwise Comparison of iq1 by ieth
                              (Benjamini-Hochberg)
Col Mean-|
Row Mean |        1           2           3           4
---------+--------------------------------------------
       2 |   3.061273
         |     0.0110
         |
       3 |  -0.085671  -1.871072
         |     0.5176     0.0613
         |
       4 |  -0.166771  -2.646096   0.000000
         |     0.5422     0.0204     0.5000
         |
       7 |   2.553091  -0.755791   1.387066   2.097047
         |     0.0178     0.3213     0.1379     0.0450

False Discovery Rate =   0.05
Reject Ho if p = P(Z <= |z|) <= FDR/2 with stopping rule

. dunntest iq5, by(ieth) ma(bh) wrap
K-Wallis probability =      0.0001
Dunn's Pairwise Comparison of iq5 by ieth
                              (Benjamini-Hochberg)
Col Mean-|
Row Mean |       1            2           3           4
---------+--------------------------------------------
       2 |   1.713447
         |     0.0866
         |
       3 |   2.264929    0.858920
         |     0.0294     0.2440
         |
       4 |  -0.476526  -1.710491  -2.265841
         |     0.3521     0.0726     0.0391
         |
       7 |   4.334614    1.465931   0.247897   3.691637
```

```
         |     0.0001     0.1019     0.4021     0.0006

False Discovery Rate =   0.05
Reject Ho if p = P(Z <= |z|) <= FDR/2 with stopping rule

. dunntest iq6, by(ieth) ma(bh) wrap
Kwallis probability =     0.0245

                 Dunn's Pairwise Comparison of iq6 by ieth
                            (Benjamini-Hochberg)
Col Mean-|
Row Mean |       1          2          3          4
---------+--------------------------------------------
       2 |   0.459251
         |     0.3589
         |
       3 |  -0.624727  -0.785168
         |     0.3326     0.3088
         |
       4 |  -1.215526  -1.110396   0.000000
         |     0.2242     0.2224     0.5000
         |
       7 |   2.934536   1.546239   2.055206   3.107180
         |     0.0084     0.1526     0.0664     0.0094

False Discovery Rate =   0.05
Reject Ho if p = P(Z <= |z|) <= FDR/2 with stopping rule
```

- Question – For each of the questions, 1-10, is there a difference in the average response if respondent is or was a hospital worker?

  Answer – NO, there are no significant differences among groups, based upon hospital work experience, in their responses to any of the 10 questions.

Statistics

- Question – For each of the questions, 1-10, is there a difference in the average response by age among those who identified their age group?

```
. dunntest iq1, by(iage) ma(bh) wrap

Warning: by() values are unlabeled, option nolabel implicit


Kruskal-Wallis equality-of-populations rank test

  +------------------------+
  | iage | Obs | Rank Sum |
  |------+-----+----------|
  |    3 |   2 |    67.00 |
  |    4 |  12 |   402.00 |
  |    5 |  14 |   405.50 |
  |    6 |  25 |   806.50 |
  |    7 |  10 |   335.00 |
  +------------------------+

chi-squared =     0.550 with 4 d.f.
probability =     0.9685

chi-squared with ties =     4.037 with 4 d.f.
probability =     0.4010


                 Dunn's Pairwise Comparison of iq1 by iage
                            (Benjamini-Hochberg)
Col Mean-|
Row Mean |            3             4             5             6
---------+--------------------------------------------
       4 |   0.000000
```

```
         |     0.6250
         |
       5 |   0.887093   1.704583
         |     0.4688     0.4414
         |
       6 |   0.249476   0.522019  -1.459674
         |     0.5736     0.6017     0.2406
         |
       7 |   0.000000   0.000000  -1.619603  -0.489962
         |     0.5556     0.5000     0.2633     0.5201

False Discovery Rate =   0.05
Reject Ho if p = P(Z <= |z|) <= FDR/2 with stopping rule

.
. dunntest iq2, by(iage) ma(bh) wrap

Warning: by() values are unlabeled, option nolabel implicit


Kruskal-Wallis equality-of-populations rank test

  +-----------------------+
  | iage | Obs | Rank Sum |
  |------+-----+----------|
  |    3 |   2 |    57.00 |
  |    4 |  12 |   320.50 |
  |    5 |  14 |   396.50 |
  |    6 |  25 |   857.50 |
  |    7 |  10 |   384.50 |
  +-----------------------+

chi-squared =     3.269 with 4 d.f.
probability =     0.5139

chi-squared with ties =     4.720 with 4 d.f.
probability =     0.3173


                 Dunn's Pairwise Comparison of iq2 by iage
                            (Benjamini-Hochberg)
Col Mean-|
Row Mean |             3             4             5             6
---------+--------------------------------------------
       4 |   0.153782
         |     0.4877
         |
       5 |   0.015486  -0.268804
         |     0.4938     0.4926
         |
       6 |  -0.517415  -1.417114  -1.174105
         |     0.4320     0.2607     0.3004
         |
       7 |  -0.842084  -1.797699  -1.603668  -0.727096
         |     0.3997     0.3611     0.2720     0.3893

False Discovery Rate =   0.05
Reject Ho if p = P(Z <= |z|) <= FDR/2 with stopping rule

.
. dunntest iq3, by(iage) ma(bh) wrap

Warning: by() values are unlabeled, option nolabel implicit


Kruskal-Wallis equality-of-populations rank test

  +-----------------------+
  | iage | Obs | Rank Sum |
  |------+-----+----------|
  |    3 |   2 |    20.00 |
  |    4 |  12 |   428.00 |
  |    5 |  14 |   405.50 |
  |    6 |  25 |   806.00 |
  |    7 |  10 |   356.50 |
  +-----------------------+

chi-squared =     4.146 with 4 d.f.
probability =     0.3866
```

```
chi-squared with ties =     8.316 with 4 d.f.
probability =     0.0807


                  Dunn's Pairwise Comparison of iq3 by iage
                              (Benjamini-Hochberg)
Col Mean-|
Row Mean |              3              4              5              6
---------+--------------------------------------------
       4 |  -2.596467
         |     0.0471
         |
       5 |  -1.938328   1.316342
         |     0.0657     0.1881
         |
       6 |  -2.338350   0.753882  -0.758192
         |     0.0323     0.2818     0.3202
         |
       7 |  -2.558488   0.003007  -1.247607  -0.704145
         |     0.0263     0.4988     0.1768     0.2674

False Discovery Rate =   0.05
Reject Ho if p = P(Z <= |z|) <= FDR/2 with stopping rule

.
. dunntest iq4, by(iage) ma(bh) wrap

Warning: by() values are unlabeled, option nolabel implicit


Kruskal-Wallis equality-of-populations rank test

  +-----------------------+
  | iage | Obs | Rank Sum |
  |------+-----+----------|
  |    3 |   2 |    52.50 |
  |    4 |  12 |   305.00 |
  |    5 |  14 |   419.50 |
  |    6 |  25 |   854.50 |
  |    7 |  10 |   384.50 |
  +-----------------------+

chi-squared =     3.509 with 4 d.f.
probability =     0.4765

chi-squared with ties =     5.484 with 4 d.f.
probability =     0.2411


                  Dunn's Pairwise Comparison of iq4 by iage
                              (Benjamini-Hochberg)
Col Mean-|
Row Mean |              3              4              5              6
---------+--------------------------------------------
       4 |   0.074414
         |     0.4703
         |
       5 |  -0.335113  -0.788405
         |     0.4097     0.3587
         |
       6 |  -0.735992  -1.701869  -0.861331
         |     0.2886     0.2219     0.3891
         |
       7 |  -1.074190  -2.076021  -1.397796  -0.778325
         |     0.3534     0.1895     0.2703     0.3117

False Discovery Rate =   0.05
Reject Ho if p = P(Z <= |z|) <= FDR/2 with stopping rule

.
. dunntest iq5, by(iage) ma(bh) wrap

Warning: by() values are unlabeled, option nolabel implicit


Kruskal-Wallis equality-of-populations rank test

  +-----------------------+
```

```
  | iage | Obs | Rank Sum |
  |------+-----+----------|
  |    3 |   2 |    39.50 |
  |    4 |  12 |   326.00 |
  |    5 |  14 |   419.50 |
  |    6 |  25 |   861.00 |
  |    7 |  10 |   370.00 |
  +------------------------+

chi-squared =     3.087 with 4 d.f.
probability =     0.5433

chi-squared with ties =     7.650 with 4 d.f.
probability =     0.1053


                 Dunn's Pairwise Comparison of iq5 by iage
                            (Benjamini-Hochberg)
Col Mean-|
Row Mean |           3            4            5            6
---------+--------------------------------------------
       4 |   -0.833898
         |      0.2527
         |
       5 |   -1.160351    -0.610687
         |      0.2049       0.3008
         |
       6 |   -1.716672    -1.778507    -1.151401
         |      0.1075       0.1255       0.1783
         |
       7 |   -1.912387    -1.972161    -1.459248    -0.587541
         |      0.1396       0.2430       0.1445       0.2784

False Discovery Rate =   0.05
Reject Ho if p = P(Z <= |z|) <= FDR/2 with stopping rule

.
. dunntest iq6, by(iage) ma(bh) wrap

Warning: by() values are unlabeled, option nolabel implicit


Kruskal-Wallis equality-of-populations rank test

  +------------------------+
  | iage | Obs | Rank Sum |
  |------+-----+----------|
  |    3 |   2 |    83.00 |
  |    4 |  12 |   402.50 |
  |    5 |  14 |   380.00 |
  |    6 |  25 |   742.50 |
  |    7 |   9 |   345.00 |
  +------------------------+

chi-squared =     3.125 with 4 d.f.
probability =     0.5372

chi-squared with ties =     4.632 with 4 d.f.
probability =     0.3272


                 Dunn's Pairwise Comparison of iq6 by iage
                            (Benjamini-Hochberg)
Col Mean-|
Row Mean |           3            4            5            6
---------+--------------------------------------------
       4 |    0.703165
         |      0.3012
         |
       5 |    1.281683     1.097642
         |      0.3333       0.3405
         |
       6 |    1.083624     0.738198    -0.516952
         |      0.2785       0.3837       0.3362
         |
       7 |    0.273361    -0.733301    -1.767517    -1.498732
         |      0.3923       0.3310       0.3857       0.3349

False Discovery Rate =   0.05
```

```
Reject Ho if p = P(Z <= |z|) <= FDR/2 with stopping rule

.
. dunntest iq7, by(iage) ma(bh) wrap

Warning: by() values are unlabeled, option nolabel implicit


Kruskal-Wallis equality-of-populations rank test

  +-----------------------+
  | iage | Obs | Rank Sum |
  |------+-----+----------|
  |    3 |   2 |    18.00 |
  |    4 |  12 |   342.00 |
  |    5 |  14 |   476.00 |
  |    6 |  25 |   827.00 |
  |    7 |  10 |   353.00 |
  +-----------------------+

chi-squared =     4.164 with 4 d.f.
probability =     0.3843

chi-squared with ties =     5.665 with 4 d.f.
probability =     0.2256


                 Dunn's Pairwise Comparison of iq7 by iage
                            (Benjamini-Hochberg)
Col Mean-|
Row Mean |            3             4             5             6
---------+--------------------------------------------
       4 |  -1.624636
         |     0.1303
         |
       5 |  -2.104451  -0.889632
         |     0.0883     0.3114
         |
       6 |  -2.085160  -0.829861   0.175376
         |     0.0618     0.2904     0.4304
         |
       7 |  -2.160529  -1.010574  -0.199794  -0.377545
         |     0.1537     0.3122     0.4676     0.4411

False Discovery Rate =   0.05
Reject Ho if p = P(Z <= |z|) <= FDR/2 with stopping rule

.
. dunntest iq8, by(iage) ma(bh) wrap

Warning: by() values are unlabeled, option nolabel implicit


Kruskal-Wallis equality-of-populations rank test

  +-----------------------+
  | iage | Obs | Rank Sum |
  |------+-----+----------|
  |    3 |   2 |    62.00 |
  |    4 |  12 |   319.50 |
  |    5 |  14 |   441.00 |
  |    6 |  25 |   806.50 |
  |    7 |  10 |   387.00 |
  +-----------------------+

chi-squared =     2.389 with 4 d.f.
probability =     0.6646

chi-squared with ties =     2.751 with 4 d.f.
probability =     0.6003


                 Dunn's Pairwise Comparison of iq8 by iage
                            (Benjamini-Hochberg)
Col Mean-|
Row Mean |            3             4             5             6
---------+--------------------------------------------
       4 |   0.335334
         |     0.5267
```

```
          |
        5 |  -0.038721  -0.725439
          |     0.4846     0.4682
          |
        6 |  -0.100377  -0.939317  -0.133283
          |     0.5111     0.4345     0.5587
          |
        7 |  -0.581934  -1.650916  -1.018004  -1.007582
          |     0.4672     0.4938     0.7717     0.5228

False Discovery Rate =   0.05
Reject Ho if p = P(Z <= |z|) <= FDR/2 with stopping rule

.
. dunntest iq9, by(iage) ma(bh) wrap

Warning: by() values are unlabeled, option nolabel implicit


Kruskal-Wallis equality-of-populations rank test

  +-----------------------+
  | iage | Obs | Rank Sum |
  |------+-----+----------|
  |    3 |   2 |    58.00 |
  |    4 |  12 |   289.50 |
  |    5 |  14 |   451.00 |
  |    6 |  25 |   843.50 |
  |    7 |  10 |   374.00 |
  +-----------------------+

chi-squared =     3.363 with 4 d.f.
probability =     0.4989

chi-squared with ties =     4.008 with 4 d.f.
probability =     0.4049


                 Dunn's Pairwise Comparison of iq9 by iage
                            (Benjamini-Hochberg)
Col Mean-|
Row Mean |             3             4             5             6
---------+--------------------------------------------
        4 |   0.380111
          |     0.4399
          |
        5 |  -0.253220  -1.224538
          |     0.4000     0.3679
          |
        6 |  -0.384128  -1.630434  -0.272188
          |     0.5006     0.2575     0.4364
          |
        7 |  -0.645800  -1.846324  -0.745866  -0.582520
          |     0.5184     0.3242     0.5697     0.4668

False Discovery Rate =   0.05
Reject Ho if p = P(Z <= |z|) <= FDR/2 with stopping rule

.
. dunntest iq10, by(iage) ma(bh) wrap

Warning: by() values are unlabeled, option nolabel implicit


Kruskal-Wallis equality-of-populations rank test

  +-----------------------+
  | iage | Obs | Rank Sum |
  |------+-----+----------|
  |    3 |   2 |    70.00 |
  |    4 |  12 |   389.00 |
  |    5 |  14 |   394.00 |
  |    6 |  25 |   813.00 |
  |    7 |  10 |   350.00 |
  +-----------------------+

chi-squared =     0.968 with 4 d.f.
probability =     0.9147
```

```
chi-squared with ties =     3.737 with 4 d.f.
probability =     0.4428


                  Dunn's Pairwise Comparison of iq10 by iage
                              (Benjamini-Hochberg)
Col Mean-|
Row Mean |            3            4            5            6
---------+--------------------------------------------
       4 |   0.362629
         |     0.5121
         |
       5 |   0.972529   1.164725
         |     0.4135     0.4069
         |
       6 |   0.361822  -0.031546  -1.405830
         |     0.4484     0.5416     0.3994
         |
       7 |   0.000000  -0.646845  -1.775587  -0.710605
         |     0.5000     0.4314     0.3790     0.4773

False Discovery Rate =   0.05
Reject Ho if p = P(Z <= |z|) <= FDR/2 with stopping rule
```

- Question – For each of the questions, 1-10, is there a difference in the average response by gender?

```
. dunntest iq1, by(igender)

Warning: by() values are unlabeled, option nolabel implicit


Kruskal-Wallis equality-of-populations rank test

  +--------------------------+
  | igender | Obs | Rank Sum |
  |---------+-----+----------|
  |       1 |  19 |   636.50 |
  |       2 |  44 |  1379.50 |
  +--------------------------+

chi-squared =     0.182 with 1 d.f.
probability =     0.6695

chi-squared with ties =     1.338 with 1 d.f.
probability =     0.2474


                Dunn's Pairwise Comparison of iq1 by igender
                              (No adjustment)
Col Mean-|
Row Mean |            1
---------+-----------
       2 |   1.156689
         |     0.1237

alpha =   0.05
Reject Ho if p = P(Z <= |z|) <= alpha/2

.
. dunntest iq2, by(igender)

Warning: by() values are unlabeled, option nolabel implicit


Kruskal-Wallis equality-of-populations rank test

  +--------------------------+
  | igender | Obs | Rank Sum |
  |---------+-----+----------|
  |       1 |  19 |   565.00 |
  |       2 |  44 |  1451.00 |
  +--------------------------+

chi-squared =     0.415 with 1 d.f.
probability =     0.5196
```

```
chi-squared with ties =     0.599 with 1 d.f.
probability =     0.4390


                Dunn's Pairwise Comparison of iq2 by igender
                              (No adjustment)
Col Mean-|
Row Mean |             1
---------+-----------
       2 |  -0.773826
         |     0.2195

alpha =   0.05
Reject Ho if p = P(Z <= |z|) <= alpha/2

.
. dunntest iq3, by(igender)

Warning: by() values are unlabeled, option nolabel implicit


Kruskal-Wallis equality-of-populations rank test

  +--------------------------+
  | igender | Obs | Rank Sum |
  |---------+-----+----------|
  |       1 |  19 |   629.00 |
  |       2 |  44 |  1387.00 |
  +--------------------------+

chi-squared =     0.099 with 1 d.f.
probability =     0.7531

chi-squared with ties =     0.198 with 1 d.f.
probability =     0.6560


                Dunn's Pairwise Comparison of iq3 by igender
                              (No adjustment)
Col Mean-|
Row Mean |             1
---------+-----------
       2 |   0.445408
         |     0.3280

alpha =   0.05
Reject Ho if p = P(Z <= |z|) <= alpha/2

.
. dunntest iq4, by(igender)

Warning: by() values are unlabeled, option nolabel implicit


Kruskal-Wallis equality-of-populations rank test

  +--------------------------+
  | igender | Obs | Rank Sum |
  |---------+-----+----------|
  |       1 |  19 |   534.50 |
  |       2 |  44 |  1481.50 |
  +--------------------------+

chi-squared =     1.212 with 1 d.f.
probability =     0.2710

chi-squared with ties =     1.894 with 1 d.f.
probability =     0.1688


                Dunn's Pairwise Comparison of iq4 by igender
                              (No adjustment)
Col Mean-|
Row Mean |             1
---------+-----------
       2 |  -1.376105
         |     0.0844

alpha =   0.05
```

```
Reject Ho if p = P(Z <= |z|) <= alpha/2

.
. dunntest iq5, by(igender)

Warning: by() values are unlabeled, option nolabel implicit


Kruskal-Wallis equality-of-populations rank test

  +--------------------------+
  | igender | Obs | Rank Sum |
  |---------+-----+----------|
  |       1 |  19 |   614.50 |
  |       2 |  44 |  1401.50 |
  +--------------------------+

chi-squared =     0.009 with 1 d.f.
probability =     0.9225

chi-squared with ties =     0.023 with 1 d.f.
probability =     0.8782


                Dunn's Pairwise Comparison of iq5 by igender
                              (No adjustment)
Col Mean-|
Row Mean |             1
---------+-----------
       2 |   0.153230
         |     0.4391

alpha =   0.05
Reject Ho if p = P(Z <= |z|) <= alpha/2

.
. dunntest iq6, by(igender)

Warning: by() values are unlabeled, option nolabel implicit


Kruskal-Wallis equality-of-populations rank test

  +--------------------------+
  | igender | Obs | Rank Sum |
  |---------+-----+----------|
  |       1 |  19 |   587.50 |
  |       2 |  43 |  1365.50 |
  +--------------------------+

chi-squared =     0.028 with 1 d.f.
probability =     0.8666

chi-squared with ties =     0.042 with 1 d.f.
probability =     0.8380


                Dunn's Pairwise Comparison of iq6 by igender
                              (No adjustment)
Col Mean-|
Row Mean |             1
---------+-----------
       2 |  -0.204490
         |     0.4190

alpha =   0.05
Reject Ho if p = P(Z <= |z|) <= alpha/2

.
. dunntest iq7, by(igender)

Warning: by() values are unlabeled, option nolabel implicit


Kruskal-Wallis equality-of-populations rank test

  +--------------------------+
  | igender | Obs | Rank Sum |
  |---------+-----+----------|
```

```
  |       1 |  19 |   551.00 |
  |       2 |  44 |  1465.00 |
  +--------------------------+

chi-squared =     0.729 with 1 d.f.
probability =     0.3933

chi-squared with ties =     0.991 with 1 d.f.
probability =     0.3194


                Dunn's Pairwise Comparison of iq7 by igender
                              (No adjustment)
Col Mean-|
Row Mean |             1
---------+-----------
       2 |  -0.995685
         |     0.1597

alpha =   0.05
Reject Ho if p = P(Z <= |z|) <= alpha/2

.
. dunntest iq8, by(igender)

Warning: by() values are unlabeled, option nolabel implicit


Kruskal-Wallis equality-of-populations rank test

  +--------------------------+
  | igender | Obs | Rank Sum |
  |---------+-----+----------|
  |       1 |  19 |   561.00 |
  |       2 |  44 |  1455.00 |
  +--------------------------+

chi-squared =     0.495 with 1 d.f.
probability =     0.4815

chi-squared with ties =     0.570 with 1 d.f.
probability =     0.4501


                Dunn's Pairwise Comparison of iq8 by igender
                              (No adjustment)
Col Mean-|
Row Mean |             1
---------+-----------
       2 |  -0.755307
         |     0.2250

alpha =   0.05
Reject Ho if p = P(Z <= |z|) <= alpha/2

.
. dunntest iq9, by(igender)

Warning: by() values are unlabeled, option nolabel implicit


Kruskal-Wallis equality-of-populations rank test

  +--------------------------+
  | igender | Obs | Rank Sum |
  |---------+-----+----------|
  |       1 |  19 |   491.00 |
  |       2 |  44 |  1525.00 |
  +--------------------------+

chi-squared =     3.070 with 1 d.f.
probability =     0.0797

chi-squared with ties =     3.658 with 1 d.f.
probability =     0.0558


                Dunn's Pairwise Comparison of iq9 by igender
                              (No adjustment)
```

```
Col Mean-|
Row Mean |          1
---------+-----------
       2 |  -1.912701
         |     0.0279

alpha =   0.05
Reject Ho if p = P(Z <= |z|) <= alpha/2

.
. dunntest iq10, by(igender)

Warning: by() values are unlabeled, option nolabel implicit


Kruskal-Wallis equality-of-populations rank test

  +---------------------------+
  | igender | Obs | Rank Sum |
  |---------+-----+----------|
  |       1 |  19 |   603.00 |
  |       2 |  44 |  1413.00 |
  +---------------------------+

chi-squared =     0.006 with 1 d.f.
probability =     0.9403

chi-squared with ties =     0.022 with 1 d.f.
probability =     0.8830


               Dunn's Pairwise Comparison of iq10 by igender
                              (No adjustment)
Col Mean-|
Row Mean |          1
---------+-----------
       2 |  -0.147156
         |     0.4415

alpha =   0.05
Reject Ho if p = P(Z <= |z|) <= alpha/2
```

- Question – For each of the questions, 1-10, is there a difference in the average response by level of education

```
. dunntest iq1, by(ied) ma(bh) wrap

Warning: by() values are unlabeled, option nolabel implicit


Kruskal-Wallis equality-of-populations rank test

  +-----------------------+
  | ied | Obs | Rank Sum |
  |-----+-----+----------|
  |   1 |   1 |    32.50 |
  |   2 |   3 |    97.50 |
  |   3 |  57 |  1761.00 |
  +-----------------------+

chi-squared =     0.031 with 2 d.f.
probability =     0.9848

chi-squared with ties =     0.218 with 2 d.f.
probability =     0.8969


                  Dunn's Pairwise Comparison of iq1 by ied
                           (Benjamini-Hochberg)
Col Mean-|
Row Mean |          1           2
---------+----------------------
       2 |   0.000000
         |     0.5000
         |
       3 |   0.239229    0.407392
         |     0.6082      1.0000
```

```
False Discovery Rate =   0.05
Reject Ho if p = P(Z <= |z|) <= FDR/2 with stopping rule

.
. dunntest iq2, by(ied) ma(bh) wrap

Warning: by() values are unlabeled, option nolabel implicit


Kruskal-Wallis equality-of-populations rank test

  +-----------------------+
  | ied | Obs | Rank Sum |
  |-----+-----+----------|
  |   1 |   1 |    40.50 |
  |   2 |   3 |   121.50 |
  |   3 |  57 |  1729.00 |
  +-----------------------+

chi-squared =     1.226 with 2 d.f.
probability =     0.5418

chi-squared with ties =     1.853 with 2 d.f.
probability =     0.3959


                  Dunn's Pairwise Comparison of iq2 by ied
                            (Benjamini-Hochberg)
Col Mean-|
Row Mean |            1            2
---------+----------------------
       2 |   0.000000
         |     0.5000
         |
       3 |   0.698004   1.188657
         |     0.3639     0.3519

False Discovery Rate =   0.05
Reject Ho if p = P(Z <= |z|) <= FDR/2 with stopping rule

.
. dunntest iq3, by(ied) ma(bh) wrap

Warning: by() values are unlabeled, option nolabel implicit


Kruskal-Wallis equality-of-populations rank test

  +-----------------------+
  | ied | Obs | Rank Sum |
  |-----+-----+----------|
  |   1 |   1 |    36.50 |
  |   2 |   3 |   109.50 |
  |   3 |  57 |  1745.00 |
  +-----------------------+

chi-squared =     0.411 with 2 d.f.
probability =     0.8143

chi-squared with ties =     0.917 with 2 d.f.
probability =     0.6323


                  Dunn's Pairwise Comparison of iq3 by ied
                            (Benjamini-Hochberg)
Col Mean-|
Row Mean |            1            2
---------+----------------------
       2 |   0.000000
         |     0.5000
         |
       3 |   0.490961   0.836076
         |     0.4676     0.6047

False Discovery Rate =   0.05
Reject Ho if p = P(Z <= |z|) <= FDR/2 with stopping rule

.
```

```
. dunntest iq4, by(ied) ma(bh) wrap

Warning: by() values are unlabeled, option nolabel implicit


Kruskal-Wallis equality-of-populations rank test

  +----------------------+
  | ied | Obs | Rank Sum |
  |-----+-----+----------|
  |   1 |   1 |    40.00 |
  |   2 |   3 |   120.00 |
  |   3 |  57 |  1731.00 |
  +----------------------+

chi-squared =     1.100 with 2 d.f.
probability =     0.5769

chi-squared with ties =     1.741 with 2 d.f.
probability =     0.4187


                  Dunn's Pairwise Comparison of iq4 by ied
                            (Benjamini-Hochberg)
Col Mean-|
Row Mean |             1            2
---------+----------------------
       2 |   0.000000
         |     0.5000
         |
       3 |   0.676626   1.152253
         |     0.3740     0.3738

False Discovery Rate =   0.05
Reject Ho if p = P(Z <= |z|) <= FDR/2 with stopping rule

.
. dunntest iq5, by(ied) ma(bh) wrap

Warning: by() values are unlabeled, option nolabel implicit


Kruskal-Wallis equality-of-populations rank test

  +----------------------+
  | ied | Obs | Rank Sum |
  |-----+-----+----------|
  |   1 |   1 |    35.50 |
  |   2 |   3 |    73.50 |
  |   3 |  57 |  1782.00 |
  +----------------------+

chi-squared =     0.479 with 2 d.f.
probability =     0.7870

chi-squared with ties =     1.261 with 2 d.f.
probability =     0.5323


                  Dunn's Pairwise Comparison of iq5 by ied
                            (Benjamini-Hochberg)
Col Mean-|
Row Mean |             1            2
---------+----------------------
       2 |   0.870715
         |     0.2879
         |
       3 |   0.383900  -1.043578
         |     0.3505     0.4450

False Discovery Rate =   0.05
Reject Ho if p = P(Z <= |z|) <= FDR/2 with stopping rule

.
. dunntest iq6, by(ied) ma(bh) wrap

Warning: by() values are unlabeled, option nolabel implicit
```

```
Kruskal-Wallis equality-of-populations rank test

  +----------------------+
  | ied | Obs | Rank Sum |
  |-----+-----+----------|
  |   1 |   1 |    40.50 |
  |   2 |   3 |    94.00 |
  |   3 |  56 |  1695.50 |
  +----------------------+

chi-squared =     0.344 with 2 d.f.
probability =     0.8420

chi-squared with ties =     0.500 with 2 d.f.
probability =     0.7788


                  Dunn's Pairwise Comparison of iq6 by ied
                            (Benjamini-Hochberg)
Col Mean-|
Row Mean |            1            2
---------+----------------------
       2 |   0.548145
         |     0.4377
         |
       3 |   0.699677   0.123104
         |     0.7262     0.4510

False Discovery Rate =   0.05
Reject Ho if p = P(Z <= |z|) <= FDR/2 with stopping rule

.
. dunntest iq7, by(ied) ma(bh) wrap

Warning: by() values are unlabeled, option nolabel implicit


Kruskal-Wallis equality-of-populations rank test

  +----------------------+
  | ied | Obs | Rank Sum |
  |-----+-----+----------|
  |   1 |   1 |    42.50 |
  |   2 |   3 |    99.50 |
  |   3 |  57 |  1749.00 |
  +----------------------+

chi-squared =     0.482 with 2 d.f.
probability =     0.7857

chi-squared with ties =     0.659 with 2 d.f.
probability =     0.7194


                  Dunn's Pairwise Comparison of iq7 by ied
                            (Benjamini-Hochberg)
Col Mean-|
Row Mean |            1            2
---------+----------------------
       2 |   0.532085
         |     0.4460
         |
       3 |   0.771080   0.275878
         |     0.6610     0.3913

False Discovery Rate =   0.05
Reject Ho if p = P(Z <= |z|) <= FDR/2 with stopping rule

.
. dunntest iq8, by(ied) ma(bh) wrap

Warning: by() values are unlabeled, option nolabel implicit


Kruskal-Wallis equality-of-populations rank test

  +----------------------+
  | ied | Obs | Rank Sum |
  |-----+-----+----------|
```

```
  |   1 |   1 |     47.00 |
  |   2 |   3 |    120.50 |
  |   3 |  57 |   1723.50 |
  +-----------------------+

chi-squared =     1.717 with 2 d.f.
probability =     0.4237

chi-squared with ties =     1.981 with 2 d.f.
probability =     0.3713


                  Dunn's Pairwise Comparison of iq8 by ied
                            (Benjamini-Hochberg)
Col Mean-|
Row Mean |             1            2
---------+----------------------
       2 |   0.358033
         |     0.3602
         |
       3 |   1.005400   1.014200
         |     0.2360     0.4657

False Discovery Rate =   0.05
Reject Ho if p = P(Z <= |z|) <= FDR/2 with stopping rule

.
. dunntest iq9, by(ied) ma(bh) wrap

Warning: by() values are unlabeled, option nolabel implicit


Kruskal-Wallis equality-of-populations rank test

  +-----------------------+
  | ied | Obs | Rank Sum |
  |-----+-----+----------|
  |   1 |   1 |     45.50 |
  |   2 |   3 |    136.50 |
  |   3 |  57 |   1709.00 |
  +-----------------------+

chi-squared =     2.856 with 2 d.f.
probability =     0.2398

chi-squared with ties =     3.409 with 2 d.f.
probability =     0.1819


                  Dunn's Pairwise Comparison of iq9 by ied
                            (Benjamini-Hochberg)
Col Mean-|
Row Mean |             1            2
---------+----------------------
       2 |   0.000000
         |     0.5000
         |
       3 |   0.946695   1.612164
         |     0.2578     0.1604

False Discovery Rate =   0.05
Reject Ho if p = P(Z <= |z|) <= FDR/2 with stopping rule

.
. dunntest iq10, by(ied) ma(bh) wrap

Warning: by() values are unlabeled, option nolabel implicit


Kruskal-Wallis equality-of-populations rank test

  +-----------------------+
  | ied | Obs | Rank Sum |
  |-----+-----+----------|
  |   1 |   1 |     33.50 |
  |   2 |   3 |    100.50 |
  |   3 |  57 |   1757.00 |
  +-----------------------+
```

```
chi-squared =     0.085 with 2 d.f.
probability =     0.9584

chi-squared with ties =     0.375 with 2 d.f.
probability =     0.8288


                 Dunn's Pairwise Comparison of iq10 by ied
                            (Benjamini-Hochberg)
Col Mean-|
Row Mean |            1             2
---------+----------------------
       2 |   0.000000
         |     0.5000
         |
       3 |   0.314214   0.535088
         |     0.5650     0.8889

False Discovery Rate =   0.05
Reject Ho if p = P(Z <= |z|) <= FDR/2 with stopping rule

-----------------------------------------------------------------------------------------------------------------
```

- Question: For each of the questions, is there a difference in the average response based upon racer or ethnicity

```
. dunntest iq1, by(ieth) ma(bh) wrap

Warning: by() values are unlabeled, option nolabel implicit


Kruskal-Wallis equality-of-populations rank test

  +-----------------------+
  | ieth | Obs | Rank Sum |
  |------+-----+----------|
  |    1 |  53 |  1744.50 |
  |    2 |   2 |    36.00 |
  |    3 |   1 |    33.50 |
  |    4 |   4 |   134.00 |
  |    7 |   3 |    68.00 |
  +-----------------------+

chi-squared =     2.110 with 4 d.f.
probability =     0.7155

chi-squared with ties =    15.496 with 4 d.f.
probability =     0.0038


                 Dunn's Pairwise Comparison of iq1 by ieth
                            (Benjamini-Hochberg)
Col Mean-|
Row Mean |            1             2             3             4
---------+--------------------------------------------
       2 |   3.061273
         |     0.0110
         |
       3 |  -0.085671  -1.871072
         |     0.5176     0.0613
         |
       4 |  -0.166771  -2.646096   0.000000
         |     0.5422     0.0204     0.5000
         |
       7 |   2.553091  -0.755791   1.387066   2.097047
         |     0.0178     0.3213     0.1379     0.0450

False Discovery Rate =   0.05
Reject Ho if p = P(Z <= |z|) <= FDR/2 with stopping rule

.
. dunntest iq2, by(ieth) ma(bh) wrap

Warning: by() values are unlabeled, option nolabel implicit


Kruskal-Wallis equality-of-populations rank test

  +-----------------------+
```

```
  | ieth | Obs | Rank Sum |
  |------+-----+----------|
  |    1 |  53 |  1798.50 |
  |    2 |   2 |    48.00 |
  |    3 |   1 |     2.00 |
  |    4 |   4 |    77.00 |
  |    7 |   3 |    90.50 |
  +-----------------------+

chi-squared =     5.615 with 4 d.f.
probability =     0.2298

chi-squared with ties =     8.107 with 4 d.f.
probability =     0.0877


                 Dunn's Pairwise Comparison of iq2 by ieth
                            (Benjamini-Hochberg)
Col Mean-|
Row Mean |             1             2             3             4
---------+------------------------------------------------------
       2 |   0.904070
         |     0.2614
         |
       3 |   2.073966   1.177565
         |     0.1904     0.2987
         |
       4 |   1.856443   0.359560  -1.011444
         |     0.1585     0.3596     0.3118
         |
       7 |   0.416143  -0.442842  -1.599094  -0.937000
         |     0.3763     0.4112     0.1830     0.2906

False Discovery Rate =   0.05
Reject Ho if p = P(Z <= |z|) <= FDR/2 with stopping rule

.
. dunntest iq3, by(ieth) ma(bh) wrap

Warning: by() values are unlabeled, option nolabel implicit


Kruskal-Wallis equality-of-populations rank test

  +-----------------------+
  | ieth | Obs | Rank Sum |
  |------+-----+----------|
  |    1 |  53 |  1761.50 |
  |    2 |   2 |    14.50 |
  |    3 |   1 |    38.50 |
  |    4 |   4 |   120.00 |
  |    7 |   3 |    81.50 |
  +-----------------------+

chi-squared =     4.269 with 4 d.f.
probability =     0.3708

chi-squared with ties =     8.563 with 4 d.f.
probability =     0.0730


                 Dunn's Pairwise Comparison of iq3 by ieth
                            (Benjamini-Hochberg)
Col Mean-|
Row Mean |             1             2             3             4
---------+------------------------------------------------------
       2 |   2.787277
         |     0.0266
         |
       3 |  -0.402941  -1.971406
         |     0.3817     0.0811
         |
       4 |   0.482159  -2.029656   0.587402
         |     0.3936     0.1060     0.3978
         |
       7 |   0.790144  -1.685695   0.758333   0.286623
         |     0.4294     0.1148     0.3735     0.3872

False Discovery Rate =   0.05
```

```
Reject Ho if p = P(Z <= |z|) <= FDR/2 with stopping rule

.
. dunntest iq4, by(ieth) ma(bh) wrap

Warning: by() values are unlabeled, option nolabel implicit


Kruskal-Wallis equality-of-populations rank test

  +-----------------------+
  | ieth | Obs | Rank Sum |
  |------+-----+----------|
  |    1 |  53 |  1803.00 |
  |    2 |   2 |    22.00 |
  |    3 |   1 |    41.50 |
  |    4 |   4 |    95.00 |
  |    7 |   3 |    54.50 |
  +-----------------------+

chi-squared =     6.055 with 4 d.f.
probability =     0.1951

chi-squared with ties =     9.464 with 4 d.f.
probability =     0.0505


                 Dunn's Pairwise Comparison of iq4 by ieth
                            (Benjamini-Hochberg)
Col Mean-|
Row Mean |            1             2             3             4
---------+--------------------------------------------
       2 |   2.179479
         |     0.1465
         |
       3 |  -0.505482  -1.698444
         |     0.3407     0.1490
         |
       4 |   1.350673  -1.004099   1.082780
         |     0.1768     0.2252     0.2324
         |
       7 |   1.821760  -0.535433   1.378175   0.498577
         |     0.1712     0.3702     0.2102     0.3090

False Discovery Rate =   0.05
Reject Ho if p = P(Z <= |z|) <= FDR/2 with stopping rule

.
. dunntest iq5, by(ieth) ma(bh) wrap

Warning: by() values are unlabeled, option nolabel implicit


Kruskal-Wallis equality-of-populations rank test

  +-----------------------+
  | ieth | Obs | Rank Sum |
  |------+-----+----------|
  |    1 |  53 |  1808.50 |
  |    2 |   2 |    39.50 |
  |    3 |   1 |     7.50 |
  |    4 |   4 |   148.00 |
  |    7 |   3 |    12.50 |
  +-----------------------+

chi-squared =    10.605 with 4 d.f.
probability =     0.0314

chi-squared with ties =    26.277 with 4 d.f.
probability =     0.0001


                 Dunn's Pairwise Comparison of iq5 by ieth
                            (Benjamini-Hochberg)
Col Mean-|
Row Mean |            1             2             3             4
---------+--------------------------------------------
       2 |   1.713447
         |     0.0866
```

```
           |
         3 |   2.264929   0.858920
           |     0.0294     0.2440
           |
         4 |  -0.476526  -1.710491  -2.265841
           |     0.3521     0.0726     0.0391
           |
         7 |   4.334614   1.465931   0.247897   3.691637
           |     0.0001     0.1019     0.4021     0.0006

False Discovery Rate =   0.05
Reject Ho if p = P(Z <= |z|) <= FDR/2 with stopping rule

.
. dunntest iq6, by(ieth) ma(bh) wrap

Warning: by() values are unlabeled, option nolabel implicit


Kruskal-Wallis equality-of-populations rank test

  +------------------------+
  | ieth | Obs | Rank Sum |
  |------+-----+----------|
  |    1 |  52 |  1672.00 |
  |    2 |   2 |    54.50 |
  |    3 |   1 |    41.50 |
  |    4 |   4 |   166.00 |
  |    7 |   3 |    19.00 |
  +------------------------+

chi-squared =     7.553 with 4 d.f.
probability =     0.1094

chi-squared with ties =    11.196 with 4 d.f.
probability =     0.0245


                 Dunn's Pairwise Comparison of iq6 by ieth
                            (Benjamini-Hochberg)
Col Mean-|
Row Mean |            1            2            3            4
---------+--------------------------------------------
         2 |   0.459251
           |     0.3589
           |
         3 |  -0.624727  -0.785168
           |     0.3326     0.3088
           |
         4 |  -1.215526  -1.110396   0.000000
           |     0.2242     0.2224     0.5000
           |
         7 |   2.934536   1.546239   2.055206   3.107180
           |     0.0084     0.1526     0.0664     0.0094

False Discovery Rate =   0.05
Reject Ho if p = P(Z <= |z|) <= FDR/2 with stopping rule

.
. dunntest iq7, by(ieth) ma(bh) wrap

Warning: by() values are unlabeled, option nolabel implicit


Kruskal-Wallis equality-of-populations rank test

  +------------------------+
  | ieth | Obs | Rank Sum |
  |------+-----+----------|
  |    1 |  53 |  1815.00 |
  |    2 |   2 |    47.00 |
  |    3 |   1 |    15.00 |
  |    4 |   4 |    77.00 |
  |    7 |   3 |    62.00 |
  +------------------------+

chi-squared =     5.167 with 4 d.f.
probability =     0.2705
```

```
chi-squared with ties =     7.030 with 4 d.f.
probability =     0.1343


                 Dunn's Pairwise Comparison of iq7 by ieth
                            (Benjamini-Hochberg)
Col Mean-|
Row Mean |            1            2            3            4
---------+--------------------------------------------
       2 |   0.949225
         |     0.4281
         |
       3 |   1.213236   0.441625
         |     0.3751     0.6588
         |
       4 |   1.840200   0.312276  -0.241888
         |     0.3287     0.5392     0.5055
         |
       7 |   1.455928   0.197500  -0.312276  -0.118029
         |     0.3635     0.4686     0.6290     0.4530

False Discovery Rate =   0.05
Reject Ho if p = P(Z <= |z|) <= FDR/2 with stopping rule

.
. dunntest iq8, by(ieth) ma(bh) wrap

Warning: by() values are unlabeled, option nolabel implicit


Kruskal-Wallis equality-of-populations rank test

  +-----------------------+
  | ieth | Obs | Rank Sum |
  |------+-----+----------|
  |    1 |  53 |  1804.00 |
  |    2 |   2 |    27.00 |
  |    3 |   1 |    48.50 |
  |    4 |   4 |    92.50 |
  |    7 |   3 |    44.00 |
  +-----------------------+

chi-squared =     7.123 with 4 d.f.
probability =     0.1295

chi-squared with ties =     8.202 with 4 d.f.
probability =     0.0845


                 Dunn's Pairwise Comparison of iq8 by ieth
                            (Benjamini-Hochberg)
Col Mean-|
Row Mean |            1            2            3            4
---------+--------------------------------------------
       2 |   1.669101
         |     0.1189
         |
       3 |  -0.838757  -1.672942
         |     0.2869     0.1572
         |
       4 |   1.232034  -0.650622   1.328647
         |     0.1816     0.3221     0.1840
         |
       7 |   1.910806  -0.074816   1.715276   0.648313
         |     0.2801     0.4702     0.2157     0.2871

False Discovery Rate =   0.05
Reject Ho if p = P(Z <= |z|) <= FDR/2 with stopping rule

.
. dunntest iq9, by(ieth) ma(bh) wrap

Warning: by() values are unlabeled, option nolabel implicit


Kruskal-Wallis equality-of-populations rank test

  +-----------------------+
  | ieth | Obs | Rank Sum |
```

```
  |------+-----+----------|
  |    1 |  53 |  1765.00 |
  |    2 |   2 |    58.00 |
  |    3 |   1 |    23.00 |
  |    4 |   4 |   108.50 |
  |    7 |   3 |    61.50 |
  +-----------------------+

chi-squared =     2.026 with 4 d.f.
probability =     0.7310

chi-squared with ties =     2.414 with 4 d.f.
probability =     0.6601


                 Dunn's Pairwise Comparison of iq9 by ieth
                            (Benjamini-Hochberg)
Col Mean-|
Row Mean |            1            2            3            4
---------+--------------------------------------------
       2 |   0.355651
         |     0.6018
         |
       3 |   0.607788   0.291742
         |     0.9055     0.5503
         |
       4 |   0.709405   0.128933  -0.219717
         |     1.0000     0.4986     0.5163
         |
       7 |   1.284614   0.554503   0.128933   0.516561
         |     0.9946     0.7240     0.4487     0.6055

False Discovery Rate =   0.05
Reject Ho if p = P(Z <= |z|) <= FDR/2 with stopping rule

.
. dunntest iq10, by(ieth) ma(bh) wrap

Warning: by() values are unlabeled, option nolabel implicit


Kruskal-Wallis equality-of-populations rank test

  +-----------------------+
  | ieth | Obs | Rank Sum |
  |------+-----+----------|
  |    1 |  53 |  1700.00 |
  |    2 |   2 |    70.00 |
  |    3 |   1 |    35.00 |
  |    4 |   4 |   140.00 |
  |    7 |   3 |    71.00 |
  +-----------------------+

chi-squared =     0.808 with 4 d.f.
probability =     0.9373

chi-squared with ties =     3.122 with 4 d.f.
probability =     0.5376


                 Dunn's Pairwise Comparison of iq10 by ieth
                            (Benjamini-Hochberg)
Col Mean-|
Row Mean |            1            2            3            4
---------+--------------------------------------------
       2 |  -0.435279
         |     0.5528
         |
       3 |  -0.310626   0.000000
         |     0.5401     0.5556
         |
       4 |  -0.604682   0.000000   0.000000
         |     0.5454     0.6250     0.5000
         |
       7 |   1.519075   1.331032   1.052274   1.590888
         |     0.3219     0.3053     0.3658     0.5582

False Discovery Rate =   0.05
Reject Ho if p = P(Z <= |z|) <= FDR/2 with stopping rule
```

```
----------------------------------------------------------------------------------------------------------------
```

- Question – For each of the questions, 1-10, is there a difference in the average response if respondent is or was a hospital worker?

```
. dunntest iq1, by(ihwork) ma(bh) wrap

Warning: by() values are unlabeled, option nolabel implicit


Kruskal-Wallis equality-of-populations rank test

  +--------------------------+
  | ihwork | Obs | Rank Sum |
  |--------+-----+----------|
  |      0 |  38 |  1211.00 |
  |      1 |  16 |   503.50 |
  |      2 |   9 |   301.50 |
  +--------------------------+

chi-squared =     0.076 with 2 d.f.
probability =     0.9629

chi-squared with ties =     0.556 with 2 d.f.
probability =     0.7574


                Dunn's Pairwise Comparison of iq1 by ihwork
                            (Benjamini-Hochberg)
Col Mean-|
Row Mean |            0            1
---------+----------------------
       1 |   0.198272
         |     0.4214
         |
       2 |  -0.650694  -0.720741
         |     0.3864     0.7066

False Discovery Rate =   0.05
Reject Ho if p = P(Z <= |z|) <= FDR/2 with stopping rule

.
. dunntest iq2, by(ihwork) ma(bh) wrap

Warning: by() values are unlabeled, option nolabel implicit


Kruskal-Wallis equality-of-populations rank test

  +--------------------------+
  | ihwork | Obs | Rank Sum |
  |--------+-----+----------|
  |      0 |  38 |  1229.50 |
  |      1 |  16 |   432.00 |
  |      2 |   9 |   354.50 |
  +--------------------------+

chi-squared =     2.667 with 2 d.f.
probability =     0.2635

chi-squared with ties =     3.851 with 2 d.f.
probability =     0.1458


                Dunn's Pairwise Comparison of iq2 by ihwork
                            (Benjamini-Hochberg)
Col Mean-|
Row Mean |            0            1
---------+----------------------
       1 |   1.177995
         |     0.1194
         |
       2 |  -1.243802  -1.949178
         |     0.1602     0.0769
```

```
False Discovery Rate =   0.05
Reject Ho if p = P(Z <= |z|) <= FDR/2 with stopping rule

.
. dunntest iq3, by(ihwork) ma(bh) wrap

Warning: by() values are unlabeled, option nolabel implicit


Kruskal-Wallis equality-of-populations rank test

  +-------------------------+
  | ihwork | Obs | Rank Sum |
  |--------+-----+----------|
  |      0 |  38 |  1187.00 |
  |      1 |  16 |   482.50 |
  |      2 |   9 |   346.50 |
  +-------------------------+

chi-squared =     1.359 with 2 d.f.
probability =     0.5068

chi-squared with ties =     2.727 with 2 d.f.
probability =     0.2558


                Dunn's Pairwise Comparison of iq3 by ihwork
                            (Benjamini-Hochberg)
Col Mean-|
Row Mean |             0             1
---------+----------------------
       1 |   0.280149
         |     0.3897
         |
       2 |  -1.513775  -1.547192
         |     0.0976     0.1827

False Discovery Rate =   0.05
Reject Ho if p = P(Z <= |z|) <= FDR/2 with stopping rule

.
. dunntest iq4, by(ihwork) ma(bh) wrap

Warning: by() values are unlabeled, option nolabel implicit


Kruskal-Wallis equality-of-populations rank test

  +-------------------------+
  | ihwork | Obs | Rank Sum |
  |--------+-----+----------|
  |      0 |  38 |  1109.50 |
  |      1 |  16 |   533.00 |
  |      2 |   9 |   373.50 |
  +-------------------------+

chi-squared =     3.388 with 2 d.f.
probability =     0.1838

chi-squared with ties =     5.295 with 2 d.f.
probability =     0.0708


                Dunn's Pairwise Comparison of iq4 by ihwork
                            (Benjamini-Hochberg)
Col Mean-|
Row Mean |             0             1
---------+----------------------
       1 |  -0.941750
         |     0.1732
         |
       2 |  -2.263389  -1.340169
         |     0.0354     0.1351

False Discovery Rate =   0.05
Reject Ho if p = P(Z <= |z|) <= FDR/2 with stopping rule

.
. dunntest iq5, by(ihwork) ma(bh) wrap
```

```
Warning: by() values are unlabeled, option nolabel implicit


Kruskal-Wallis equality-of-populations rank test

  +-------------------------+
  | ihwork | Obs | Rank Sum |
  |--------+-----+----------|
  |      0 |  38 |  1219.00 |
  |      1 |  16 |   464.00 |
  |      2 |   9 |   333.00 |
  +-------------------------+

chi-squared =     1.099 with 2 d.f.
probability =     0.5773

chi-squared with ties =     2.723 with 2 d.f.
probability =     0.2563


                Dunn's Pairwise Comparison of iq5 by ihwork
                            (Benjamini-Hochberg)
Col Mean-|
Row Mean |             0             1
---------+----------------------
       1 |   0.887196
         |     0.1875
         |
       2 |  -1.139947  -1.648784
         |     0.1907     0.1488

False Discovery Rate =   0.05
Reject Ho if p = P(Z <= |z|) <= FDR/2 with stopping rule

.
. dunntest iq6, by(ihwork) ma(bh) wrap

Warning: by() values are unlabeled, option nolabel implicit


Kruskal-Wallis equality-of-populations rank test

  +-------------------------+
  | ihwork | Obs | Rank Sum |
  |--------+-----+----------|
  |      0 |  38 |  1081.00 |
  |      1 |  16 |   540.00 |
  |      2 |   8 |   332.00 |
  +-------------------------+

chi-squared =     3.794 with 2 d.f.
probability =     0.1500

chi-squared with ties =     5.625 with 2 d.f.
probability =     0.0601


                Dunn's Pairwise Comparison of iq6 by ihwork
                            (Benjamini-Hochberg)
Col Mean-|
Row Mean |             0             1
---------+----------------------
       1 |  -1.200715
         |     0.1149
         |
       2 |  -2.264381  -1.207799
         |     0.0353     0.1703

False Discovery Rate =   0.05
Reject Ho if p = P(Z <= |z|) <= FDR/2 with stopping rule

.
. dunntest iq7, by(ihwork) ma(bh) wrap

Warning: by() values are unlabeled, option nolabel implicit


Kruskal-Wallis equality-of-populations rank test
```

```
  +-------------------------+
  | ihwork | Obs | Rank Sum |
  |--------+-----+----------|
  |      0 |  38 |  1189.00 |
  |      1 |  16 |   460.00 |
  |      2 |   9 |   367.00 |
  +-------------------------+

chi-squared =     2.624 with 2 d.f.
probability =     0.2693

chi-squared with ties =     3.570 with 2 d.f.
probability =     0.1678


                Dunn's Pairwise Comparison of iq7 by ihwork
                            (Benjamini-Hochberg)
Col Mean-|
Row Mean |             0             1
---------+----------------------
       1 |   0.542224
         |     0.2938
         |
       2 |  -1.628668  -1.836862
         |     0.0775     0.0993

False Discovery Rate =   0.05
Reject Ho if p = P(Z <= |z|) <= FDR/2 with stopping rule

.
. dunntest iq8, by(ihwork) ma(bh) wrap

Warning: by() values are unlabeled, option nolabel implicit


Kruskal-Wallis equality-of-populations rank test

  +-------------------------+
  | ihwork | Obs | Rank Sum |
  |--------+-----+----------|
  |      0 |  38 |  1080.00 |
  |      1 |  16 |   576.50 |
  |      2 |   9 |   359.50 |
  +-------------------------+

chi-squared =     3.913 with 2 d.f.
probability =     0.1413

chi-squared with ties =     4.506 with 2 d.f.
probability =     0.1051


                Dunn's Pairwise Comparison of iq8 by ihwork
                            (Benjamini-Hochberg)
Col Mean-|
Row Mean |             0             1
---------+----------------------
       1 |  -1.494891
         |     0.1012
         |
       2 |  -1.819713  -0.549796
         |     0.1032     0.2912

False Discovery Rate =   0.05
Reject Ho if p = P(Z <= |z|) <= FDR/2 with stopping rule

.
. dunntest iq9, by(ihwork) ma(bh) wrap

Warning: by() values are unlabeled, option nolabel implicit


Kruskal-Wallis equality-of-populations rank test

  +-------------------------+
  | ihwork | Obs | Rank Sum |
  |--------+-----+----------|
  |      0 |  38 |  1096.00 |
```

```
  |      1 |  16 |   545.00 |
  |      2 |   9 |   375.00 |
  +-------------------------+

chi-squared =     3.833 with 2 d.f.
probability =     0.1471

chi-squared with ties =     4.568 with 2 d.f.
probability =     0.1019


                Dunn's Pairwise Comparison of iq9 by ihwork
                            (Benjamini-Hochberg)
Col Mean-|
Row Mean |             0            1
---------+----------------------
       1 |  -1.043163
         |     0.1484
         |
       2 |  -2.060159  -1.086818
         |     0.0591     0.2078

False Discovery Rate =   0.05
Reject Ho if p = P(Z <= |z|) <= FDR/2 with stopping rule

.
. dunntest iq10, by(ihwork) ma(bh) wrap

Warning: by() values are unlabeled, option nolabel implicit


Kruskal-Wallis equality-of-populations rank test

  +-------------------------+
  | ihwork | Obs | Rank Sum |
  |--------+-----+----------|
  |      0 |  38 |  1206.00 |
  |      1 |  16 |   495.00 |
  |      2 |   9 |   315.00 |
  +-------------------------+

chi-squared =     0.303 with 2 d.f.
probability =     0.8596

chi-squared with ties =     1.169 with 2 d.f.
probability =     0.5574


                Dunn's Pairwise Comparison of iq10 by ihwork
                            (Benjamini-Hochberg)
Col Mean-|
Row Mean |             0            1
---------+----------------------
       1 |   0.287560
         |     0.3868
         |
       2 |  -0.943719  -1.045310
         |     0.2590     0.4438

False Discovery Rate =   0.05
Reject Ho if p = P(Z <= |z|) <= FDR/2 with stopping rule
```

Nurse Student Statistics on Factor Analysis Produced Variables

- Question – For each of the factor variables (knowledge, participation, and total cost), are there differences in the average response by age?

  Answer – NO, there are no significant differences among the age categories for any of the three factor variables.

- Question – For each of the factor variables (knowledge, participation, and total cost), are there differences in the average response by gender?

  Answer – NO, there are no significant differences between genders for any of the three factor variables.

- Question – For each of the factor variables (knowledge, participation, and total cost), are there differences in the average response by level of education?

  Answer – NO, there are no significant differences among the levels of education for any of the three factor variables.

- Question: For each of the factor variables (knowledge, participation, and total cost), are there differences in the average response based upon racer or ethnicity?

  Answer – YES, for the factor variable knowledge there is a significant difference between groups 1 and 2 and between groups 1 and 7, and for the factor variable total cost there are significant differences between the pairs of groups 1 and 7, 3 and 7, and 4 and 7

- Question: For each of the factor variables (knowledge, participation, and total cost), are there differences in the average response based experience working in a hospital?

  Answer – YES, for the factor variable "participation" there is a significant difference between group 0 and group 2

STATISTICS

- Question – For each of the factor variables (knowledge, participation, and total cost), are there differences in the average response by age?

```
. dunntest iknowledge, by(iage)


Kruskal-Wallis equality-of-populations rank test

  +-----------------------+
  | iage | Obs | Rank Sum |
  |------+-----+----------|
  |    3 |   2 |    27.50 |
  |    4 |  12 |   309.00 |
  |    5 |  14 |   417.50 |
  |    6 |  25 |   850.00 |
  |    7 |  10 |   412.00 |
  +-----------------------+

chi-squared =     6.392 with 4 d.f.
probability =     0.1717

chi-squared with ties =     8.092 with 4 d.f.
probability =     0.0883


              Dunn's Pairwise Comparison of iknowledge by iage
```

```
                                 (No adjustment)
Col Mean-|
Row Mean |              3              4              5              6
---------+--------------------------------------------
       4 |  -0.964413
         |     0.1674
         |
       5 |  -1.305010  -0.635265
         |     0.0959     0.2626
         |
       6 |  -1.691486  -1.441963  -0.768369
         |     0.0454     0.0747     0.2211
         |
       7 |  -2.175239  -2.214869  -1.686889  -1.181160
         |     0.0148     0.0134     0.0458     0.1188

alpha =   0.05
Reject Ho if p = P(Z <= |z|) <= alpha/2

.
. dunntest iparticipate, by(iage)

Kruskal-Wallis equality-of-populations rank test

  +-----------------------+
  | iage | Obs | Rank Sum |
  |------+-----+----------|
  |    3 |   2 |    37.00 |
  |    4 |  12 |   281.00 |
  |    5 |  14 |   458.00 |
  |    6 |  25 |   834.00 |
  |    7 |  10 |   406.00 |
  +-----------------------+

chi-squared =     6.076 with 4 d.f.
probability =     0.1935

chi-squared with ties =     6.276 with 4 d.f.
probability =     0.1795


             Dunn's Pairwise Comparison of iparticipate by iage
                                 (No adjustment)
Col Mean-|
Row Mean |              3              4              5              6
---------+--------------------------------------------
       4 |  -0.356920
         |     0.3606
         |
       5 |  -1.042565  -1.310385
         |     0.1486     0.0950
         |
       6 |  -1.121195  -1.569823  -0.107251
         |     0.1311     0.0582     0.4573
         |
       7 |  -1.581888  -2.225081  -1.055987  -1.072837
         |     0.0568     0.0130     0.1455     0.1417

alpha =   0.05
Reject Ho if p = P(Z <= |z|) <= alpha/2

.
. dunntest itotcost, by(iage)

Warning: by() values are unlabeled, option nolabel implicit


Kruskal-Wallis equality-of-populations rank test

  +-----------------------+
  | iage | Obs | Rank Sum |
  |------+-----+----------|
  |    3 |   2 |    83.00 |
  |    4 |  12 |   402.50 |
  |    5 |  14 |   380.00 |
  |    6 |  25 |   742.50 |
  |    7 |   9 |   345.00 |
  +-----------------------+
```

```
chi-squared =     3.125 with 4 d.f.
probability =     0.5372

chi-squared with ties =     4.632 with 4 d.f.
probability =     0.3272


               Dunn's Pairwise Comparison of itotcost by iage
                              (No adjustment)
Col Mean-|
Row Mean |             3             4             5             6
---------+--------------------------------------------
       4 |   0.703165
         |     0.2410
         |
       5 |   1.281683   1.097642
         |     0.1000     0.1362
         |
       6 |   1.083624   0.738198  -0.516952
         |     0.1393     0.2302     0.3026
         |
       7 |   0.273361  -0.733301  -1.767517  -1.498732
         |     0.3923     0.2317     0.0386     0.0670

alpha =   0.05
Reject Ho if p = P(Z <= |z|) <= alpha/2
================================================================================================================
```

Question – For each of the factor variables (knowledge, participation, and total cost), are there differences in the average response by gender?

```
. dunntest iknowledge, by(igender)

Warning: by() values are unlabeled, option nolabel implicit


Kruskal-Wallis equality-of-populations rank test

  +--------------------------+
  | igender | Obs | Rank Sum |
  |---------+-----+----------|
  |       1 |  19 |   598.00 |
  |       2 |  44 |  1418.00 |
  +--------------------------+

chi-squared =     0.022 with 1 d.f.
probability =     0.8810

chi-squared with ties =     0.028 with 1 d.f.
probability =     0.8662


            Dunn's Pairwise Comparison of iknowledge by igender
                              (No adjustment)
Col Mean-|
Row Mean |             1
---------+-----------
       2 |  -0.168503
         |     0.4331

alpha =   0.05
Reject Ho if p = P(Z <= |z|) <= alpha/2

.
. dunntest iparticipate, by(igender)

Warning: by() values are unlabeled, option nolabel implicit


Kruskal-Wallis equality-of-populations rank test

  +--------------------------+
  | igender | Obs | Rank Sum |
  |---------+-----+----------|
  |       1 |  19 |   502.00 |
  |       2 |  44 |  1514.00 |
  +--------------------------+
```

```
chi-squared =     2.520 with 1 d.f.
probability =     0.1124

chi-squared with ties =     2.603 with 1 d.f.
probability =     0.1067


           Dunn's Pairwise Comparison of iparticipate by igender
                              (No adjustment)
Col Mean-|
Row Mean |              1
---------+-----------
       2 |  -1.613363
         |     0.0533

alpha =   0.05
Reject Ho if p = P(Z <= |z|) <= alpha/2

.
. dunntest itotcost, by(igender)

Warning: by() values are unlabeled, option nolabel implicit


Kruskal-Wallis equality-of-populations rank test

  +--------------------------+
  | igender | Obs | Rank Sum |
  |---------+-----+----------|
  |       1 |  19 |   587.50 |
  |       2 |  43 |  1365.50 |
  +--------------------------+

chi-squared =     0.028 with 1 d.f.
probability =     0.8666

chi-squared with ties =     0.042 with 1 d.f.
probability =     0.8380


             Dunn's Pairwise Comparison of itotcost by igender
                              (No adjustment)
Col Mean-|
Row Mean |              1
---------+-----------
       2 |  -0.204490
         |     0.4190

alpha =   0.05
Reject Ho if p = P(Z <= |z|) <= alpha/2
```

==

- Question – For each of the factor variables (knowledge, participation, and total cost), are there differences in the average response by level of education?

```
. dunntest iknowledge, by(ied)

Warning: by() values are unlabeled, option nolabel implicit


Kruskal-Wallis equality-of-populations rank test

  +----------------------+
  | ied | Obs | Rank Sum |
  |-----+-----+----------|
  |   1 |   1 |    43.00 |
  |   2 |   3 |    96.50 |
  |   3 |  57 |  1751.50 |
  +----------------------+

chi-squared =     0.483 with 2 d.f.
probability =     0.7854

chi-squared with ties =     0.629 with 2 d.f.
probability =     0.7303
```

```
               Dunn's Pairwise Comparison of iknowledge by ied
                                (No adjustment)
Col Mean-|
Row Mean |            1            2
---------+----------------------
       2 |   0.602700
         |     0.2734
         |
       3 |   0.781528   0.156016
         |     0.2172     0.4380

alpha =   0.05
Reject Ho if p = P(Z <= |z|) <= alpha/2

.
. dunntest iparticipate, by(ied)

Warning: by() values are unlabeled, option nolabel implicit


Kruskal-Wallis equality-of-populations rank test

  +----------------------+
  | ied | Obs | Rank Sum |
  |-----+-----+----------|
  |   1 |   1 |    53.00 |
  |   2 |   3 |   137.00 |
  |   3 |  57 |  1701.00 |
  +----------------------+

chi-squared =     3.826 with 2 d.f.
probability =     0.1389

chi-squared with ties =     3.948 with 2 d.f.
probability =     0.1389


              Dunn's Pairwise Comparison of iparticipate by ied
                                (No adjustment)
Col Mean-|
Row Mean |            1            2
---------+----------------------
       2 |   0.363420
         |     0.3581
         |
       3 |   1.313711   1.528732
         |     0.0945     0.0632

alpha =   0.05
Reject Ho if p = P(Z <= |z|) <= alpha/2

.
. dunntest itotcost, by(ied)

Warning: by() values are unlabeled, option nolabel implicit


Kruskal-Wallis equality-of-populations rank test

  +----------------------+
  | ied | Obs | Rank Sum |
  |-----+-----+----------|
  |   1 |   1 |    40.50 |
  |   2 |   3 |    94.00 |
  |   3 |  56 |  1695.50 |
  +----------------------+

chi-squared =     0.344 with 2 d.f.
probability =     0.8420

chi-squared with ties =     0.500 with 2 d.f.
probability =     0.7788


                Dunn's Pairwise Comparison of itotcost by ied
                                (No adjustment)
Col Mean-|
Row Mean |            1            2
```

```
---------+----------------------
       2 |   0.548145
         |     0.2918
         |
       3 |   0.699677   0.123104
         |     0.2421     0.4510

alpha =   0.05
Reject Ho if p = P(Z <= |z|) <= alpha/2
```

==

- Question: For each of the factor variables (knowledge, participation, and total cost), are there differences in the average response based upon racer or ethnicity?

```
. dunntest iknowledge, by(ieth)

Warning: by() values are unlabeled, option nolabel implicit


Kruskal-Wallis equality-of-populations rank test

  +-----------------------+
  | ieth | Obs | Rank Sum |
  |------+-----+----------|
  |    1 |  53 |  1859.50 |
  |    2 |   2 |    22.50 |
  |    3 |   1 |     7.00 |
  |    4 |   4 |    93.00 |
  |    7 |   3 |    34.00 |
  +-----------------------+

chi-squared =    10.649 with 4 d.f.
probability =     0.0308

chi-squared with ties =    13.481 with 4 d.f.
probability =     0.0091


              Dunn's Pairwise Comparison of iknowledge by ieth
                              (No adjustment)
Col Mean-|
Row Mean |             1             2             3             4
---------+--------------------------------------------
       2 |   2.031072
         |     0.0211
         |
       3 |   1.707868   0.213002
         |     0.0438     0.4157
         |
       4 |   1.400992  -0.850533  -0.892152
         |     0.0806     0.1975     0.1862
         |
       7 |   2.456616  -0.005603  -0.230353   0.957716
         |     0.0070     0.4978     0.4089     0.1691

alpha =   0.05
Reject Ho if p = P(Z <= |z|) <= alpha/2

.
. dunntest iparticipate, by(ieth)

Warning: by() values are unlabeled, option nolabel implicit


Kruskal-Wallis equality-of-populations rank test

  +-----------------------+
  | ieth | Obs | Rank Sum |
  |------+-----+----------|
  |    1 |  53 |  1836.00 |
  |    2 |   2 |    24.00 |
  |    3 |   1 |    32.00 |
  |    4 |   4 |    84.50 |
  |    7 |   3 |    39.50 |
  +-----------------------+

chi-squared =     8.056 with 4 d.f.
probability =     0.0895
```

```
chi-squared with ties =     8.321 with 4 d.f.
probability =     0.0805


              Dunn's Pairwise Comparison of iparticipate by ieth
                                 (No adjustment)
Col Mean-|
Row Mean |             1             2             3             4
---------+--------------------------------------------
       2 |   1.742754
         |     0.0407
         |
       3 |   0.145095  -0.905406
         |     0.4423     0.1826
         |
       4 |   1.445287  -0.584200   0.539304
         |     0.0742     0.2795     0.2948
         |
       7 |   2.006289  -0.070859   0.904309   0.577727
         |     0.0224     0.4718     0.1829     0.2817

alpha =   0.05
Reject Ho if p = P(Z <= |z|) <= alpha/2

.
. dunntest itotcost, by(ieth)

Warning: by() values are unlabeled, option nolabel implicit


Kruskal-Wallis equality-of-populations rank test

  +-----------------------+
  | ieth | Obs | Rank Sum |
  |------+-----+----------|
  |    1 |  52 |  1672.00 |
  |    2 |   2 |    54.50 |
  |    3 |   1 |    41.50 |
  |    4 |   4 |   166.00 |
  |    7 |   3 |    19.00 |
  +-----------------------+

chi-squared =     7.553 with 4 d.f.
probability =     0.1094

chi-squared with ties =    11.196 with 4 d.f.
probability =     0.0245


               Dunn's Pairwise Comparison of itotcost by ieth
                                 (No adjustment)
Col Mean-|
Row Mean |        1          2           3            4
---------+--------------------------------------------
       2 |   0.459251
         |     0.3230
         |
       3 |  -0.624727  -0.785168
         |     0.2661     0.2162
         |
       4 |  -1.215526  -1.110396   0.000000
         |     0.1121     0.1334     0.5000
         |
       7 |   2.934536   1.546239   2.055206   3.107180
         |     0.0017     0.0610     0.0199     0.0009

alpha =   0.05
Reject Ho if p = P(Z <= |z|) <= alpha/2
```

==

- Question: For each of the factor variables (knowledge, participation, and total cost), are there differences in the average response based experience working in a hospital?

```
. dunntest iknowledge, by(ihwork)

Warning: by() values are unlabeled, option nolabel implicit
```

```
Kruskal-Wallis equality-of-populations rank test

  +-------------------------+
  | ihwork | Obs | Rank Sum |
  |--------+-----+----------|
  |      0 |  38 |  1196.50 |
  |      1 |  16 |   439.00 |
  |      2 |   9 |   380.50 |
  +-------------------------+

chi-squared =     3.850 with 2 d.f.
probability =     0.1458

chi-squared with ties =     4.875 with 2 d.f.
probability =     0.0874


             Dunn's Pairwise Comparison of iknowledge by ihwork
                              (No adjustment)
Col Mean-|
Row Mean |             0             1
---------+----------------------
       1 |   0.834026
         |     0.2021
         |
       2 |  -1.786749  -2.186219
         |     0.0370     0.0144

alpha =   0.05
Reject Ho if p = P(Z <= |z|) <= alpha/2

.
. dunntest iparticipate, by(ihwork)

Warning: by() values are unlabeled, option nolabel implicit


Kruskal-Wallis equality-of-populations rank test

  +-------------------------+
  | ihwork | Obs | Rank Sum |
  |--------+-----+----------|
  |      0 |  38 |  1060.00 |
  |      1 |  16 |   540.00 |
  |      2 |   9 |   416.00 |
  +-------------------------+

chi-squared =     7.470 with 2 d.f.
probability =     0.0239

chi-squared with ties =     7.716 with 2 d.f.
probability =     0.0211


            Dunn's Pairwise Comparison of iparticipate by ihwork
                              (No adjustment)
Col Mean-|
Row Mean |             0             1
---------+----------------------
       1 |  -1.089332
         |     0.1380
         |
       2 |  -2.741107  -1.659641
         |     0.0031     0.0485

alpha =   0.05
Reject Ho if p = P(Z <= |z|) <= alpha/2

.
. dunntest itotcost, by(ihwork)

Warning: by() values are unlabeled, option nolabel implicit


Kruskal-Wallis equality-of-populations rank test

  +-------------------------+
```

```
  | ihwork | Obs | Rank Sum |
  |--------+-----+----------|
  |      0 |  38 |  1081.00 |
  |      1 |  16 |   540.00 |
  |      2 |   8 |   332.00 |
  +-------------------------+

chi-squared =     3.794 with 2 d.f.
probability =     0.1500

chi-squared with ties =     5.625 with 2 d.f.
probability =     0.0601


              Dunn's Pairwise Comparison of itotcost by ihwork
                              (No adjustment)
Col Mean-|
Row Mean |             0             1
---------+----------------------
       1 |  -1.200715
         |     0.1149
         |
       2 |  -2.264381  -1.207799
         |     0.0118     0.1136

alpha =   0.05
Reject Ho if p = P(Z <= |z|) <= alpha/2
```

HPESS Survey Statistics Report

- Question – For each of the questions, 1-10, is there a difference in the average response by age?

  Answer – YES, but for only two questions:
  Q1: age group 1 differed from all of the other groups.
  Q2: age groups 1 and 5 differed from groups 2,3,4, but did not differ from each other.

- Question – For each of the questions, 1-10, is there a difference in the average response by gender?

  Answer – NO – there are no significant differences in responses between genders for any of the 10 questions.

- Question – For each of the questions, 1-10, is there a difference in the average response by level of education

  Answer – YES, for questions 1, 2, 3, and 10

Q1:		1 v. 3	2 v. 3
Q2:		1 v. 3	2 v. 3
Q3:	1 v.2	1 v. 3	2 v. 3
Q10:		1 v. 3	2 v. 3

- Question: For each of the questions, is there a difference in the average response based upon racer or ethnicity

  Answer - NO – there are no significant difference in responses among races or ethnicities for any of the 10 questions.

- Question – For each of the questions, 1-10, is there a difference in the average response if respondent is or was a hospital worker?

  Answer – YES – for questions 1, 2, and 5. For all three questions, group 1 is significantly different from both group 0, and group 2.

===

- Question – For each of the questions, 1-10, is there a difference in the average response by age among those who identified their age group?

```
. dunntest iq1, by(iage) ma(bh) wrap

Kruskal-Wallis equality-of-populations rank test

  +-----------------------+
  | iage | Obs | Rank Sum |
  |------+-----+----------|
  |    1 |   1 |     3.50 |
  |    2 |  23 |   878.50 |
  |    3 |  35 |  1376.50 |
  |    4 |  11 |   456.50 |
  |    5 |   5 |   169.50 |
  |------+-----+----------|
  |    6 |   1 |    41.50 |
  +-----------------------+

chi-squared =      3.004 with 5 d.f.
probability =      0.6994
```

```
chi-squared with ties =    13.768 with 5 d.f.
probability =     0.0171


                 Dunn's Pairwise Comparison of iq1 by iage
                            (Benjamini-Hochberg)
Col Mean-|
Row Mean |          1            2            3            4            5
---------+-----------------------------------------------------------------
       2 |  -3.292779
         |     0.0025
         |
       3 |  -3.424849  -0.409178
         |     0.0023     0.4265
         |
       4 |  -3.527106  -0.873848  -0.609012
         |     0.0032     0.3583     0.3699
         |
       5 |  -2.690371   0.843972   1.100788   1.366042
         |     0.0134     0.3322     0.2903     0.2149
         |
       6 |  -2.604940  -0.313598  -0.207567   0.000000  -0.672593
         |     0.0138     0.4349     0.4476     0.5000     0.3759

False Discovery Rate =   0.05
Reject Ho if p = P(Z <= |z|) <= FDR/2 with stopping rule


. dunntest iq2, by(iage) ma(bh) wrap

Kruskal-Wallis equality-of-populations rank test

  +------------------------+
  | iage | Obs | Rank Sum |
  |------+-----+----------|
  |    1 |   1 |     4.50 |
  |    2 |  22 |   849.00 |
  |    3 |  35 |  1357.50 |
  |    4 |  11 |   462.00 |
  |    5 |   5 |   172.50 |
  |------+-----+----------|
  |    6 |   1 |     4.50 |
  +------------------------+

chi-squared =     5.286 with 5 d.f.
probability =     0.3819

chi-squared with ties =    18.489 with 5 d.f.
probability =     0.0024


                 Dunn's Pairwise Comparison of iq2 by iage
                            (Benjamini-Hochberg)
Col Mean-|
Row Mean |          1            2            3            4            5
---------+-----------------------------------------------------------------
       2 |  -2.861006
         |     0.0063
         |
       3 |  -2.900874  -0.061439
         |     0.0070     0.5095
         |
       4 |  -3.080845  -0.792177  -0.797937
         |     0.0155     0.2920     0.3187
         |
       5 |  -2.349976   0.708544   0.769210   1.193206
         |     0.0201     0.2761     0.2761     0.1940
         |
       6 |   0.000000   2.861006   2.900874   3.080845   2.349976
         |     0.5000     0.0053     0.0093     0.0077     0.0176

False Discovery Rate =   0.05
Reject Ho if p = P(Z <= |z|) <= FDR/2 with stopping rule


. dunntest iq3, by(iage) ma(bh) wrap

Kruskal-Wallis equality-of-populations rank test
```

```
  +-----------------------+
  | iage | Obs | Rank Sum |
  |------+-----+----------|
  |    1 |   1 |     7.00 |
  |    2 |  23 |   921.00 |
  |    3 |  35 |  1347.00 |
  |    4 |  11 |   419.00 |
  |    5 |   5 |   187.00 |
  |------+-----+----------|
  |    6 |   1 |    45.00 |
  +-----------------------+

chi-squared =     2.250 with 5 d.f.
probability =     0.8136

chi-squared with ties =     5.288 with 5 d.f.
probability =     0.3817


                 Dunn's Pairwise Comparison of iq3 by iage
                            (Benjamini-Hochberg)
Col Mean-|
Row Mean |             1             2             3             4             5
---------+-----------------------------------------------------------------
       2 |  -2.245722
         |     0.1854
         |
       3 |  -2.155302   0.402900
         |     0.1168     0.5725
         |
       4 |  -2.066574   0.369776   0.079295
         |     0.0969     0.4851     0.4684
         |
       5 |  -1.926615   0.371927   0.157658   0.088931
         |     0.1013     0.5325     0.5046     0.4978
         |
       6 |  -1.865437  -0.336858  -0.445925  -0.459239  -0.481654
         |     0.0932     0.4601     0.6147     0.6922     0.7876

False Discovery Rate =   0.05
Reject Ho if p = P(Z <= |z|) <= FDR/2 with stopping rule



. dunntest iq4, by(iage) ma(bh) wrap

Kruskal-Wallis equality-of-populations rank test

  +-----------------------+
  | iage | Obs | Rank Sum |
  |------+-----+----------|
  |    1 |   1 |    13.00 |
  |    2 |  23 |   934.00 |
  |    3 |  36 |  1433.50 |
  |    4 |  11 |   362.00 |
  |    5 |   5 |   211.00 |
  |------+-----+----------|
  |    6 |   1 |    49.50 |
  +-----------------------+

chi-squared =     2.656 with 5 d.f.
probability =     0.7529

chi-squared with ties =     4.393 with 5 d.f.
probability =     0.4944


                 Dunn's Pairwise Comparison of iq4 by iage
                            (Benjamini-Hochberg)
Col Mean-|
Row Mean |             1             2             3             4             5
---------+-----------------------------------------------------------------
       2 |  -1.553696
         |     0.9019
         |
       3 |  -1.520764   0.169968
         |     0.3208     0.4325
         |
```

```
        4 |  -1.095769   1.207400   1.153083
          |     0.2927     0.3409     0.3111
          |
        5 |  -1.532336  -0.185389  -0.286737  -0.990242
          |     0.4704     0.4569     0.4467     0.3019
          |
        6 |  -1.483678  -0.500363  -0.548924  -0.913141  -0.383084
          |     0.2586     0.4206     0.4373     0.3010     0.4385

False Discovery Rate =   0.05
Reject Ho if p = P(Z <= |z|) <= FDR/2 with stopping rule


. dunntest iq5, by(iage) ma(bh) wrap

Kruskal-Wallis equality-of-populations rank test

  +------------------------+
  | iage | Obs | Rank Sum |
  |------+-----+----------|
  |    1 |   1 |     7.00 |
  |    2 |  23 |   836.00 |
  |    3 |  35 |  1476.50 |
  |    4 |  11 |   377.00 |
  |    5 |   5 |   185.00 |
  |------+-----+----------|
  |    6 |   1 |    44.50 |
  +------------------------+

chi-squared =     3.728 with 5 d.f.
probability =     0.5892

chi-squared with ties =     9.323 with 5 d.f.
probability =     0.0968


                 Dunn's Pairwise Comparison of iq5 by iage
                            (Benjamini-Hochberg)
Col Mean-|
Row Mean |           1            2            3            4            5
---------+-------------------------------------------------------
        2 |  -2.057391
          |     0.1487
          |
        3 |  -2.484459  -1.557480
          |     0.0973     0.1279
          |
        4 |  -1.869894   0.405361   1.639361
          |     0.0922     0.4283     0.1264
          |
        5 |  -1.961161  -0.094649   0.776748  -0.362103
          |     0.1247     0.4623     0.4100     0.4138
          |
        6 |  -1.898886  -0.571498  -0.163411  -0.701210  -0.490290
          |     0.1080     0.4257     0.4662     0.4026     0.4254

False Discovery Rate =   0.05
Reject Ho if p = P(Z <= |z|) <= FDR/2 with stopping rule


. dunntest iq6, by(iage) ma(bh) wrap

Kruskal-Wallis equality-of-populations rank test

  +------------------------+
  | iage | Obs | Rank Sum |
  |------+-----+----------|
  |    1 |   1 |    11.00 |
  |    2 |  23 |   841.50 |
  |    3 |  35 |  1397.00 |
  |    4 |  11 |   468.50 |
  |    5 |   5 |   161.50 |
  |------+-----+----------|
  |    6 |   1 |    46.50 |
  +------------------------+

chi-squared =     2.770 with 5 d.f.
probability =     0.7354
```

```
chi-squared with ties =     5.486 with 5 d.f.
probability =     0.3595


                 Dunn's Pairwise Comparison of iq6 by iage
                            (Benjamini-Hochberg)
Col Mean-|
Row Mean |          1            2            3            4            5
---------+-----------------------------------------------------------------
       2 |  -1.596368
         |     0.2070
         |
       3 |  -1.816984  -0.790016
         |     0.2596     0.3221
         |
       4 |  -1.927631  -1.043792  -0.493509
         |     0.4043     0.3178     0.3586
         |
       5 |  -1.239210   0.553701   1.015019   1.215993
         |     0.3229     0.3624     0.2907     0.2800
         |
       6 |  -1.599813  -0.618474  -0.413849  -0.238527  -0.826140
         |     0.2741     0.3656     0.3637     0.4057     0.3406

False Discovery Rate =   0.05
Reject Ho if p = P(Z <= |z|) <= FDR/2 with stopping rule


. dunntest iq7, by(iage) ma(bh) wrap

Kruskal-Wallis equality-of-populations rank test

  +------------------------+
  | iage | Obs | Rank Sum |
  |------+-----+----------|
  |    1 |   1 |    13.50 |
  |    2 |  22 |   819.00 |
  |    3 |  35 |  1270.50 |
  |    4 |  11 |   493.50 |
  |    5 |   5 |   205.50 |
  |------+-----+----------|
  |    6 |   1 |    48.00 |
  +------------------------+

chi-squared =     2.907 with 5 d.f.
probability =     0.7143

chi-squared with ties =     4.855 with 5 d.f.
probability =     0.4338


                 Dunn's Pairwise Comparison of iq7 by iage
                            (Benjamini-Hochberg)
Col Mean-|
Row Mean |          1            2            3            4            5
---------+-----------------------------------------------------------------
       2 |  -1.376058
         |     0.2532
         |
       3 |  -1.333089   0.202096
         |     0.2281     0.4499
         |
       4 |  -1.780629  -1.226249  -1.469099
         |     0.5623     0.2358     0.3545
         |
       5 |  -1.494032  -0.463525  -0.595349   0.413781
         |     0.5069     0.4384     0.4137     0.4244
         |
       6 |  -1.446590  -0.624762  -0.684085  -0.178063  -0.373508
         |     0.2775     0.4434     0.4631     0.4293     0.4089

False Discovery Rate =   0.05
Reject Ho if p = P(Z <= |z|) <= FDR/2 with stopping rule


. dunntest iq8, by(iage) ma(bh) wrap

Kruskal-Wallis equality-of-populations rank test
```

```
  +-----------------------+
  | iage | Obs | Rank Sum |
  |------+-----+----------|
  |    1 |   1 |    16.00 |
  |    2 |  23 |   896.00 |
  |    3 |  35 |  1360.00 |
  |    4 |  11 |   356.00 |
  |    5 |   5 |   239.50 |
  |------+-----+----------|
  |    6 |   1 |    58.50 |
  +-----------------------+

chi-squared =     3.633 with 5 d.f.
probability =     0.6034

chi-squared with ties =     4.157 with 5 d.f.
probability =     0.5270


                 Dunn's Pairwise Comparison of iq8 by iage
                            (Benjamini-Hochberg)
Col Mean-|
Row Mean |              1             2             3             4             5
---------+-------------------------------------------------------
       2 |  -1.088658
         |     0.3454
         |
       3 |  -1.091772   0.017935
         |     0.4124     0.4928
         |
       4 |  -0.758949   0.871211   0.910035
         |     0.2584     0.2398     0.2721
         |
       5 |  -1.410676  -0.878018  -0.916267  -1.395398
         |     0.5938     0.2590     0.2996     0.4072
         |
       6 |  -1.455798  -0.926803  -0.938242  -1.212211  -0.468751
         |     1.0000     0.3319     0.3730     0.4227     0.3425

False Discovery Rate =   0.05
Reject Ho if p = P(Z <= |z|) <= FDR/2 with stopping rule



. dunntest iq9, by(iage) ma(bh) wrap

Kruskal-Wallis equality-of-populations rank test

  +-----------------------+
  | iage | Obs | Rank Sum |
  |------+-----+----------|
  |    1 |   1 |    26.50 |
  |    2 |  23 |   844.00 |
  |    3 |  35 |  1377.00 |
  |    4 |  11 |   443.50 |
  |    5 |   5 |   208.50 |
  |------+-----+----------|
  |    6 |   1 |    26.50 |
  +-----------------------+

chi-squared =     0.975 with 5 d.f.
probability =     0.9646

chi-squared with ties =     1.158 with 5 d.f.
probability =     0.9488


                 Dunn's Pairwise Comparison of iq9 by iage
                            (Benjamini-Hochberg)
Col Mean-|
Row Mean |              1             2             3             4             5
---------+-------------------------------------------------------
       2 |  -0.492653
         |     0.5834
         |
       3 |  -0.625047  -0.486788
         |     0.7979     0.4271
         |
       4 |  -0.653017  -0.487754  -0.139274
```

```
         |     0.9633     0.4693     0.5130
         |
       5 |  -0.684890  -0.500594  -0.243357  -0.126456
         |     1.0000     0.6607     0.5048     0.4818
         |
       6 |   0.000000   0.492653   0.625047   0.653017   0.684890
         |     0.5000     0.5185     0.6649     1.0000     1.0000

False Discovery Rate =   0.05
Reject Ho if p = P(Z <= |z|) <= FDR/2 with stopping rule


. dunntest iq10, by(iage) ma(bh) wrap

Kruskal-Wallis equality-of-populations rank test

  +------------------------+
  | iage | Obs | Rank Sum |
  |------+-----+----------|
  |    1 |   1 |     6.50 |
  |    2 |  23 |   856.50 |
  |    3 |  35 |  1427.50 |
  |    4 |  11 |   409.00 |
  |    5 |   5 |   182.50 |
  |------+-----+----------|
  |    6 |   1 |    44.00 |
  +------------------------+

chi-squared =     2.692 with 5 d.f.
probability =     0.7473

chi-squared with ties =     7.233 with 5 d.f.
probability =     0.2039


                 Dunn's Pairwise Comparison of iq10 by iage
                            (Benjamini-Hochberg)
Col Mean-|
Row Mean |            1             2             3             4             5
---------+-----------------------------------------------------------
       2 |  -2.233632
         |     0.0957
         |
       3 |  -2.509329  -0.980744
         |     0.0907     0.4084
         |
       4 |  -2.180462   0.011605   0.773901
         |     0.0731     0.4954     0.4703
         |
       5 |  -2.032789   0.111187   0.665386   0.093832
         |     0.0789     0.5258     0.4742     0.4957
         |
       6 |  -1.968240  -0.491273  -0.235250  -0.484547  -0.508197
         |     0.0736     0.4674     0.5088     0.4282     0.5094

False Discovery Rate =   0.05
Reject Ho if p = P(Z <= |z|) <= FDR/2 with stopping rule

----------------------------------------------------------------------------------------------------------------
```

- Question – For each of the questions, 1-10, is there a difference in the average response by gender?

```
. ranksum iq1, by(igender)

Two-sample Wilcoxon rank-sum (Mann-Whitney) test

     igender |      obs    rank sum    expected
-------------+---------------------------------
           1 |       17       629.5       654.5
           2 |       59      2296.5      2271.5
-------------+---------------------------------
    combined |       76        2926        2926

unadjusted variance     6435.92
adjustment for ties    -5031.72
                     ----------
adjusted variance       1404.20
```

```
Ho: iq1(igender==1) = iq1(igender==2)
             z =  -0.667
    Prob > |z| =   0.5047

.
. ranksum iq2, by(igender)

Two-sample Wilcoxon rank-sum (Mann-Whitney) test

     igender |      obs    rank sum    expected
-------------+---------------------------------
           1 |       17         564         646
           2 |       58        2286        2204
-------------+---------------------------------
    combined |       75        2850        2850

unadjusted variance     6244.67
adjustment for ties    -4459.21
                     ----------
adjusted variance       1785.46

Ho: iq2(igender==1) = iq2(igender==2)
             z =  -1.941
    Prob > |z| =   0.0523

.
. ranksum iq3, by(igender)

Two-sample Wilcoxon rank-sum (Mann-Whitney) test

     igender |      obs    rank sum    expected
-------------+---------------------------------
           1 |       17         613       654.5
           2 |       59        2313      2271.5
-------------+---------------------------------
    combined |       76        2926        2926

unadjusted variance     6435.92
adjustment for ties    -3697.73
                     ----------
adjusted variance       2738.19

Ho: iq3(igender==1) = iq3(igender==2)
             z =  -0.793
    Prob > |z| =   0.4277

.
. ranksum iq4, by(igender)

Two-sample Wilcoxon rank-sum (Mann-Whitney) test

     igender |      obs    rank sum    expected
-------------+---------------------------------
           1 |       17         659         663
           2 |       60        2344        2340
-------------+---------------------------------
    combined |       77        3003        3003

unadjusted variance     6630.00
adjustment for ties    -2621.46
                     ----------
adjusted variance       4008.54

Ho: iq4(igender==1) = iq4(igender==2)
             z =  -0.063
    Prob > |z| =   0.9496

.
. ranksum iq5, by(igender)

Two-sample Wilcoxon rank-sum (Mann-Whitney) test

     igender |      obs    rank sum    expected
-------------+---------------------------------
           1 |       17       600.5       654.5
           2 |       59      2325.5      2271.5
-------------+---------------------------------
    combined |       76        2926        2926
```

```
unadjusted variance     6435.92
adjustment for ties    -3862.43
                     ----------
adjusted variance       2573.49

Ho: iq5(igender==1) = iq5(igender==2)
             z =  -1.064
    Prob > |z| =   0.2871

.
. ranksum iq6, by(igender)

Two-sample Wilcoxon rank-sum (Mann-Whitney) test

     igender |      obs    rank sum    expected
-------------+---------------------------------
           1 |       17         684       654.5
           2 |       59        2242      2271.5
-------------+---------------------------------
    combined |       76        2926        2926

unadjusted variance     6435.92
adjustment for ties    -3186.72
                     ----------
adjusted variance       3249.19

Ho: iq6(igender==1) = iq6(igender==2)
             z =   0.518
    Prob > |z| =   0.6048

.
. ranksum iq7, by(igender)

Two-sample Wilcoxon rank-sum (Mann-Whitney) test

     igender |      obs    rank sum    expected
-------------+---------------------------------
           1 |       17         599         646
           2 |       58        2251        2204
-------------+---------------------------------
    combined |       75        2850        2850

unadjusted variance     6244.67
adjustment for ties    -2505.86
                     ----------
adjusted variance       3738.81

Ho: iq7(igender==1) = iq7(igender==2)
             z =  -0.769
    Prob > |z| =   0.4421

.
. ranksum iq8, by(igender)

Two-sample Wilcoxon rank-sum (Mann-Whitney) test

     igender |      obs    rank sum    expected
-------------+---------------------------------
           1 |       17       610.5       654.5
           2 |       59      2315.5      2271.5
-------------+---------------------------------
    combined |       76        2926        2926

unadjusted variance     6435.92
adjustment for ties     -812.08
                     ----------
adjusted variance       5623.84

Ho: iq8(igender==1) = iq8(igender==2)
             z =  -0.587
    Prob > |z| =   0.5574

.
. ranksum iq9, by(igender)

Two-sample Wilcoxon rank-sum (Mann-Whitney) test

     igender |      obs    rank sum    expected
```

```
-------------+---------------------------------
           1 |       17         597       654.5
           2 |       59        2329      2271.5
-------------+---------------------------------
    combined |       76        2926        2926

unadjusted variance     6435.92
adjustment for ties    -1019.01
                     ----------
adjusted variance       5416.90

Ho: iq9(igender==1) = iq9(igender==2)
             z =  -0.781
    Prob > |z| =   0.4347

.
. ranksum iq10, by(igender)

Two-sample Wilcoxon rank-sum (Mann-Whitney) test

     igender |      obs    rank sum    expected
-------------+---------------------------------
           1 |       17       635.5       654.5
           2 |       59      2290.5      2271.5
-------------+---------------------------------
    combined |       76        2926        2926

unadjusted variance     6435.92
adjustment for ties    -4040.59
                     ----------
adjusted variance       2395.32

Ho: iq10(igender==1) = iq10(igender==2)
             z =  -0.388
    Prob > |z| =   0.6979

-----------------------------------------------------------------------------------------------------------
```

- Question – For each of the questions, 1-10, is there a difference in the average response <u>by level of education</u>

```
. dunntest iq1, by(ied) ma(bh) wrap

Warning: by() values are unlabeled, option nolabel implicit


Kruskal-Wallis equality-of-populations rank test

  +-----------------------+
  | ied | Obs | Rank Sum |
  |-----+-----+----------|
  |   1 |  26 |   965.00 |
  |   2 |  49 |  1957.50 |
  |   3 |   1 |     3.50 |
  +-----------------------+

chi-squared =     2.825 with 2 d.f.
probability =     0.2435

chi-squared with ties =    12.949 with 2 d.f.
probability =     0.0015


                  Dunn's Pairwise Comparison of iq1 by ied
                            (Benjamini-Hochberg)
Col Mean-|
Row Mean |             1             2
---------+----------------------------
       2 |  -1.132195
         |     0.1288
         |
       3 |   3.197953   3.498063
         |     0.0010     0.0007

False Discovery Rate =   0.05
Reject Ho if p = P(Z <= |z|) <= FDR/2 with stopping rule

.
. dunntest iq2, by(ied) ma(bh) wrap
```

```
Warning: by() values are unlabeled, option nolabel implicit


Kruskal-Wallis equality-of-populations rank test

  +-----------------------+
  | ied | Obs | Rank Sum |
  |-----+-----+----------|
  |   1 |  26 |   979.50 |
  |   2 |  48 |  1866.00 |
  |   3 |   1 |     4.50 |
  +-----------------------+

chi-squared =     2.446 with 2 d.f.
probability =     0.2944

chi-squared with ties =     8.554 with 2 d.f.
probability =     0.0139


                  Dunn's Pairwise Comparison of iq2 by ied
                            (Benjamini-Hochberg)
Col Mean-|
Row Mean |             1            2
---------+----------------------
       2 |  -0.423546
         |     0.3359
         |
       3 |   2.793337   2.919430
         |     0.0039     0.0053

False Discovery Rate =   0.05
Reject Ho if p = P(Z <= |z|) <= FDR/2 with stopping rule

.
. dunntest iq3, by(ied) ma(bh) wrap

Warning: by() values are unlabeled, option nolabel implicit


Kruskal-Wallis equality-of-populations rank test

  +-----------------------+
  | ied | Obs | Rank Sum |
  |-----+-----+----------|
  |   1 |  26 |   904.00 |
  |   2 |  49 |  2015.00 |
  |   3 |   1 |     7.00 |
  +-----------------------+

chi-squared =     3.468 with 2 d.f.
probability =     0.1766

chi-squared with ties =     8.151 with 2 d.f.
probability =     0.0170


                  Dunn's Pairwise Comparison of iq3 by ied
                            (Benjamini-Hochberg)
Col Mean-|
Row Mean |             1            2
---------+----------------------
       2 |  -1.817857
         |     0.0345
         |
       3 |   1.891823   2.345120
         |     0.0439     0.0285

False Discovery Rate =   0.05
Reject Ho if p = P(Z <= |z|) <= FDR/2 with stopping rule

.
. dunntest iq4, by(ied) ma(bh) wrap

Warning: by() values are unlabeled, option nolabel implicit


Kruskal-Wallis equality-of-populations rank test
```

```
  +-----------------------+
  | ied | Obs | Rank Sum |
  |-----+-----+----------|
  |   1 |  26 |  1021.50 |
  |   2 |  50 |  1968.50 |
  |   3 |   1 |    13.00 |
  +-----------------------+

chi-squared =     1.369 with 2 d.f.
probability =     0.5044

chi-squared with ties =     2.264 with 2 d.f.
probability =     0.3224


                  Dunn's Pairwise Comparison of iq4 by ied
                            (Benjamini-Hochberg)
Col Mean-|
Row Mean |            1            2
---------+----------------------
       2 |  -0.019386
         |     0.4923
         |
       3 |   1.482968   1.500969
         |     0.1036     0.2000

False Discovery Rate =   0.05
Reject Ho if p = P(Z <= |z|) <= FDR/2 with stopping rule

.
. dunntest iq5, by(ied) ma(bh) wrap

Warning: by() values are unlabeled, option nolabel implicit


Kruskal-Wallis equality-of-populations rank test

  +-----------------------+
  | ied | Obs | Rank Sum |
  |-----+-----+----------|
  |   1 |  26 |  1044.50 |
  |   2 |  49 |  1874.50 |
  |   3 |   1 |     7.00 |
  +-----------------------+

chi-squared =     2.190 with 2 d.f.
probability =     0.3345

chi-squared with ties =     5.477 with 2 d.f.
probability =     0.0647


                  Dunn's Pairwise Comparison of iq5 by ied
                            (Benjamini-Hochberg)
Col Mean-|
Row Mean |            1            2
---------+----------------------
       2 |   0.566082
         |     0.2857
         |
       3 |   2.331166   2.215729
         |     0.0296     0.0200

False Discovery Rate =   0.05
Reject Ho if p = P(Z <= |z|) <= FDR/2 with stopping rule

.
. dunntest iq6, by(ied) ma(bh) wrap

Warning: by() values are unlabeled, option nolabel implicit


Kruskal-Wallis equality-of-populations rank test

  +-----------------------+
  | ied | Obs | Rank Sum |
  |-----+-----+----------|
  |   1 |  26 |  1024.00 |
```

```
  |   2 |  49 |  1891.00 |
  |   3 |   1 |    11.00 |
  +----------------------+

chi-squared =     1.593 with 2 d.f.
probability =     0.4508

chi-squared with ties =     3.156 with 2 d.f.
probability =     0.2064


                  Dunn's Pairwise Comparison of iq6 by ied
                            (Benjamini-Hochberg)
Col Mean-|
Row Mean |             1             2
---------+----------------------
       2 |   0.208239
         |     0.4175
         |
       3 |   1.775186   1.740803
         |     0.1138     0.0613

False Discovery Rate =   0.05
Reject Ho if p = P(Z <= |z|) <= FDR/2 with stopping rule

.
. dunntest iq7, by(ied) ma(bh) wrap

Warning: by() values are unlabeled, option nolabel implicit


Kruskal-Wallis equality-of-populations rank test

  +----------------------+
  | ied | Obs | Rank Sum |
  |-----+-----+----------|
  |   1 |  26 |  1065.50 |
  |   2 |  48 |  1771.00 |
  |   3 |   1 |    13.50 |
  +----------------------+

chi-squared =     1.873 with 2 d.f.
probability =     0.3920

chi-squared with ties =     3.129 with 2 d.f.
probability =     0.2092


                  Dunn's Pairwise Comparison of iq7 by ied
                            (Benjamini-Hochberg)
Col Mean-|
Row Mean |             1             2
---------+----------------------
       2 |   0.994759
         |     0.1599
         |
       3 |   1.599098   1.373101
         |     0.1647     0.1273

False Discovery Rate =   0.05
Reject Ho if p = P(Z <= |z|) <= FDR/2 with stopping rule

.
. dunntest iq8, by(ied) ma(bh) wrap

Warning: by() values are unlabeled, option nolabel implicit


Kruskal-Wallis equality-of-populations rank test

  +----------------------+
  | ied | Obs | Rank Sum |
  |-----+-----+----------|
  |   1 |  26 |  1025.50 |
  |   2 |  49 |  1868.50 |
  |   3 |   1 |    32.00 |
  +----------------------+

chi-squared =     0.148 with 2 d.f.
```

```
probability =     0.9289

chi-squared with ties =     0.169 with 2 d.f.
probability =     0.9190


                  Dunn's Pairwise Comparison of iq8 by ied
                            (Benjamini-Hochberg)
Col Mean-|
Row Mean |            1             2
---------+----------------------
       2 |   0.261480
         |     0.3969
         |
       3 |   0.353785   0.294096
         |     1.0000     0.5765

False Discovery Rate =   0.05
Reject Ho if p = P(Z <= |z|) <= FDR/2 with stopping rule

.
. dunntest iq9, by(ied) ma(bh) wrap

Warning: by() values are unlabeled, option nolabel implicit


Kruskal-Wallis equality-of-populations rank test

  +-----------------------+
  | ied | Obs | Rank Sum |
  |-----+-----+----------|
  |   1 |  26 |  1086.50 |
  |   2 |  49 |  1813.00 |
  |   3 |   1 |    26.50 |
  +-----------------------+

chi-squared =     1.098 with 2 d.f.
probability =     0.5776

chi-squared with ties =     1.304 with 2 d.f.
probability =     0.5209


                  Dunn's Pairwise Comparison of iq9 by ied
                            (Benjamini-Hochberg)
Col Mean-|
Row Mean |            1             2
---------+----------------------
       2 |   0.974133
         |     0.4950
         |
       3 |   0.740520   0.513063
         |     0.3442     0.3040

False Discovery Rate =   0.05
Reject Ho if p = P(Z <= |z|) <= FDR/2 with stopping rule

.
. dunntest iq10, by(ied) ma(bh) wrap

Warning: by() values are unlabeled, option nolabel implicit


Kruskal-Wallis equality-of-populations rank test

  +-----------------------+
  | ied | Obs | Rank Sum |
  |-----+-----+----------|
  |   1 |  26 |   956.50 |
  |   2 |  49 |  1963.00 |
  |   3 |   1 |     6.50 |
  +-----------------------+

chi-squared =     2.501 with 2 d.f.
probability =     0.2864

chi-squared with ties =     6.720 with 2 d.f.
probability =     0.0347
```

```
                 Dunn's Pairwise Comparison of iq10 by ied
                            (Benjamini-Hochberg)
Col Mean-|
Row Mean |            1            2
---------+----------------------
       2 |  -1.001222
         |     0.1584
         |
       3 |   2.206194   2.466110
         |     0.0205     0.0205

False Discovery Rate =   0.05
Reject Ho if p = P(Z <= |z|) <= FDR/2 with stopping rule
```

- Question: For each of the questions, is there a difference in the average response based upon racer or ethnicity

```
. dunntest iq1, by(ieth) ma(bh) wrap

Warning: by() values are unlabeled, option nolabel implicit


Kruskal-Wallis equality-of-populations rank test

  +-----------------------+
  | ieth | Obs | Rank Sum |
  |------+-----+----------|
  |    1 |  39 |  1542.50 |
  |    2 |  12 |   460.00 |
  |    3 |  20 |   716.00 |
  |    4 |   3 |   124.50 |
  |    7 |   2 |    83.00 |
  +-----------------------+

chi-squared =     0.480 with 4 d.f.
probability =     0.9754

chi-squared with ties =     2.201 with 4 d.f.
probability =     0.6988


                 Dunn's Pairwise Comparison of iq1 by ieth
                            (Benjamini-Hochberg)
Col Mean-|
Row Mean |            1            2            3            4
---------+--------------------------------------------
       2 |   0.357681
         |     0.5147
         |
       3 |   1.322301   0.672593
         |     0.9303     0.6265
         |
       4 |  -0.315316  -0.475595  -0.892515
         |     0.4703     0.6344     0.9303
         |
       7 |  -0.260575  -0.401951  -0.745114   0.000000
         |     0.4413     0.5731     0.7603     0.5000

False Discovery Rate =   0.05
Reject Ho if p = P(Z <= |z|) <= FDR/2 with stopping rule

.
. dunntest iq2, by(ieth) ma(bh) wrap

Warning: by() values are unlabeled, option nolabel implicit


Kruskal-Wallis equality-of-populations rank test

  +-----------------------+
  | ieth | Obs | Rank Sum |
  |------+-----+----------|
  |    1 |  38 |  1483.50 |
  |    2 |  12 |   429.00 |
  |    3 |  20 |   727.50 |
```

```
  |    4 |   3 |   126.00 |
  |    7 |   2 |    84.00 |
  +------------------------+

chi-squared =     0.494 with 4 d.f.
probability =     0.9741

chi-squared with ties =     1.728 with 4 d.f.
probability =     0.7857


                 Dunn's Pairwise Comparison of iq2 by ieth
                            (Benjamini-Hochberg)
Col Mean-|
Row Mean |              1              2              3              4
---------+--------------------------------------------
       2 |   0.852426
         |     1.0000
         |
       3 |   0.827632  -0.146874
         |     0.6798     0.4907
         |
       4 |  -0.423606  -0.830842  -0.779591
         |     0.4799     1.0000     0.5445
         |
       7 |  -0.350170  -0.702190  -0.650840   0.000000
         |     0.4539     0.4826     0.4293     0.5000

False Discovery Rate =   0.05
Reject Ho if p = P(Z <= |z|) <= FDR/2 with stopping rule

.
. dunntest iq3, by(ieth) ma(bh) wrap

Warning: by() values are unlabeled, option nolabel implicit


Kruskal-Wallis equality-of-populations rank test

  +------------------------+
  | ieth | Obs | Rank Sum |
  |------+-----+----------|
  |    1 |  39 |  1641.00 |
  |    2 |  12 |   350.00 |
  |    3 |  20 |   710.00 |
  |    4 |   3 |   135.00 |
  |    7 |   2 |    90.00 |
  +------------------------+

chi-squared =     3.969 with 4 d.f.
probability =     0.4102

chi-squared with ties =     9.329 with 4 d.f.
probability =     0.0534


                 Dunn's Pairwise Comparison of iq3 by ieth
                            (Benjamini-Hochberg)
Col Mean-|
Row Mean |              1              2              3              4
---------+--------------------------------------------
       2 |   2.715092
         |     0.0331
         |
       3 |   1.660183  -1.204134
         |     0.1615     0.2285
         |
       4 |  -0.338704  -1.702903  -1.065239
         |     0.4593     0.2215     0.2390
         |
       7 |  -0.279903  -1.439216  -0.889312   0.000000
         |     0.4331     0.1876     0.2670     0.5000

False Discovery Rate =   0.05
Reject Ho if p = P(Z <= |z|) <= FDR/2 with stopping rule

.
. dunntest iq4, by(ieth) ma(bh) wrap
```

```
Warning: by() values are unlabeled, option nolabel implicit


Kruskal-Wallis equality-of-populations rank test

  +-----------------------+
  | ieth | Obs | Rank Sum |
  |------+-----+----------|
  |    1 |  39 |  1584.50 |
  |    2 |  12 |   474.00 |
  |    3 |  20 |   733.00 |
  |    4 |   3 |    37.50 |
  |    7 |   2 |    97.00 |
  +-----------------------+

chi-squared =     5.096 with 4 d.f.
probability =     0.2776

chi-squared with ties =     8.628 with 4 d.f.
probability =     0.0711


                 Dunn's Pairwise Comparison of iq4 by ieth
                            (Benjamini-Hochberg)
Col Mean-|
Row Mean |            1            2            3            4
---------+--------------------------------------------------------
       2 |   0.201372
         |     0.4202
         |
       3 |   0.852280   0.459885
         |     0.3284     0.3587
         |
       4 |   2.766202   2.464580   2.298277
         |     0.0284     0.0343     0.0269
         |
       7 |  -0.639739  -0.694317  -0.941479  -2.323629
         |     0.3265     0.3482     0.3465     0.0336

False Discovery Rate =   0.05
Reject Ho if p = P(Z <= |z|) <= FDR/2 with stopping rule

.
. dunntest iq5, by(ieth) ma(bh) wrap

Warning: by() values are unlabeled, option nolabel implicit


Kruskal-Wallis equality-of-populations rank test

  +-----------------------+
  | ieth | Obs | Rank Sum |
  |------+-----+----------|
  |    1 |  39 |  1585.50 |
  |    2 |  12 |   384.00 |
  |    3 |  20 |   771.50 |
  |    4 |   3 |    96.00 |
  |    7 |   2 |    89.00 |
  +-----------------------+

chi-squared =     1.818 with 4 d.f.
probability =     0.7691

chi-squared with ties =     4.548 with 4 d.f.
probability =     0.3369


                 Dunn's Pairwise Comparison of iq5 by ieth
                            (Benjamini-Hochberg)
Col Mean-|
Row Mean |            1            2            3            4
---------+--------------------------------------------------------
       2 |   1.877283
         |     0.3024
         |
       3 |   0.541285  -1.289464
         |     0.3677     0.4931
         |
       4 |   1.034332   0.000000   0.760484
```

```
          |     0.3762     0.5000     0.3725
          |
        7 |  -0.379896  -1.172018  -0.572123  -0.980581
          |     0.3911     0.4020     0.4052     0.3268

False Discovery Rate =   0.05
Reject Ho if p = P(Z <= |z|) <= FDR/2 with stopping rule

.
. dunntest iq6, by(ieth) ma(bh) wrap

Warning: by() values are unlabeled, option nolabel implicit


Kruskal-Wallis equality-of-populations rank test

  +------------------------+
  | ieth | Obs | Rank Sum |
  |------+-----+----------|
  |    1 |  39 |  1547.50 |
  |    2 |  12 |   479.50 |
  |    3 |  20 |   666.50 |
  |    4 |   3 |   139.50 |
  |    7 |   2 |    93.00 |
  +------------------------+

chi-squared =     1.918 with 4 d.f.
probability =     0.7508

chi-squared with ties =     3.799 with 4 d.f.
probability =     0.4338


                 Dunn's Pairwise Comparison of iq6 by ieth
                            (Benjamini-Hochberg)
Col Mean-|
Row Mean |             1             2             3             4
---------+--------------------------------------------
        2 |  -0.053834
          |     0.5317
          |
        3 |   1.472508   1.157760
          |     0.7044     0.4116
          |
        4 |  -0.725506  -0.645877  -1.356183
          |     0.4681     0.4320     0.4376
          |
        7 |  -0.599554  -0.545866  -1.132205   0.000000
          |     0.3920     0.3657     0.3219     0.5000

False Discovery Rate =   0.05
Reject Ho if p = P(Z <= |z|) <= FDR/2 with stopping rule

.
. dunntest iq7, by(ieth) ma(bh) wrap

Warning: by() values are unlabeled, option nolabel implicit


Kruskal-Wallis equality-of-populations rank test

  +------------------------+
  | ieth | Obs | Rank Sum |
  |------+-----+----------|
  |    1 |  38 |  1459.00 |
  |    2 |  12 |   507.00 |
  |    3 |  20 |   644.00 |
  |    4 |   3 |   144.00 |
  |    7 |   2 |    96.00 |
  +------------------------+

chi-squared =     2.938 with 4 d.f.
probability =     0.5683

chi-squared with ties =     4.907 with 4 d.f.
probability =     0.2970


                 Dunn's Pairwise Comparison of iq7 by ieth
```

```
                             (Benjamini-Hochberg)
Col Mean-|
Row Mean |              1              2              3              4
---------+--------------------------------------------
       2 |  -0.690387
         |     0.3500
         |
       3 |   1.329710   1.632067
         |     0.3060     0.5133
         |
       4 |  -0.949754  -0.528220  -1.513248
         |     0.3422     0.3733     0.3255
         |
       7 |  -0.785104  -0.446427  -1.263331   0.000000
         |     0.3603     0.3640     0.2581     0.5000

False Discovery Rate =   0.05
Reject Ho if p = P(Z <= |z|) <= FDR/2 with stopping rule

.
. dunntest iq8, by(ieth) ma(bh) wrap

Warning: by() values are unlabeled, option nolabel implicit


Kruskal-Wallis equality-of-populations rank test

  +------------------------+
  | ieth | Obs | Rank Sum |
  |------+-----+----------|
  |    1 |  39 |  1519.00 |
  |    2 |  12 |   510.00 |
  |    3 |  20 |   673.50 |
  |    4 |   3 |   106.50 |
  |    7 |   2 |   117.00 |
  +------------------------+

chi-squared =     3.060 with 4 d.f.
probability =     0.5478

chi-squared with ties =     3.502 with 4 d.f.
probability =     0.4775


                 Dunn's Pairwise Comparison of iq8 by ieth
                             (Benjamini-Hochberg)
Col Mean-|
Row Mean |              1              2              3              4
---------+--------------------------------------------
       2 |  -0.521135
         |     0.3764
         |
       3 |   0.928892   1.170773
         |     0.2941     0.3021
         |
       4 |   0.278839   0.525328  -0.142791
         |     0.4335     0.4281     0.4432
         |
       7 |  -1.306345  -1.014820  -1.621568  -1.220522
         |     0.4786     0.3102     0.5245     0.3704

False Discovery Rate =   0.05
Reject Ho if p = P(Z <= |z|) <= FDR/2 with stopping rule

.
. dunntest iq9, by(ieth) ma(bh) wrap

Warning: by() values are unlabeled, option nolabel implicit


Kruskal-Wallis equality-of-populations rank test

  +------------------------+
  | ieth | Obs | Rank Sum |
  |------+-----+----------|
  |    1 |  39 |  1358.00 |
  |    2 |  12 |   488.50 |
  |    3 |  20 |   821.00 |
  |    4 |   3 |   142.50 |
```

```
  |    7 |   2 |   116.00 |
  +-----------------------+

chi-squared =     3.527 with 4 d.f.
probability =     0.4738

chi-squared with ties =     4.191 with 4 d.f.
probability =     0.3808


                 Dunn's Pairwise Comparison of iq9 by ieth
                            (Benjamini-Hochberg)
Col Mean-|
Row Mean |            1             2             3             4
---------+--------------------------------------------
       2 |  -0.880360
         |     0.3156
         |
       3 |  -1.118000  -0.046185
         |     0.4393     0.4816
         |
       4 |  -1.044571  -0.519338  -0.514209
         |     0.2962     0.3772     0.3373
         |
       7 |  -1.578074  -1.117498  -1.128123  -0.567738
         |     0.5727     0.3297     0.6482     0.4073

False Discovery Rate =   0.05
Reject Ho if p = P(Z <= |z|) <= FDR/2 with stopping rule

.
. dunntest iq10, by(ieth) ma(bh) wrap

Warning: by() values are unlabeled, option nolabel implicit


Kruskal-Wallis equality-of-populations rank test

  +-----------------------+
  | ieth | Obs | Rank Sum |
  |------+-----+----------|
  |    1 |  39 |  1603.50 |
  |    2 |  12 |   415.50 |
  |    3 |  20 |   687.00 |
  |    4 |   3 |   132.00 |
  |    7 |   2 |    88.00 |
  +-----------------------+

chi-squared =     1.933 with 4 d.f.
probability =     0.7481

chi-squared with ties =     5.194 with 4 d.f.
probability =     0.2680


                 Dunn's Pairwise Comparison of iq10 by ieth
                            (Benjamini-Hochberg)
Col Mean-|
Row Mean |            1             2             3             4
---------+--------------------------------------------
       2 |   1.459385
         |     0.3611
         |
       3 |   1.825894   0.055902
         |     0.3393     0.5308
         |
       4 |  -0.357370  -1.078049  -1.156913
         |     0.5149     0.3513     0.4122
         |
       7 |  -0.295328  -0.911118  -0.965845   0.000000
         |     0.4798     0.3019     0.3341     0.5000

False Discovery Rate =   0.05
Reject Ho if p = P(Z <= |z|) <= FDR/2 with stopping rule

--------------------------------------------------------------------------------------------------------------------

. dunntest iq1, by(ihwork) ma(bh) wrap
```

```
Warning: by() values are unlabeled, option nolabel implicit


Kruskal-Wallis equality-of-populations rank test

  +-------------------------+
  | ihwork | Obs | Rank Sum |
  |--------+-----+----------|
  |      0 |  16 |   664.00 |
  |      1 |  10 |   263.00 |
  |      2 |  50 |  1999.00 |
  +-------------------------+

chi-squared =     3.572 with 2 d.f.
probability =     0.1676

chi-squared with ties =    16.371 with 2 d.f.
probability =     0.0003


                Dunn's Pairwise Comparison of iq1 by ihwork
                            (Benjamini-Hochberg)
Col Mean-|
Row Mean |            0            1
---------+----------------------
       1 |   3.655494
         |     0.0002
         |
       2 |   0.513034  -3.828465
         |     0.3040     0.0002

False Discovery Rate =   0.05
Reject Ho if p = P(Z <= |z|) <= FDR/2 with stopping rule

.
. dunntest iq2, by(ihwork) ma(bh) wrap

Warning: by() values are unlabeled, option nolabel implicit


Kruskal-Wallis equality-of-populations rank test

  +-------------------------+
  | ihwork | Obs | Rank Sum |
  |--------+-----+----------|
  |      0 |  16 |   634.50 |
  |      1 |   9 |   228.00 |
  |      2 |  50 |  1987.50 |
  +-------------------------+

chi-squared =     3.455 with 2 d.f.
probability =     0.1777

chi-squared with ties =    12.083 with 2 d.f.
probability =     0.0024


                Dunn's Pairwise Comparison of iq2 by ihwork
                            (Benjamini-Hochberg)
Col Mean-|
Row Mean |            0            1
---------+----------------------
       1 |   2.949684
         |     0.0024
         |
       2 |  -0.028008  -3.416473
         |     0.4888     0.0010

False Discovery Rate =   0.05
Reject Ho if p = P(Z <= |z|) <= FDR/2 with stopping rule

.
. dunntest iq3, by(ihwork) ma(bh) wrap

Warning: by() values are unlabeled, option nolabel implicit


Kruskal-Wallis equality-of-populations rank test
```

```
  +-------------------------+
  | ihwork | Obs | Rank Sum |
  |--------+-----+----------|
  |      0 |  16 |   644.00 |
  |      1 |  10 |   298.00 |
  |      2 |  50 |  1984.00 |
  +-------------------------+

chi-squared =     1.795 with 2 d.f.
probability =     0.4075

chi-squared with ties =     4.220 with 2 d.f.
probability =     0.1213


                Dunn's Pairwise Comparison of iq3 by ihwork
                            (Benjamini-Hochberg)
Col Mean-|
Row Mean |            0            1
---------+----------------------
       1 |   1.799706
         |     0.0539
         |
       2 |   0.137772  -1.980059
         |     0.4452     0.0715

False Discovery Rate =   0.05
Reject Ho if p = P(Z <= |z|) <= FDR/2 with stopping rule

.
. dunntest iq4, by(ihwork) ma(bh) wrap

Warning: by() values are unlabeled, option nolabel implicit


Kruskal-Wallis equality-of-populations rank test

  +-------------------------+
  | ihwork | Obs | Rank Sum |
  |--------+-----+----------|
  |      0 |  17 |   685.50 |
  |      1 |  10 |   300.50 |
  |      2 |  50 |  2017.00 |
  +-------------------------+

chi-squared =     1.839 with 2 d.f.
probability =     0.3987

chi-squared with ties =     3.042 with 2 d.f.
probability =     0.2185


                Dunn's Pairwise Comparison of iq4 by ihwork
                            (Benjamini-Hochberg)
Col Mean-|
Row Mean |            0            1
---------+----------------------
       1 |   1.481917
         |     0.1038
         |
       2 |  -0.003372  -1.707601
         |     0.4987     0.1316

False Discovery Rate =   0.05
Reject Ho if p = P(Z <= |z|) <= FDR/2 with stopping rule

.
. dunntest iq5, by(ihwork) ma(bh) wrap

Warning: by() values are unlabeled, option nolabel implicit


Kruskal-Wallis equality-of-populations rank test

  +-------------------------+
  | ihwork | Obs | Rank Sum |
  |--------+-----+----------|
  |      0 |  16 |   712.00 |
  |      1 |  10 |   220.00 |
```

```
  |      2 |  50 |  1994.00 |
  +-------------------------+

chi-squared =     6.959 with 2 d.f.
probability =     0.0308

chi-squared with ties =    17.404 with 2 d.f.
probability =     0.0002


                Dunn's Pairwise Comparison of iq5 by ihwork
                            (Benjamini-Hochberg)
Col Mean-|
Row Mean |             0            1
---------+----------------------
       1 |   3.997040
         |     0.0001
         |
       2 |   1.151855  -3.696235
         |     0.1247     0.0002

False Discovery Rate =   0.05
Reject Ho if p = P(Z <= |z|) <= FDR/2 with stopping rule

.
. dunntest iq6, by(ihwork) ma(bh) wrap

Warning: by() values are unlabeled, option nolabel implicit


Kruskal-Wallis equality-of-populations rank test

  +-------------------------+
  | ihwork | Obs | Rank Sum |
  |--------+-----+----------|
  |      0 |  16 |   559.00 |
  |      1 |  10 |   308.00 |
  |      2 |  50 |  2059.00 |
  +-------------------------+

chi-squared =     2.369 with 2 d.f.
probability =     0.3060

chi-squared with ties =     4.692 with 2 d.f.
probability =     0.0958


                Dunn's Pairwise Comparison of iq6 by ihwork
                            (Benjamini-Hochberg)
Col Mean-|
Row Mean |             0            1
---------+----------------------
       1 |   0.654135
         |     0.2565
         |
       2 |  -1.385120  -1.909689
         |     0.1245     0.0843

False Discovery Rate =   0.05
Reject Ho if p = P(Z <= |z|) <= FDR/2 with stopping rule

.
. dunntest iq7, by(ihwork) ma(bh) wrap

Warning: by() values are unlabeled, option nolabel implicit


Kruskal-Wallis equality-of-populations rank test

  +-------------------------+
  | ihwork | Obs | Rank Sum |
  |--------+-----+----------|
  |      0 |  16 |   644.50 |
  |      1 |   9 |   353.00 |
  |      2 |  50 |  1852.50 |
  +-------------------------+

chi-squared =     0.299 with 2 d.f.
probability =     0.8613
```

```
chi-squared with ties =     0.499 with 2 d.f.
probability =     0.7793


                Dunn's Pairwise Comparison of iq7 by ihwork
                            (Benjamini-Hochberg)
Col Mean-|
Row Mean |            0            1
---------+----------------------
       1 |   0.150716
         |     0.4401
         |
       2 |   0.667091   0.355734
         |     0.7571     0.5415

False Discovery Rate =   0.05
Reject Ho if p = P(Z <= |z|) <= FDR/2 with stopping rule

.
. dunntest iq8, by(ihwork) ma(bh) wrap

Warning: by() values are unlabeled, option nolabel implicit


Kruskal-Wallis equality-of-populations rank test

  +-------------------------+
  | ihwork | Obs | Rank Sum |
  |--------+-----+----------|
  |      0 |  16 |   521.00 |
  |      1 |  10 |   393.00 |
  |      2 |  50 |  2012.00 |
  +-------------------------+

chi-squared =     1.480 with 2 d.f.
probability =     0.4771

chi-squared with ties =     1.694 with 2 d.f.
probability =     0.4287


                Dunn's Pairwise Comparison of iq8 by ihwork
                            (Benjamini-Hochberg)
Col Mean-|
Row Mean |            0            1
---------+----------------------
       1 |  -0.809654
         |     0.3136
         |
       2 |  -1.294852  -0.131451
         |     0.2931     0.4477

False Discovery Rate =   0.05
Reject Ho if p = P(Z <= |z|) <= FDR/2 with stopping rule

.
. dunntest iq9, by(ihwork) ma(bh) wrap

Warning: by() values are unlabeled, option nolabel implicit


Kruskal-Wallis equality-of-populations rank test

  +-------------------------+
  | ihwork | Obs | Rank Sum |
  |--------+-----+----------|
  |      0 |  16 |   639.00 |
  |      1 |  10 |   379.00 |
  |      2 |  50 |  1908.00 |
  +-------------------------+

chi-squared =     0.087 with 2 d.f.
probability =     0.9574

chi-squared with ties =     0.103 with 2 d.f.
probability =     0.9496
```

```
                Dunn's Pairwise Comparison of iq9 by ihwork
                            (Benjamini-Hochberg)
Col Mean-|
Row Mean |             0             1
---------+----------------------
       1 |   0.249482
         |     0.6022
         |
       2 |   0.305457  -0.037047
         |     1.0000     0.4852

False Discovery Rate =   0.05
Reject Ho if p = P(Z <= |z|) <= FDR/2 with stopping rule

.
. dunntest iq10, by(ihwork) ma(bh) wrap

Warning: by() values are unlabeled, option nolabel implicit


Kruskal-Wallis equality-of-populations rank test

  +-------------------------+
  | ihwork | Obs | Rank Sum |
  |--------+-----+----------|
  |      0 |  16 |   666.50 |
  |      1 |  10 |   322.00 |
  |      2 |  50 |  1937.50 |
  +-------------------------+

chi-squared =     1.147 with 2 d.f.
probability =     0.5635

chi-squared with ties =     3.082 with 2 d.f.
probability =     0.2141


                Dunn's Pairwise Comparison of iq10 by ihwork
                            (Benjamini-Hochberg)
Col Mean-|
Row Mean |             0             1
---------+----------------------
       1 |   1.741221
         |     0.1225
         |
       2 |   0.751048  -1.403500
         |     0.2263     0.1204

False Discovery Rate =   0.05
Reject Ho if p = P(Z <= |z|) <= FDR/2 with stopping rule

.
```

HPESS Survey Statistics on Factor Analysis Produced Variables

- Question – For each of the factor variables (knowledge, participation), is there a difference in the average response by age?

  Answer – NO, not for either variable

- Question – For each of the factor variables (knowledge, participation), is there a difference in the average response by gender?

  Answer – NO, not for either variable

- Question – For each of the factor variables (knowledge, participation), is there a difference in the average response by level of education

  Answer – NO, not for either variable

- Question: For each of the factor variables (knowledge, participation), is there a difference in the average response based upon racer or ethnicity

  Answer – K-Wallis (nonparametric ANOVA reports a significant p value for "knowledge" but the Dunn test finds no significant difference among the pairs tested. No significant difference was found for "participate"

- Question – For each of the factor variables (knowledge, participation), is there a difference in the average response by age?

```
. dunntest iknowledge, by(iage) ma(bh) wrap

Kruskal-Wallis equality-of-populations rank test

  +-----------------------+
  | iage | Obs | Rank Sum |
  |------+-----+----------|
  |    1 |   1 |     3.50 |
  |    2 |  22 |   876.00 |
  |    3 |  35 |  1415.50 |
  |    4 |  11 |   324.50 |
  |    5 |   5 |   209.50 |
  |------+-----+----------|
  |    6 |   1 |    21.00 |
  +-----------------------+

chi-squared =     5.540 with 5 d.f.
probability =     0.3535

chi-squared with ties =     7.568 with 5 d.f.
probability =     0.1817


              Dunn's Pairwise Comparison of iknowledge by iage
                            (Benjamini-Hochberg)
Col Mean-|
Row Mean |            1            2            3            4            5
---------+--------------------------------------------------------
       2 |  -1.904824
         |     0.2130
         |
       3 |  -1.953424  -0.123125
         |     0.3808     0.4510
         |
       4 |  -1.334942   1.498433   1.697718
```

```
          |     0.2274     0.2010     0.1679
          |
        5 |  -1.879853  -0.225341  -0.163446  -1.232896
          |     0.1503     0.4741     0.4662     0.2332
          |
        6 |  -0.663600   0.986980   1.028078   0.436423   1.023149
          |     0.3456     0.2427     0.2849     0.4141     0.2552

False Discovery Rate =   0.05
Reject Ho if p = P(Z <= |z|) <= FDR/2 with stopping rule

.
. dunntest iparticipate, by(iage) ma(bh) wrap

Kruskal-Wallis equality-of-populations rank test

  +-----------------------+
  | iage | Obs | Rank Sum |
  |------+-----+----------|
  |    1 |   1 |    10.00 |
  |    2 |  22 |   810.00 |
  |    3 |  35 |  1355.00 |
  |    4 |  11 |   407.50 |
  |    5 |   5 |   221.50 |
  |------+-----+----------|
  |    6 |   1 |    46.00 |
  +-----------------------+

chi-squared =     2.326 with 5 d.f.
probability =     0.8024

chi-squared with ties =     2.448 with 5 d.f.
probability =     0.7843


             Dunn's Pairwise Comparison of iparticipate by iage
                            (Benjamini-Hochberg)
Col Mean-|
Row Mean |             1             2             3             4             5
---------+-------------------------------------------------------
        2 |  -1.234590
          |     0.5425
          |
        3 |  -1.332682  -0.328032
          |     0.6849     0.4643
          |
        4 |  -1.218838  -0.028970   0.227253
          |     0.4179     0.4884     0.4732
          |
        5 |  -1.473837  -0.710833  -0.549938  -0.633107
          |     1.0000     0.5965     0.5460     0.5643
          |
        6 |  -1.198211  -0.422690  -0.338143  -0.403548  -0.073047
          |     0.3463     0.5604     0.5013     0.5149     0.5045

False Discovery Rate =   0.05
Reject Ho if p = P(Z <= |z|) <= FDR/2 with stopping rule
```

Question – For each of the factor variables (knowledge, participation), is there a difference in the average response by gender?

```
. ranksum iknowledge, by(igender)

Two-sample Wilcoxon rank-sum (Mann-Whitney) test

     igender |      obs    rank sum    expected
-------------+---------------------------------
           1 |       17         579         646
           2 |       58        2271        2204
-------------+---------------------------------
    combined |       75        2850        2850

unadjusted variance     6244.67
adjustment for ties    -1673.27
                     ----------
adjusted variance       4571.40
```

```
Ho: iknowl~e(igender==1) = iknowl~e(igender==2)
             z =  -0.991
    Prob > |z| =   0.3217

.
. ranksum iparticipate, by(igender)

Two-sample Wilcoxon rank-sum (Mann-Whitney) test

     igender |      obs    rank sum    expected
-------------+---------------------------------
           1 |       17       599.5         646
           2 |       58      2250.5        2204
-------------+---------------------------------
    combined |       75        2850        2850

unadjusted variance     6244.67
adjustment for ties     -310.99
                     ----------
adjusted variance       5933.68

Ho: iparti~e(igender==1) = iparti~e(igender==2)
             z =  -0.604
    Prob > |z| =   0.5461
```

- Question – For each of the factor variables (knowledge, participation), is there a difference in the average response by level of education

```
. dunntest iknowledge, by(ied) ma(bh) wrap

Kruskal-Wallis equality-of-populations rank test

  +----------------------+
  | ied | Obs | Rank Sum |
  |-----+-----+----------|
  |   1 |  26 |   952.00 |
  |   2 |  48 |  1894.50 |
  |   3 |   1 |     3.50 |
  +----------------------+

chi-squared =     2.829 with 2 d.f.
probability =     0.2431

chi-squared with ties =     3.864 with 2 d.f.
probability =     0.1449


              Dunn's Pairwise Comparison of iknowledge by ied
                           (Benjamini-Hochberg)
Col Mean-|
Row Mean |            1            2
---------+----------------------
       2 |  -0.628394
         |     0.2649
         |
       3 |   1.742681   1.909111
         |     0.0610     0.0844

False Discovery Rate =    0.05
Reject Ho if p = P(Z <= |z|) <= FDR/2 with stopping rule

.
. dunntest iparticipate, by(ied) ma(bh) wrap

Kruskal-Wallis equality-of-populations rank test

  +----------------------+
  | ied | Obs | Rank Sum |
  |-----+-----+----------|
  |   1 |  26 |  1051.50 |
  |   2 |  48 |  1784.00 |
  |   3 |   1 |    14.50 |
  +----------------------+
```

```
chi-squared =     1.559 with 2 d.f.
probability =     0.4586

chi-squared with ties =     1.641 with 2 d.f.
probability =     0.4402


             Dunn's Pairwise Comparison of iparticipate by ied
                            (Benjamini-Hochberg)
Col Mean-|
Row Mean |             1             2
---------+----------------------
       2 |   0.633189
         |     0.2633
         |
       3 |   1.198283   1.055981
         |     0.3462     0.2182

False Discovery Rate =   0.05
Reject Ho if p = P(Z <= |z|) <= FDR/2 with stopping rule

----------------------------------------------------------------------------------------------------------------
```

- Question: For each of the factor variables (knowledge, participation), is there a difference in the average response based upon racer or ethnicity

```
. dunntest iknowledge, by(ieth) ma(bh) wrap

Warning: by() values are unlabeled, option nolabel implicit


Kruskal-Wallis equality-of-populations rank test

  +-----------------------+
  | ieth | Obs | Rank Sum |
  |------+-----+----------|
  |    1 |  38 |  1601.50 |
  |    2 |  12 |   333.00 |
  |    3 |  20 |   759.00 |
  |    4 |   3 |    53.50 |
  |    7 |   2 |   103.00 |
  +-----------------------+

chi-squared =     7.365 with 4 d.f.
probability =     0.1178

chi-squared with ties =    10.060 with 4 d.f.
probability =     0.0394


              Dunn's Pairwise Comparison of iknowledge by ieth
                            (Benjamini-Hochberg)
Col Mean-|
Row Mean |             1             2             3             4
---------+--------------------------------------------
       2 |   2.331226
         |     0.0987
         |
       3 |   0.814293  -1.498008
         |     0.2308     0.1118
         |
       4 |   2.173971   0.823862   1.742413
         |     0.0743     0.2563     0.1018
         |
       7 |  -0.691538  -1.667587  -0.979809  -1.977762
         |     0.2446     0.0954     0.2337     0.0799

False Discovery Rate =   0.05
Reject Ho if p = P(Z <= |z|) <= FDR/2 with stopping rule

.
. dunntest iparticipate, by(ieth) ma(bh) wrap

Warning: by() values are unlabeled, option nolabel implicit


Kruskal-Wallis equality-of-populations rank test
```

```
  +-----------------------+
  | ieth | Obs | Rank Sum |
  |------+-----+----------|
  |    1 |  38 |  1430.50 |
  |    2 |  12 |   507.00 |
  |    3 |  20 |   659.50 |
  |    4 |   3 |   128.00 |
  |    7 |   2 |   125.00 |
  +-----------------------+

chi-squared =     4.195 with 4 d.f.
probability =     0.3803

chi-squared with ties =     4.414 with 4 d.f.
probability =     0.3528


             Dunn's Pairwise Comparison of iparticipate by ieth
                            (Benjamini-Hochberg)
Col Mean-|
Row Mean |            1             2             3             4
---------+--------------------------------------------
       2 |  -0.654633
         |     0.3204
         |
       3 |   0.795667   1.195612
         |     0.3552     0.2898
         |
       4 |  -0.394164  -0.030384  -0.736811
         |     0.3853     0.4879     0.3295
         |
       7 |  -1.612653  -1.247994  -1.873935  -1.022662
         |     0.2670     0.3534     0.3047     0.3065

False Discovery Rate =   0.05
Reject Ho if p = P(Z <= |z|) <= FDR/2 with stopping rule
```

National Survey Statistics Report

Summary

- Question – For each of the questions, 1-10, are there differences in the average response by age?

  Answer – YES, for ALL questions there are significant differences among the responses of the various age groups

- Question – For each of the questions, 1-10, are there differences in the average response by gender?

  Answer – YES, for ALL questions there are significant differences between the responses of the genders.

- Question – For each of the questions, 1-10, are there differences in the average response by income level?

  Answer – YES, for questions 1, 2, 3, 4, and 6 there are differences in responses among income levels.

- Question: For each of the questions, are there differences in the average responses among regions?

  Answer – YES, but only for question 9.

- Question – For each of the questions, 1-10, are there differences in the average responses among the devices used?
  Answer – Yes, for all questions, except 2, 8 and 9, there are differences in the average responses among the devices used.

Statistics

- Question – For each of the questions, 1-10, are there differences in the average response by age among those who identified their age group?

```
. dunntest iq1, by(iage) ma(bh) wrap

Warning: by() values are unlabeled, option nolabel implicit


Kruskal-Wallis equality-of-populations rank test

  +------------------------+
  | iage | Obs |  Rank Sum |
  |------+-----+-----------|
  |    2 | 297 | 136808.00 |
  |    3 | 230 | 120095.00 |
  |    4 | 343 | 193579.00 |
  |    5 | 197 | 119296.00 |
  +------------------------+

chi-squared =    31.130 with 3 d.f.
probability =     0.0001

chi-squared with ties =    53.379 with 3 d.f.
probability =     0.0001


                  Dunn's Pairwise Comparison of iq1 by iage
                              (Benjamini-Hochberg)
Col Mean-|
Row Mean |            2              3              4
```

```
---------+--------------------------------
       3 |  -2.976209
         |     0.0022
         |
       4 |  -5.561425  -2.104981
         |     0.0000     0.0212
         |
       5 |  -6.702295  -3.651101  -1.958054
         |     0.0000     0.0003     0.0251

False Discovery Rate =   0.05
Reject Ho if p = P(Z <= |z|) <= FDR/2 with stopping rule

.
. dunntest iq2, by(iage) ma(bh) wrap

Warning: by() values are unlabeled, option nolabel implicit


Kruskal-Wallis equality-of-populations rank test

  +------------------------+
  | iage | Obs |  Rank Sum |
  |------+-----+-----------|
  |    2 | 297 | 137489.50 |
  |    3 | 230 | 117935.00 |
  |    4 | 343 | 193709.50 |
  |    5 | 197 | 120644.00 |
  +------------------------+

chi-squared =    33.059 with 3 d.f.
probability =     0.0001

chi-squared with ties =    47.662 with 3 d.f.
probability =     0.0001


                 Dunn's Pairwise Comparison of iq2 by iage
                            (Benjamini-Hochberg)
Col Mean-|
Row Mean |            2             3             4
---------+--------------------------------
       3 |  -2.210640
         |     0.0162
         |
       4 |  -5.005456  -2.376918
         |     0.0000     0.0131
         |
       5 |  -6.338529  -3.999461  -2.077098
         |     0.0000     0.0001     0.0189

False Discovery Rate =   0.05
Reject Ho if p = P(Z <= |z|) <= FDR/2 with stopping rule

.
. dunntest iq3, by(iage) ma(bh) wrap

Warning: by() values are unlabeled, option nolabel implicit


Kruskal-Wallis equality-of-populations rank test

  +------------------------+
  | iage | Obs |  Rank Sum |
  |------+-----+-----------|
  |    2 | 297 | 139770.50 |
  |    3 | 230 | 117843.00 |
  |    4 | 343 | 191441.00 |
  |    5 | 197 | 120723.50 |
  +------------------------+

chi-squared =    28.691 with 3 d.f.
probability =     0.0001

chi-squared with ties =    53.833 with 3 d.f.
probability =     0.0001


                 Dunn's Pairwise Comparison of iq3 by iage
```

```
                            (Benjamini-Hochberg)
Col Mean-|
Row Mean |              2              3              4
---------+-------------------------------------
       3 |  -2.113003
         |     0.0173
         |
       4 |  -4.908660  -2.387522
         |     0.0000     0.0102
         |
       5 |  -6.879036  -4.599409  -2.718488
         |     0.0000     0.0000     0.0049

False Discovery Rate =   0.05
Reject Ho if p = P(Z <= |z|) <= FDR/2 with stopping rule

.
. dunntest iq4, by(iage) ma(bh) wrap

Warning: by() values are unlabeled, option nolabel implicit


Kruskal-Wallis equality-of-populations rank test

  +------------------------+
  | iage | Obs |  Rank Sum |
  |------+-----+-----------|
  |    2 | 297 | 131759.50 |
  |    3 | 230 | 116810.50 |
  |    4 | 343 | 196304.50 |
  |    5 | 197 | 124903.50 |
  +------------------------+

chi-squared =    53.252 with 3 d.f.
probability =     0.0001

chi-squared with ties =    70.467 with 3 d.f.
probability =     0.0001


                 Dunn's Pairwise Comparison of iq4 by iage
                            (Benjamini-Hochberg)
Col Mean-|
Row Mean |              2              3              4
---------+-------------------------------------
       3 |  -2.730052
         |     0.0038
         |
       4 |  -6.060387  -2.822725
         |     0.0000     0.0036
         |
       5 |  -7.734777  -4.851098  -2.576905
         |     0.0000     0.0000     0.0050

False Discovery Rate =   0.05
Reject Ho if p = P(Z <= |z|) <= FDR/2 with stopping rule

.
. dunntest iq5, by(iage) ma(bh) wrap

Warning: by() values are unlabeled, option nolabel implicit


Kruskal-Wallis equality-of-populations rank test

  +------------------------+
  | iage | Obs |  Rank Sum |
  |------+-----+-----------|
  |    2 | 297 | 130735.50 |
  |    3 | 230 | 118988.50 |
  |    4 | 343 | 197372.50 |
  |    5 | 197 | 122681.50 |
  +------------------------+

chi-squared =    50.736 with 3 d.f.
probability =     0.0001

chi-squared with ties =    74.894 with 3 d.f.
probability =     0.0001
```

```
                 Dunn's Pairwise Comparison of iq5 by iage
                            (Benjamini-Hochberg)
Col Mean-|
Row Mean |             2             3             4
---------+---------------------------------
       3 |  -3.463252
         |     0.0004
         |
       4 |  -6.727241  -2.687273
         |     0.0000     0.0043
         |
       5 |  -7.833291  -4.280955  -2.086904
         |     0.0000     0.0000     0.0184

False Discovery Rate =   0.05
Reject Ho if p = P(Z <= |z|) <= FDR/2 with stopping rule

.
. dunntest iq6, by(iage) ma(bh) wrap

Warning: by() values are unlabeled, option nolabel implicit


Kruskal-Wallis equality-of-populations rank test

  +------------------------+
  | iage | Obs |  Rank Sum |
  |------+-----+-----------|
  |    2 | 297 | 139523.00 |
  |    3 | 230 | 121315.50 |
  |    4 | 343 | 196979.50 |
  |    5 | 197 | 111960.00 |
  +------------------------+

chi-squared =    21.310 with 3 d.f.
probability =     0.0001

chi-squared with ties =    31.684 with 3 d.f.
probability =     0.0001


                 Dunn's Pairwise Comparison of iq6 by iage
                            (Benjamini-Hochberg)
Col Mean-|
Row Mean |             2             3             4
---------+---------------------------------
       3 |  -2.598612
         |     0.0094
         |
       4 |  -5.217225  -2.174021
         |     0.0000     0.0223
         |
       5 |  -4.243787  -1.665690   0.263774
         |     0.0000     0.0575     0.3960

False Discovery Rate =   0.05
Reject Ho if p = P(Z <= |z|) <= FDR/2 with stopping rule

.
. dunntest iq7, by(iage) ma(bh) wrap

Warning: by() values are unlabeled, option nolabel implicit


Kruskal-Wallis equality-of-populations rank test

  +------------------------+
  | iage | Obs |  Rank Sum |
  |------+-----+-----------|
  |    2 | 297 | 134994.00 |
  |    3 | 230 | 118404.00 |
  |    4 | 343 | 195415.00 |
  |    5 | 197 | 120965.00 |
  +------------------------+

chi-squared =    38.545 with 3 d.f.
probability =     0.0001
```

```
chi-squared with ties =    47.396 with 3 d.f.
probability =     0.0001


                 Dunn's Pairwise Comparison of iq7 by iage
                            (Benjamini-Hochberg)
Col Mean-|
Row Mean |              2             3             4
---------+---------------------------------
       3 |  -2.469339
         |     0.0102
         |
       4 |  -5.229834  -2.318978
         |     0.0000     0.0122
         |
       5 |  -6.246620  -3.678399  -1.783685
         |     0.0000     0.0002     0.0372

False Discovery Rate =   0.05
Reject Ho if p = P(Z <= |z|) <= FDR/2 with stopping rule

.
. dunntest iq8, by(iage) ma(bh) wrap

Warning: by() values are unlabeled, option nolabel implicit


Kruskal-Wallis equality-of-populations rank test

  +------------------------+
  | iage | Obs |  Rank Sum |
  |------+-----+-----------|
  |    2 | 297 | 144264.00 |
  |    3 | 230 | 123659.00 |
  |    4 | 343 | 195323.50 |
  |    5 | 197 | 106531.50 |
  +------------------------+

chi-squared =    11.953 with 3 d.f.
probability =     0.0075

chi-squared with ties =    13.243 with 3 d.f.
probability =     0.0041


                 Dunn's Pairwise Comparison of iq8 by iage
                            (Benjamini-Hochberg)
Col Mean-|
Row Mean |              2             3             4
---------+---------------------------------
       3 |  -2.018706
         |     0.0435
         |
       4 |  -3.607781  -1.274845
         |     0.0009     0.1518
         |
       5 |  -2.045700  -0.109821   1.096108
         |     0.0612     0.4563     0.1638

False Discovery Rate =   0.05
Reject Ho if p = P(Z <= |z|) <= FDR/2 with stopping rule

.
. dunntest iq9, by(iage) ma(bh) wrap

Warning: by() values are unlabeled, option nolabel implicit


Kruskal-Wallis equality-of-populations rank test

  +------------------------+
  | iage | Obs |  Rank Sum |
  |------+-----+-----------|
  |    2 | 297 | 145982.00 |
  |    3 | 230 | 123673.00 |
  |    4 | 343 | 185055.00 |
  |    5 | 197 | 115068.00 |
  +------------------------+
```

```
chi-squared =    10.994 with 3 d.f.
probability =     0.0118

chi-squared with ties =    12.738 with 3 d.f.
probability =     0.0052


                 Dunn's Pairwise Comparison of iq9 by iage
                            (Benjamini-Hochberg)
Col Mean-|
Row Mean |            2            3            4
---------+---------------------------------
       3 |  -1.836776
         |     0.0662
         |
       4 |  -2.115200  -0.074195
         |     0.0516     0.4704
         |
       5 |  -3.519369  -1.669304  -1.742007
         |     0.0013     0.0570     0.0611

False Discovery Rate =   0.05
Reject Ho if p = P(Z <= |z|) <= FDR/2 with stopping rule

.
. dunntest iq10, by(iage) ma(bh) wrap

Warning: by() values are unlabeled, option nolabel implicit


Kruskal-Wallis equality-of-populations rank test

  +------------------------+
  | iage | Obs |  Rank Sum |
  |------+-----+-----------|
  |    2 | 297 | 134627.00 |
  |    3 | 230 | 122540.00 |
  |    4 | 343 | 194647.50 |
  |    5 | 197 | 117963.50 |
  +------------------------+

chi-squared =    33.137 with 3 d.f.
probability =     0.0001

chi-squared with ties =    60.194 with 3 d.f.
probability =     0.0001


                 Dunn's Pairwise Comparison of iq10 by iage
                            (Benjamini-Hochberg)
Col Mean-|
Row Mean |            2            3            4
---------+---------------------------------
       3 |  -3.958265
         |     0.0001
         |
       4 |  -6.301218  -1.780890
         |     0.0000     0.0450
         |
       5 |  -6.925950  -2.974246  -1.532010
         |     0.0000     0.0022     0.0628

False Discovery Rate =   0.05
Reject Ho if p = P(Z <= |z|) <= FDR/2 with stopping rule
```

- Question – For each of the questions, 1-10, are there differences in the average response by gender?

```
. dunntest iq1, by(igender)

Warning: by() values are unlabeled, option nolabel implicit


Kruskal-Wallis equality-of-populations rank test

  +---------------------------+
```

```
  | igender | Obs |  Rank Sum |
  |---------+-----+-----------|
  |       1 | 497 | 248163.00 |
  |       2 | 570 | 321615.00 |
  +---------------------------+

chi-squared =    11.781 with 1 d.f.
probability =     0.0006

chi-squared with ties =    20.202 with 1 d.f.
probability =     0.0001


                Dunn's Pairwise Comparison of iq1 by igender
                              (No adjustment)
Col Mean-|
Row Mean |              1
---------+-----------
       2 |  -4.494629
         |     0.0000

alpha =   0.05
Reject Ho if p = P(Z <= |z|) <= alpha/2

.
. dunntest iq2, by(igender)

Warning: by() values are unlabeled, option nolabel implicit


Kruskal-Wallis equality-of-populations rank test

  +---------------------------+
  | igender | Obs |  Rank Sum |
  |---------+-----+-----------|
  |       1 | 497 | 245930.00 |
  |       2 | 570 | 323848.00 |
  +---------------------------+

chi-squared =    15.032 with 1 d.f.
probability =     0.0001

chi-squared with ties =    21.672 with 1 d.f.
probability =     0.0001


                Dunn's Pairwise Comparison of iq2 by igender
                              (No adjustment)
Col Mean-|
Row Mean |              1
---------+-----------
       2 |  -4.655324
         |     0.0000

alpha =   0.05
Reject Ho if p = P(Z <= |z|) <= alpha/2

.
. dunntest iq3, by(igender)

Warning: by() values are unlabeled, option nolabel implicit


Kruskal-Wallis equality-of-populations rank test

  +---------------------------+
  | igender | Obs |  Rank Sum |
  |---------+-----+-----------|
  |       1 | 497 | 254937.00 |
  |       2 | 570 | 314841.00 |
  +---------------------------+

chi-squared =     4.340 with 1 d.f.
probability =     0.0372

chi-squared with ties =     8.144 with 1 d.f.
probability =     0.0043
```

```
                Dunn's Pairwise Comparison of iq3 by igender
                              (No adjustment)
Col Mean-|
Row Mean |            1
---------+-----------
       2 |  -2.853738
         |     0.0022

alpha =   0.05
Reject Ho if p = P(Z <= |z|) <= alpha/2

.
. dunntest iq4, by(igender)

Warning: by() values are unlabeled, option nolabel implicit


Kruskal-Wallis equality-of-populations rank test

  +---------------------------+
  | igender | Obs |  Rank Sum |
  |---------+-----+-----------|
  |       1 | 497 | 245219.00 |
  |       2 | 570 | 324559.00 |
  +---------------------------+

chi-squared =    16.150 with 1 d.f.
probability =     0.0001

chi-squared with ties =    21.371 with 1 d.f.
probability =     0.0001


                Dunn's Pairwise Comparison of iq4 by igender
                              (No adjustment)
Col Mean-|
Row Mean |            1
---------+-----------
       2 |  -4.622902
         |     0.0000

alpha =   0.05
Reject Ho if p = P(Z <= |z|) <= alpha/2

.
. dunntest iq5, by(igender)

Warning: by() values are unlabeled, option nolabel implicit


Kruskal-Wallis equality-of-populations rank test

  +---------------------------+
  | igender | Obs |  Rank Sum |
  |---------+-----+-----------|
  |       1 | 497 | 250255.00 |
  |       2 | 570 | 319523.00 |
  +---------------------------+

chi-squared =     9.095 with 1 d.f.
probability =     0.0026

chi-squared with ties =    13.426 with 1 d.f.
probability =     0.0002


                Dunn's Pairwise Comparison of iq5 by igender
                              (No adjustment)
Col Mean-|
Row Mean |            1
---------+-----------
       2 |  -3.664079
         |     0.0001

alpha =   0.05
Reject Ho if p = P(Z <= |z|) <= alpha/2

.
. dunntest iq6, by(igender)
```

```
Warning: by() values are unlabeled, option nolabel implicit


Kruskal-Wallis equality-of-populations rank test

  +---------------------------+
  | igender | Obs |  Rank Sum |
  |---------+-----+-----------|
  |       1 | 497 | 253170.50 |
  |       2 | 570 | 316607.50 |
  +---------------------------+

chi-squared =     5.930 with 1 d.f.
probability =     0.0149

chi-squared with ties =     8.817 with 1 d.f.
probability =     0.0030


                Dunn's Pairwise Comparison of iq6 by igender
                              (No adjustment)
Col Mean-|
Row Mean |             1
---------+-----------
       2 |  -2.969281
         |     0.0015

alpha =   0.05
Reject Ho if p = P(Z <= |z|) <= alpha/2

.
. dunntest iq7, by(igender)

Warning: by() values are unlabeled, option nolabel implicit


Kruskal-Wallis equality-of-populations rank test

  +---------------------------+
  | igender | Obs |  Rank Sum |
  |---------+-----+-----------|
  |       1 | 497 | 242886.00 |
  |       2 | 570 | 326892.00 |
  +---------------------------+

chi-squared =    20.100 with 1 d.f.
probability =     0.0001

chi-squared with ties =    24.716 with 1 d.f.
probability =     0.0001


                Dunn's Pairwise Comparison of iq7 by igender
                              (No adjustment)
Col Mean-|
Row Mean |             1
---------+-----------
       2 |  -4.971520
         |     0.0000

alpha =   0.05
Reject Ho if p = P(Z <= |z|) <= alpha/2

.
. dunntest iq8, by(igender)

Warning: by() values are unlabeled, option nolabel implicit


Kruskal-Wallis equality-of-populations rank test

  +---------------------------+
  | igender | Obs |  Rank Sum |
  |---------+-----+-----------|
  |       1 | 497 | 243180.50 |
  |       2 | 570 | 326597.50 |
  +---------------------------+
```

```
chi-squared =    19.578 with 1 d.f.
probability =     0.0001

chi-squared with ties =    21.691 with 1 d.f.
probability =     0.0001


                Dunn's Pairwise Comparison of iq8 by igender
                              (No adjustment)
Col Mean-|
Row Mean |             1
---------+-----------
       2 |  -4.657396
         |     0.0000

alpha =   0.05
Reject Ho if p = P(Z <= |z|) <= alpha/2

.
. dunntest iq9, by(igender)

Warning: by() values are unlabeled, option nolabel implicit


Kruskal-Wallis equality-of-populations rank test

  +---------------------------+
  | igender | Obs |  Rank Sum |
  |---------+-----+-----------|
  |       1 | 497 | 250477.00 |
  |       2 | 570 | 319301.00 |
  +---------------------------+

chi-squared =     8.830 with 1 d.f.
probability =     0.0030

chi-squared with ties =    10.231 with 1 d.f.
probability =     0.0014


                Dunn's Pairwise Comparison of iq9 by igender
                              (No adjustment)
Col Mean-|
Row Mean |             1
---------+-----------
       2 |  -3.198645
         |     0.0007

alpha =   0.05
Reject Ho if p = P(Z <= |z|) <= alpha/2

.
. dunntest iq10, by(igender)

Warning: by() values are unlabeled, option nolabel implicit


Kruskal-Wallis equality-of-populations rank test

  +---------------------------+
  | igender | Obs |  Rank Sum |
  |---------+-----+-----------|
  |       1 | 497 | 246943.50 |
  |       2 | 570 | 322834.50 |
  +---------------------------+

chi-squared =    13.508 with 1 d.f.
probability =     0.0002

chi-squared with ties =    24.537 with 1 d.f.
probability =     0.0001


               Dunn's Pairwise Comparison of iq10 by igender
                              (No adjustment)
Col Mean-|
Row Mean |             1
---------+-----------
       2 |  -4.953449
```

```
         |     0.0000

alpha =   0.05
Reject Ho if p = P(Z <= |z|) <= alpha/2

-----------------------------------------------------------------------------------------------------------------
```

- Question – For each of the questions, 1-10, are there differences in the average response by income level?

```
. dunntest iq1, by(iincome)

Warning: by() values are unlabeled, option nolabel implicit


Kruskal-Wallis equality-of-populations rank test

  +----------------------------+
  | iincome | Obs |  Rank Sum |
  |---------+-----+-----------|
  |       1 |  85 |  39647.00 |
  |       2 | 124 |  60999.00 |
  |       3 | 220 | 109906.00 |
  |       4 | 194 | 109253.00 |
  |       5 | 138 |  73959.00 |
  |---------+-----+-----------|
  |       6 |  81 |  47674.00 |
  |       7 |  45 |  26205.00 |
  |       8 |  29 |  18958.00 |
  |       9 |  13 |   7766.00 |
  |      10 |  22 |  13681.00 |
  |---------+-----+-----------|
  |      11 | 116 |  61730.00 |
  +----------------------------+

chi-squared =    21.252 with 10 d.f.
probability =     0.0194

chi-squared with ties =    36.441 with 10 d.f.
probability =     0.0001


                Dunn's Pairwise Comparison of iq1 by iincome
                              (No adjustment)
Col Mean-|
Row Mean |       1          2          3          4          5          6
---------+------------------------------------------------------------------
       2 |  -0.769253
         |     0.2209
         |
       3 |  -1.102569  -0.289304
         |     0.1351     0.3862
         |
       4 |  -3.159808  -2.632641  -2.743449
         |     0.0008     0.0042     0.0030
         |
       5 |  -2.141875  -1.511267  -1.422898   1.038856
         |     0.0161     0.0654     0.0774     0.1494
         |
       6 |  -3.342301  -2.874429  -2.909733  -0.816141  -1.597847
         |     0.0004     0.0020     0.0018     0.2072     0.0550
         |
       7 |  -2.671383  -2.207428  -2.149485  -0.492410  -1.148526   0.142490
         |     0.0038     0.0136     0.0158     0.3112     0.1254     0.4433
         |
       8 |  -3.700701  -3.333112  -3.315692  -1.932950  -2.450205  -1.279432
         |     0.0001     0.0004     0.0005     0.0266     0.0071     0.1004
         |
       9 |  -1.868475  -1.537144  -1.456172  -0.507627  -0.900035  -0.125393
         |     0.0308     0.0621     0.0727     0.3059     0.1841     0.4501
         |
      10 |  -2.761056  -2.386668  -2.323942  -1.108837  -1.590545  -0.588491
         |     0.0029     0.0085     0.0101     0.1338     0.0559     0.2781
         |
      11 |  -1.955930  -1.323354  -1.206620   1.122513   0.127501   1.655509
         |     0.0252     0.0929     0.1138     0.1308     0.4493     0.0489
Col Mean-|
Row Mean |       7          8          9         10
```

```
---------+--------------------------------------------
       8 |  -1.273936
         |     0.1013
         |
       9 |  -0.203120   0.717258
         |     0.4195     0.2366
         |
      10 |  -0.645693   0.478844  -0.297344
         |     0.2592     0.3160     0.3831
         |
      11 |   1.214096   2.488185   0.947688   1.639269
         |     0.1124     0.0064     0.1716     0.0506

alpha =   0.05
Reject Ho if p = P(Z <= |z|) <= alpha/2

.
. dunntest iq2, by(iincome)

Warning: by() values are unlabeled, option nolabel implicit


Kruskal-Wallis equality-of-populations rank test

  +---------------------------+
  | iincome | Obs |  Rank Sum |
  |---------+-----+-----------|
  |       1 |  85 |  39413.00 |
  |       2 | 124 |  62680.50 |
  |       3 | 220 | 113218.00 |
  |       4 | 194 | 104957.50 |
  |       5 | 138 |  77734.00 |
  |---------+-----+-----------|
  |       6 |  81 |  46268.50 |
  |       7 |  45 |  27142.00 |
  |       8 |  29 |  14295.00 |
  |       9 |  13 |   8091.00 |
  |      10 |  22 |  12619.00 |
  |---------+-----+-----------|
  |      11 | 116 |  63359.50 |
  +---------------------------+

chi-squared =    13.281 with 10 d.f.
probability =     0.2084

chi-squared with ties =    19.148 with 10 d.f.
probability =     0.0384


                Dunn's Pairwise Comparison of iq2 by iincome
                              (No adjustment)
Col Mean-|
Row Mean |          1          2          3          4          5          6
---------+------------------------------------------------------------------
       2 |  -1.156759
         |     0.1237
         |
       3 |  -1.554296  -0.317118
         |     0.0601     0.3756
         |
       4 |  -2.316595  -1.204085  -1.044061
         |     0.0103     0.1143     0.1482
         |
       5 |  -2.814820  -1.820137  -1.746089  -0.779272
         |     0.0024     0.0344     0.0404     0.2179
         |
       6 |  -2.698388  -1.792626  -1.696535  -0.889441  -0.220641
         |     0.0035     0.0365     0.0449     0.1869     0.4127
         |
       7 |  -2.947791  -2.186686  -2.108330  -1.463268  -0.904860  -0.669351
         |     0.0016     0.0144     0.0175     0.0717     0.1828     0.2516
         |
       8 |  -0.529937   0.237196   0.427915   0.941103   1.342026   1.409567
         |     0.2981     0.4063     0.3344     0.1733     0.0898     0.0793
         |
       9 |  -2.076410  -1.562379  -1.471004  -1.106612  -0.793658  -0.667291
         |     0.0189     0.0591     0.0706     0.1342     0.2137     0.2523
         |
      10 |  -1.790286  -1.147028  -1.027451  -0.564161  -0.174837  -0.038489
```

```
         |     0.0367     0.1257     0.1521     0.2863     0.4306     0.4846
         |
      11 |  -2.251971  -1.228138  -1.072211  -0.172116   0.528550   0.673092
         |     0.0122     0.1097     0.1418     0.4317     0.2986     0.2504
Col Mean-|
Row Mean |          7          8          9         10
---------+--------------------------------------------
       8 |   1.803556
         |     0.0357
         |
       9 |  -0.237949  -1.511200
         |     0.4060     0.0654
         |
      10 |   0.442807  -1.111590   0.543469
         |     0.3290     0.1332     0.2934
         |
      11 |   1.263574  -0.999773   1.014893   0.458911
         |     0.1032     0.1587     0.1551     0.3231

alpha =   0.05
Reject Ho if p = P(Z <= |z|) <= alpha/2

.
. dunntest iq3, by(iincome)

Warning: by() values are unlabeled, option nolabel implicit


Kruskal-Wallis equality-of-populations rank test

  +---------------------------+
  | iincome | Obs |  Rank Sum |
  |---------+-----+-----------|
  |       1 |  85 |  38988.50 |
  |       2 | 124 |  65318.50 |
  |       3 | 220 | 111481.50 |
  |       4 | 194 | 108216.50 |
  |       5 | 138 |  75233.00 |
  |---------+-----+-----------|
  |       6 |  81 |  46445.50 |
  |       7 |  45 |  26126.00 |
  |       8 |  29 |  16689.00 |
  |       9 |  13 |   8034.00 |
  |      10 |  22 |  13280.50 |
  |---------+-----+-----------|
  |      11 | 116 |  59965.00 |
  +---------------------------+

chi-squared =    13.531 with 10 d.f.
probability =     0.1955

chi-squared with ties =    25.388 with 10 d.f.
probability =     0.0047


                Dunn's Pairwise Comparison of iq3 by iincome
                              (No adjustment)
Col Mean-|
Row Mean |          1          2          3          4          5          6
---------+------------------------------------------------------------------
       2 |  -2.148829
         |     0.0158
         |
       3 |  -1.672250   0.792784
         |     0.0472     0.2140
         |
       4 |  -3.387523  -1.200612  -2.305484
         |     0.0004     0.1150     0.0106
         |
       5 |  -2.787910  -0.661150  -1.573197   0.504950
         |     0.0027     0.2543     0.0578     0.3068
         |
       6 |  -3.283862  -1.451113  -2.280115  -0.523645  -0.896635
         |     0.0005     0.0734     0.0113     0.3003     0.1850
         |
       7 |  -2.938900  -1.374539  -2.006238  -0.611462  -0.916926  -0.171575
         |     0.0016     0.0846     0.0224     0.2704     0.1796     0.4319
         |
       8 |  -2.414087  -1.049909  -1.546854  -0.394415  -0.659672  -0.042756
```

```
         |     0.0079     0.1469     0.0609     0.3466     0.2547     0.4829
         |
       9 |  -2.377882  -1.391143  -1.732772  -0.933760  -1.115905  -0.663510
         |     0.0087     0.0821     0.0416     0.1752     0.1322     0.2535
         |
      10 |  -2.693915  -1.477507  -1.926749  -0.905783  -1.132569  -0.559433
         |     0.0035     0.0698     0.0270     0.1825     0.1287     0.2879
         |
      11 |  -1.813516   0.338009  -0.395350   1.548125   0.996072   1.733268
         |     0.0349     0.3677     0.3463     0.0608     0.1596     0.0415
Col Mean-|
Row Mean |          7          8          9         10
---------+--------------------------------------------
       8 |   0.095106
         |     0.4621
         |
       9 |  -0.528284  -0.566220
         |     0.2987     0.2856
         |
      10 |  -0.394380  -0.442980   0.182222
         |     0.3467     0.3289     0.4277
         |
      11 |   1.610698   1.253413   1.535893   1.657645
         |     0.0536     0.1050     0.0623     0.0487

alpha =   0.05
Reject Ho if p = P(Z <= |z|) <= alpha/2

.
. dunntest iq4, by(iincome)

Warning: by() values are unlabeled, option nolabel implicit


Kruskal-Wallis equality-of-populations rank test

  +---------------------------+
  | iincome | Obs |  Rank Sum |
  |---------+-----+-----------|
  |       1 |  85 |  37107.00 |
  |       2 | 124 |  65210.00 |
  |       3 | 220 | 110440.00 |
  |       4 | 194 | 111545.50 |
  |       5 | 138 |  75994.50 |
  |---------+-----+-----------|
  |       6 |  81 |  42547.50 |
  |       7 |  45 |  27401.50 |
  |       8 |  29 |  15829.50 |
  |       9 |  13 |   7802.00 |
  |      10 |  22 |  13522.00 |
  |---------+-----+-----------|
  |      11 | 116 |  62378.50 |
  +---------------------------+

chi-squared =    19.683 with 10 d.f.
probability =     0.0324

chi-squared with ties =    26.046 with 10 d.f.
probability =     0.0037


                Dunn's Pairwise Comparison of iq4 by iincome
                              (No adjustment)
Col Mean-|
Row Mean |          1          2          3          4          5          6
---------+------------------------------------------------------------------
       2 |  -2.368171
         |     0.0089
         |
       3 |  -1.912976   0.794063
         |     0.0279     0.2136
         |
       4 |  -3.972534  -1.593812  -2.765956
         |     0.0000     0.0555     0.0028
         |
       5 |  -3.089953  -0.748099  -1.673598   0.814298
         |     0.0010     0.2272     0.0471     0.2077
         |
       6 |  -2.133003   0.015921  -0.668591   1.402405   0.677582
```

```
         |     0.0165     0.4936     0.2519     0.0804     0.2490
         |
       7 |  -3.490216  -1.781082  -2.439558  -0.765840  -1.266400  -1.679380
         |     0.0002     0.0374     0.0074     0.2219     0.1027     0.0465
         |
       8 |  -1.897109  -0.361180  -0.828471   0.546218   0.088444  -0.354785
         |     0.0289     0.3590     0.2037     0.2925     0.4648     0.3614
         |
       9 |  -2.050700  -0.950966  -1.283692  -0.328050  -0.636509  -0.935496
         |     0.0201     0.1708     0.0996     0.3714     0.2622     0.1748
         |
      10 |  -2.779079  -1.432053  -1.880365  -0.658084  -1.039898  -1.387458
         |     0.0027     0.0761     0.0300     0.2552     0.1492     0.0827
         |
      11 |  -2.645686  -0.342701  -1.162901   1.184141   0.383446  -0.321426
         |     0.0041     0.3659     0.1224     0.1182     0.3507     0.3739
Col Mean-|
Row Mean |          7          8          9         10
---------+--------------------------------------------
       8 |   0.988807
         |     0.1614
         |
       9 |   0.103952  -0.607388
         |     0.4586     0.2718
         |
      10 |  -0.081994  -0.908257  -0.154540
         |     0.4673     0.1819     0.4386
         |
      11 |   1.512891   0.145623   0.796518   1.234306
         |     0.0652     0.4421     0.2129     0.1085

alpha =   0.05
Reject Ho if p = P(Z <= |z|) <= alpha/2

.
. dunntest iq5, by(iincome)

Warning: by() values are unlabeled, option nolabel implicit


Kruskal-Wallis equality-of-populations rank test

  +---------------------------+
  | iincome | Obs |  Rank Sum |
  |---------+-----+-----------|
  |       1 |  85 |  43091.50 |
  |       2 | 124 |  66453.50 |
  |       3 | 220 | 109374.50 |
  |       4 | 194 | 106261.50 |
  |       5 | 138 |  75463.00 |
  |---------+-----+-----------|
  |       6 |  81 |  44934.00 |
  |       7 |  45 |  24609.50 |
  |       8 |  29 |  17201.00 |
  |       9 |  13 |   8082.00 |
  |      10 |  22 |  13958.00 |
  |---------+-----+-----------|
  |      11 | 116 |  60349.50 |
  +---------------------------+

chi-squared =     9.564 with 10 d.f.
probability =     0.4796

chi-squared with ties =    14.118 with 10 d.f.
probability =     0.1677


                Dunn's Pairwise Comparison of iq5 by iincome
                              (No adjustment)
Col Mean-|
Row Mean |            1            2            3            4            5            6
---------+------------------------------------------------------------------
       2 |  -0.810736
         |     0.2088
         |
       3 |   0.302602   1.360806
         |     0.3811     0.0868
         |
       4 |  -1.236093  -0.405473  -2.024892
```

```
         |     0.1082     0.3426     0.0214
         |
       5 |  -1.140193  -0.347880  -1.803628   0.032089
         |     0.1271     0.3640     0.0356     0.4872
         |
       6 |  -1.213243  -0.519526  -1.746860  -0.208654  -0.222731
         |     0.1125     0.3017     0.0403     0.4174     0.4119
         |
       7 |  -0.853708  -0.248352  -1.198176   0.020538  -0.001021   0.166739
         |     0.1966     0.4019     0.1154     0.4918     0.4996     0.4338
         |
       8 |  -1.579954  -1.093750  -1.915503  -0.899027  -0.893698  -0.699570
         |     0.0571     0.1370     0.0277     0.1843     0.1857     0.2421
         |
       9 |  -1.518954  -1.160057  -1.720222  -1.017718  -1.017309  -0.883481
         |     0.0644     0.1230     0.0427     0.1544     0.1545     0.1885
         |
      10 |  -2.101410  -1.679350  -2.420832  -1.519726  -1.504827  -1.307239
         |     0.0178     0.0465     0.0077     0.0643     0.0662     0.0956
         |
      11 |  -0.367139   0.478014  -0.793637   0.923288   0.831911   0.939016
         |     0.3568     0.3163     0.2137     0.1779     0.2027     0.1739
Col Mean-|
Row Mean |          7          8          9         10
---------+--------------------------------------------
       8 |  -0.765919
         |     0.2219
         |
       9 |  -0.936777  -0.337291
         |     0.1744     0.3679
         |
      10 |  -1.327258  -0.576151  -0.143834
         |     0.0922     0.2823     0.4428
         |
      11 |   0.597686   1.384077   1.367391   1.936218
         |     0.2750     0.0832     0.0858     0.0264

alpha =   0.05
Reject Ho if p = P(Z <= |z|) <= alpha/2

.
. dunntest iq6, by(iincome)

Warning: by() values are unlabeled, option nolabel implicit


Kruskal-Wallis equality-of-populations rank test

  +---------------------------+
  | iincome | Obs |  Rank Sum |
  |---------+-----+-----------|
  |       1 |  85 |  39943.00 |
  |       2 | 124 |  65934.00 |
  |       3 | 220 | 112644.00 |
  |       4 | 194 | 111196.50 |
  |       5 | 138 |  76173.50 |
  |---------+-----+-----------|
  |       6 |  81 |  42432.00 |
  |       7 |  45 |  27899.50 |
  |       8 |  29 |  16523.00 |
  |       9 |  13 |   7017.00 |
  |      10 |  22 |  12425.00 |
  |---------+-----+-----------|
  |      11 | 116 |  57590.50 |
  +---------------------------+

chi-squared =    14.334 with 10 d.f.
probability =     0.1583

chi-squared with ties =    21.312 with 10 d.f.
probability =     0.0190


                Dunn's Pairwise Comparison of iq6 by iincome
                              (No adjustment)
Col Mean-|
Row Mean |          1          2          3          4          5          6
---------+------------------------------------------------------------------
       2 |  -1.736761
```

```
         |     0.0412
         |
       3 |  -1.304384   0.694423
         |     0.0961     0.2437
         |
       4 |  -3.141146  -1.426563  -2.457107
         |     0.0008     0.0769     0.0070
         |
       5 |  -2.355036  -0.647742  -1.456204   0.753132
         |     0.0093     0.2586     0.0727     0.2257
         |
       6 |  -1.374388   0.218080  -0.360277   1.475366   0.795202
         |     0.0847     0.4137     0.3593     0.0701     0.2132
         |
       7 |  -3.220984  -2.006780  -2.611245  -1.119447  -1.567548  -2.045979
         |     0.0006     0.0224     0.0045     0.1315     0.0585     0.0204
         |
       8 |  -1.837011  -0.729574  -1.156479   0.067955  -0.344334  -0.839400
         |     0.0331     0.2328     0.1237     0.4729     0.3653     0.2006
         |
       9 |  -0.928093  -0.109172  -0.384708   0.461416   0.166563  -0.210799
         |     0.1767     0.4565     0.3502     0.3223     0.4339     0.4165
         |
      10 |  -1.569049  -0.565228  -0.933516   0.147834  -0.220464  -0.673484
         |     0.0583     0.2860     0.1753     0.4412     0.4128     0.2503
         |
      11 |  -0.735847   1.079976   0.536170   2.586049   1.743757   0.748257
         |     0.2309     0.1401     0.2959     0.0049     0.0406     0.2272
Col Mean-|
Row Mean |          7          8          9         10
---------+--------------------------------------------
       8 |   0.834645
         |     0.2020
         |
       9 |   1.008073   0.355517
         |     0.1567     0.3611
         |
      10 |   0.839834   0.069777  -0.282811
         |     0.2005     0.4722     0.3887
         |
      11 |   2.782937   1.396782   0.585780   1.162216
         |     0.0027     0.0812     0.2790     0.1226

alpha =   0.05
Reject Ho if p = P(Z <= |z|) <= alpha/2

.
. dunntest iq7, by(iincome)

Warning: by() values are unlabeled, option nolabel implicit


Kruskal-Wallis equality-of-populations rank test

  +---------------------------+
  | iincome | Obs |  Rank Sum |
  |---------+-----+-----------|
  |       1 |  85 |  40655.00 |
  |       2 | 124 |  63730.00 |
  |       3 | 220 | 112270.00 |
  |       4 | 194 | 105789.00 |
  |       5 | 138 |  76798.00 |
  |---------+-----+-----------|
  |       6 |  81 |  41235.00 |
  |       7 |  45 |  24842.00 |
  |       8 |  29 |  18999.00 |
  |       9 |  13 |   8325.00 |
  |      10 |  22 |  13773.00 |
  |---------+-----+-----------|
  |      11 | 116 |  63362.00 |
  +---------------------------+

chi-squared =    14.459 with 10 d.f.
probability =     0.1531

chi-squared with ties =    17.779 with 10 d.f.
probability =     0.0588
```

```
                Dunn's Pairwise Comparison of iq7 by iincome
                              (No adjustment)
Col Mean-|
Row Mean |          1            2            3            4            5            6
---------+------------------------------------------------------------------------------
       2 |  -0.911185
         |     0.1811
         |
       3 |  -0.902310    0.116431
         |     0.1834      0.4537
         |
       4 |  -1.853772   -0.981248   -1.278245
         |     0.0319      0.1632      0.1006
         |
       5 |  -2.041196   -1.237557   -1.530584   -0.362009
         |     0.0206      0.1079      0.0629      0.3587
         |
       6 |  -0.713304    0.122853    0.034446    0.985495    1.219413
         |     0.2378      0.4511      0.4863      0.1622      0.1113
         |
       7 |  -1.439516   -0.787636   -0.917725   -0.146588    0.093548   -0.831651
         |     0.0750      0.2155      0.1794      0.4417      0.4627      0.2028
         |
       8 |  -2.959064   -2.463005   -2.637831   -1.985144   -1.737404   -2.428826
         |     0.0015      0.0069      0.0042      0.0236      0.0412      0.0076
         |
       9 |  -1.958548   -1.560599   -1.639754   -1.194228   -1.040342   -1.581461
         |     0.0251      0.0593      0.0505      0.1162      0.1491      0.0569
         |
      10 |  -2.222639   -1.743556   -1.862341   -1.291486   -1.089991   -1.750747
         |     0.0131      0.0406      0.0313      0.0983      0.1379      0.0400
         |
      11 |  -1.712027   -0.899033   -1.126019   -0.028207    0.293755   -0.923223
         |     0.0434      0.1843      0.1301      0.4887      0.3845      0.1779
Col Mean-|
Row Mean |          7            8            9           10
---------+----------------------------------------------------
       8 |  -1.557863
         |     0.0596
         |
       9 |  -1.009557    0.159054
         |     0.1564      0.4368
         |
      10 |  -1.023591    0.370267    0.147496
         |     0.1530      0.3556      0.4414
         |
      11 |   0.119255    1.887710    1.158465    1.235174
         |     0.4525      0.0295      0.1233      0.1084

alpha =   0.05
Reject Ho if p = P(Z <= |z|) <= alpha/2

.
. dunntest iq8, by(iincome)

Warning: by() values are unlabeled, option nolabel implicit


Kruskal-Wallis equality-of-populations rank test

  +---------------------------+
  | iincome | Obs |  Rank Sum |
  |---------+-----+-----------|
  |       1 |  85 |  44398.00 |
  |       2 | 124 |  67446.50 |
  |       3 | 220 | 114674.50 |
  |       4 | 194 | 109552.50 |
  |       5 | 138 |  77545.00 |
  |---------+-----+-----------|
  |       6 |  81 |  39286.00 |
  |       7 |  45 |  27072.00 |
  |       8 |  29 |  11459.50 |
  |       9 |  13 |   7777.00 |
  |      10 |  22 |  11179.00 |
  |---------+-----+-----------|
  |      11 | 116 |  59388.00 |
  +---------------------------+

chi-squared =    15.098 with 10 d.f.
```

```
probability =     0.1285

chi-squared with ties =    16.728 with 10 d.f.
probability =     0.0806


                Dunn's Pairwise Comparison of iq8 by iincome
                              (No adjustment)
Col Mean-|
Row Mean |          1            2            3            4            5            6
---------+------------------------------------------------------------------
       2 |  -0.523795
         |     0.3002
         |
       3 |   0.028930     0.689738
         |     0.4885       0.2452
         |
       4 |  -1.112733    -0.617347    -1.507100
         |     0.1329       0.2685       0.0659
         |
       5 |  -0.980783    -0.496797    -1.279359     0.085372
         |     0.1633       0.3097       0.1004       0.4660
         |
       6 |   0.820893     1.408492     0.952324     2.057639     1.876777
         |     0.2059       0.0795       0.1705       0.0198       0.0303
         |
       7 |  -1.468715    -1.132022    -1.677545    -0.761682    -0.789533    -2.141891
         |     0.0710       0.1288       0.0467       0.2231       0.2149       0.0161
         |
       8 |   2.019931     2.463517     2.180125     2.908858     2.788476     1.418337
         |     0.0217       0.0069       0.0146       0.0018       0.0026       0.0780
         |
       9 |  -0.870561    -0.636301    -0.921258    -0.399729    -0.427500    -1.294341
         |     0.1920       0.2623       0.1785       0.3447       0.3345       0.0978
         |
      10 |   0.202668     0.528388     0.200283     0.858878     0.800248    -0.328534
         |     0.4197       0.2986       0.4206       0.1952       0.2118       0.3713
         |
      11 |   0.247939     0.845071     0.276314     1.534811     1.354597    -0.635813
         |     0.4021       0.1990       0.3912       0.0624       0.0878       0.2624
Col Mean-|
Row Mean |          7            8            9           10
---------+--------------------------------------------
       8 |   2.961248
         |     0.0015
         |
       9 |   0.036549    -2.078189
         |     0.4854       0.0188
         |
      10 |   1.227169    -1.364937     0.879687
         |     0.1099       0.0861       0.1895
         |
      11 |   1.743327    -1.921793     1.007449    -0.056245
         |     0.0406       0.0273       0.1569       0.4776

alpha =   0.05
Reject Ho if p = P(Z <= |z|) <= alpha/2

.
. dunntest iq9, by(iincome)

Warning: by() values are unlabeled, option nolabel implicit


Kruskal-Wallis equality-of-populations rank test

  +---------------------------+
  | iincome | Obs |  Rank Sum |
  |---------+-----+-----------|
  |       1 |  85 |  42614.00 |
  |       2 | 124 |  71402.00 |
  |       3 | 220 | 115021.00 |
  |       4 | 194 | 107204.00 |
  |       5 | 138 |  73164.00 |
  |---------+-----+-----------|
  |       6 |  81 |  36234.00 |
  |       7 |  45 |  25791.00 |
  |       8 |  29 |  18002.00 |
  |       9 |  13 |   6129.00 |
```

```
  |      10 |  22 |  12144.00 |
  |---------+-----+-----------|
  |      11 | 116 |  62073.00 |
  +---------------------------+

chi-squared =    14.299 with 10 d.f.
probability =     0.1598

chi-squared with ties =    16.568 with 10 d.f.
probability =     0.0845


                Dunn's Pairwise Comparison of iq9 by iincome
                              (No adjustment)
Col Mean-|
Row Mean |            1            2            3            4            5            6
---------+------------------------------------------------------------------
       2 |  -1.847551
         |     0.0323
         |
       3 |  -0.587541   1.648615
         |     0.2784     0.0496
         |
       4 |  -1.376451   0.705584  -1.056011
         |     0.0843     0.2402     0.1455
         |
       5 |  -0.730439   1.288633  -0.236466   0.703374
         |     0.2326     0.0988     0.4065     0.2409
         |
       6 |   1.214944   3.141555   2.028888   2.779463   2.067305
         |     0.1122     0.0008     0.0212     0.0027     0.0194
         |
       7 |  -1.360262   0.053977  -1.074127  -0.433524  -0.874138  -2.363446
         |     0.0869     0.4785     0.1414     0.3323     0.1910     0.0091
         |
       8 |  -1.939659  -0.760958  -1.731626  -1.195867  -1.548947  -2.799362
         |     0.0262     0.2233     0.0417     0.1159     0.0607     0.0026
         |
       9 |   0.350465   1.250438   0.628553   0.989247   0.706893  -0.282083
         |     0.3630     0.1056     0.2648     0.1613     0.2398     0.3889
         |
      10 |  -0.739751   0.359696  -0.455786   0.009284  -0.332100  -1.520705
         |     0.2297     0.3595     0.3243     0.4963     0.3699     0.0642
         |
      11 |  -0.826199   1.100886  -0.374111   0.520401  -0.136936  -2.117528
         |     0.2043     0.1355     0.3542     0.3014     0.4455     0.0171
Col Mean-|
Row Mean |            7            8            9           10
---------+--------------------------------------------
       8 |  -0.698600
         |     0.2424
         |
       9 |   1.127888   1.562424
         |     0.1297     0.0591
         |
      10 |   0.283759   0.849481  -0.804181
         |     0.3883     0.1978     0.2106
         |
      11 |   0.756224   1.440971  -0.760168   0.253676
         |     0.2248     0.0748     0.2236     0.3999

alpha =   0.05
Reject Ho if p = P(Z <= |z|) <= alpha/2

.
. dunntest iq10, by(iincome)

Warning: by() values are unlabeled, option nolabel implicit


Kruskal-Wallis equality-of-populations rank test

  +---------------------------+
  | iincome | Obs |  Rank Sum |
  |---------+-----+-----------|
  |       1 |  85 |  40198.50 |
  |       2 | 124 |  64675.00 |
  |       3 | 220 | 115226.00 |
  |       4 | 194 | 105304.00 |
```

```
  |       5 | 138 |  75828.00 |
  |---------+-----+-----------|
  |       6 |  81 |  43222.00 |
  |       7 |  45 |  27158.00 |
  |       8 |  29 |  17443.00 |
  |       9 |  13 |   7630.50 |
  |      10 |  22 |  12461.00 |
  |---------+-----+-----------|
  |      11 | 116 |  60632.00 |
  +---------------------------+

chi-squared =     8.754 with 10 d.f.
probability =     0.5556

chi-squared with ties =    15.902 with 10 d.f.
probability =     0.1025


               Dunn's Pairwise Comparison of iq10 by iincome
                              (No adjustment)
Col Mean-|
Row Mean |          1          2          3          4          5          6
---------+------------------------------------------------------------------
       2 |  -1.510986
         |     0.0654
         |
       3 |  -1.740758  -0.084983
         |     0.0409     0.4661
         |
       4 |  -2.349653  -0.807641  -0.845934
         |     0.0094     0.2096     0.1988
         |
       5 |  -2.428329  -0.986350  -1.036053  -0.262123
         |     0.0076     0.1620     0.1501     0.3966
         |
       6 |  -1.709198  -0.368355  -0.331484   0.304134   0.495983
         |     0.0437     0.3563     0.3701     0.3805     0.3100
         |
       7 |  -3.098024  -2.059211  -2.132063  -1.604670  -1.376629  -1.644439
         |     0.0010     0.0197     0.0165     0.0543     0.0843     0.0500
         |
       8 |  -2.614557  -1.694358  -1.720791  -1.289040  -1.113423  -1.371867
         |     0.0045     0.0451     0.0426     0.0987     0.1328     0.0851
         |
       9 |  -1.674775  -0.980992  -0.968521  -0.674109  -0.565066  -0.781047
         |     0.0470     0.1633     0.1664     0.2501     0.2860     0.2174
         |
      10 |  -1.709276  -0.847650  -0.834294  -0.458910  -0.322558  -0.596764
         |     0.0437     0.1983     0.2021     0.3231     0.3735     0.2753
         |
      11 |  -1.524450  -0.037823   0.040590   0.749543   0.930124   0.329695
         |     0.0637     0.4849     0.4838     0.2268     0.1762     0.3708
Col Mean-|
Row Mean |          7          8          9         10
---------+--------------------------------------------
       8 |   0.037254
         |     0.4851
         |
       9 |   0.229874   0.190278
         |     0.4091     0.4245
         |
      10 |   0.623759   0.542557   0.256952
         |     0.2664     0.2937     0.3986
         |
      11 |   2.012741   1.659858   0.961094   0.822269
         |     0.0221     0.0485     0.1683     0.2055

alpha =   0.05
Reject Ho if p = P(Z <= |z|) <= alpha/2
```

- Question: For each of the questions, are there differences in the average response among regions?

```
. dunntest iq1, by(iregion)

Warning: by() values are unlabeled, option nolabel implicit
```

```
Kruskal-Wallis equality-of-populations rank test

  +--------------------------+
  | iregion | Obs |  Rank Sum |
  |---------+-----+-----------|
  |       1 |  47 |  25801.50 |
  |       2 | 123 |  67314.50 |
  |       3 | 190 | 102363.00 |
  |       4 |  60 |  30521.00 |
  |       5 | 196 |  99988.50 |
  |---------+-----+-----------|
  |       6 |  74 |  39154.50 |
  |       7 | 102 |  53159.00 |
  |       8 |  77 |  40078.50 |
  |       9 | 189 | 101830.50 |
  +--------------------------+

chi-squared =     2.163 with 8 d.f.
probability =     0.9756

chi-squared with ties =     3.726 with 8 d.f.
probability =     0.8809


                Dunn's Pairwise Comparison of iq1 by iregion
                              (No adjustment)
Col Mean-|
Row Mean |       1          2          3          4          5          6
---------+------------------------------------------------------------------
       2 |   0.042474
         |     0.4831
         |
       3 |   0.269342   0.316211
         |     0.3938     0.3759
         |
       4 |   0.888316   1.052593   0.872168
         |     0.1872     0.1463     0.1916
         |
       5 |   1.026723   1.386337   1.206927  -0.042564
         |     0.1523     0.0828     0.1137     0.4830
         |
       6 |   0.457191   0.530134   0.302107  -0.505166  -0.597188
         |     0.3238     0.2980     0.3813     0.3067     0.2752
         |
       7 |   0.677356   0.837319   0.615384  -0.329566  -0.387744   0.223575
         |     0.2491     0.2012     0.2692     0.3709     0.3491     0.4115
         |
       8 |   0.660596   0.791341   0.580345  -0.294747  -0.330689   0.227308
         |     0.2544     0.2144     0.2808     0.3841     0.3704     0.4101
         |
       9 |   0.268329   0.314656  -0.001383  -0.872573  -1.206703  -0.302920
         |     0.3942     0.3765     0.4994     0.1914     0.1138     0.3810
Col Mean-|
Row Mean |        7          8
---------+----------------------
       8 |   0.018968
         |     0.4924
         |
       9 |  -0.615972  -0.580954
         |     0.2690     0.2806

alpha =   0.05
Reject Ho if p = P(Z <= |z|) <= alpha/2

.
. dunntest iq2, by(iregion)

Warning: by() values are unlabeled, option nolabel implicit


Kruskal-Wallis equality-of-populations rank test

  +--------------------------+
  | iregion | Obs |  Rank Sum |
  |---------+-----+-----------|
  |       1 |  47 |  23519.00 |
  |       2 | 123 |  69050.00 |
```

```
  |       3 | 190 | 100366.50 |
  |       4 |  60 |  31012.00 |
  |       5 | 196 | 100609.50 |
  |---------+-----+-----------|
  |       6 |  74 |  36875.00 |
  |       7 | 102 |  54881.50 |
  |       8 |  77 |  44283.00 |
  |       9 | 189 |  99614.50 |
  +---------------------------+

chi-squared =     4.999 with 8 d.f.
probability =     0.7577

chi-squared with ties =     7.247 with 8 d.f.
probability =     0.5102


                Dunn's Pairwise Comparison of iq2 by iregion
                              (No adjustment)
Col Mean-|
Row Mean |       1          2          3          4          5          6
---------+------------------------------------------------------------------
       2 |  -1.401196
         |     0.0806
         |
       3 |  -0.673408   1.128301
         |     0.2503     0.1296
         |
       4 |  -0.333024   1.113944   0.302762
         |     0.3696     0.1327     0.3810
         |
       5 |  -0.313209   1.646623   0.577895   0.094889
         |     0.3771     0.0498     0.2817     0.4622
         |
       6 |   0.044227   1.689339   0.860804   0.420891   0.433300
         |     0.4824     0.0456     0.1947     0.3369     0.3324
         |
       7 |  -0.841525   0.686424  -0.314897  -0.513148  -0.798495  -1.025584
         |     0.2000     0.2462     0.3764     0.3039     0.2123     0.1525
         |
       8 |  -1.590200  -0.372086  -1.366818  -1.332635  -1.810343  -1.858851
         |     0.0559     0.3549     0.0858     0.0913     0.0351     0.0315
         |
       9 |  -0.644434   1.167399   0.045410  -0.271087  -0.531360  -0.826147
         |     0.2596     0.1215     0.4819     0.3932     0.2976     0.2044
Col Mean-|
Row Mean |       7          8
---------+----------------------
       8 |  -0.967067
         |     0.1668
         |
       9 |   0.352577   1.400283
         |     0.3622     0.0807

alpha =   0.05
Reject Ho if p = P(Z <= |z|) <= alpha/2

.
. dunntest iq3, by(iregion)

Warning: by() values are unlabeled, option nolabel implicit


Kruskal-Wallis equality-of-populations rank test

  +---------------------------+
  | iregion | Obs |  Rank Sum |
  |---------+-----+-----------|
  |       1 |  47 |  24663.50 |
  |       2 | 123 |  68571.50 |
  |       3 | 190 | 103626.00 |
  |       4 |  60 |  29282.00 |
  |       5 | 196 | 101056.00 |
  |---------+-----+-----------|
  |       6 |  74 |  36988.00 |
  |       7 | 102 |  51807.00 |
  |       8 |  77 |  42563.50 |
  |       9 | 189 | 101653.50 |
  +---------------------------+
```

```
chi-squared =     4.863 with 8 d.f.
probability =     0.7721

chi-squared with ties =     9.241 with 8 d.f.
probability =     0.3224


                 Dunn's Pairwise Comparison of iq3 by iregion
                                (No adjustment)
Col Mean-|
Row Mean |       1           2           3           4           5           6
---------+------------------------------------------------------------------------
       2 |  -0.861221
         |     0.1946
         |
       3 |  -0.571695    0.471363
         |     0.2838      0.3187
         |
       4 |   0.850479    1.989908    1.747619
         |     0.1975      0.0233      0.0403
         |
       5 |   0.254530    1.643252    1.320843   -0.842644
         |     0.3995      0.0502      0.0933      0.1997
         |
       6 |   0.602672    1.767949    1.500029   -0.306543    0.520904
         |     0.2734      0.0385      0.0668      0.3796      0.3012
         |
       7 |   0.431017    1.670219    1.377797   -0.551195    0.283785   -0.238533
         |     0.3332      0.0474      0.0841      0.2908      0.3883      0.4057
         |
       8 |  -0.682835    0.146504   -0.246206   -1.696032   -1.247144   -1.466964
         |     0.2474      0.4418      0.4028      0.0449      0.1062      0.0712
         |
       9 |  -0.362407    0.764912    0.331578   -1.516629   -0.984934   -1.250510
         |     0.3585      0.2222      0.3701      0.0647      0.1623      0.1056
Col Mean-|
Row Mean |       7            8
---------+----------------------
       8 |  -1.340578
         |     0.0900
         |
       9 |  -1.099269    0.497979
         |     0.1358      0.3092

alpha =   0.05
Reject Ho if p = P(Z <= |z|) <= alpha/2

.
. dunntest iq4, by(iregion)

Warning: by() values are unlabeled, option nolabel implicit


Kruskal-Wallis equality-of-populations rank test

  +--------------------------+
  | iregion | Obs | Rank Sum |
  |---------+-----+----------|
  |       1 |  47 | 23898.00 |
  |       2 | 123 | 70371.00 |
  |       3 | 190 | 99803.00 |
  |       4 |  60 | 29574.00 |
  |       5 | 196 | 99327.50 |
  |---------+-----+----------|
  |       6 |  74 | 39668.00 |
  |       7 | 102 | 56000.00 |
  |       8 |  77 | 43087.50 |
  |       9 | 189 | 98482.00 |
  +--------------------------+

chi-squared =     5.937 with 8 d.f.
probability =     0.6543

chi-squared with ties =     7.884 with 8 d.f.
probability =     0.4449


                 Dunn's Pairwise Comparison of iq4 by iregion
```

```
                              (No adjustment)
Col Mean-|
Row Mean |        1           2           3            4           5           6
---------+-------------------------------------------------------------------------
       2 |  -1.399868
         |     0.0808
         |
       3 |  -0.389159    1.526466
         |     0.3486      0.0634
         |
       4 |   0.301407    1.897289    0.824575
         |     0.3816      0.0289      0.2048
         |
       5 |   0.039361    2.142444    0.685502  -0.354599
         |     0.4843      0.0161      0.2465     0.3614
         |
       6 |  -0.557758    0.924573  -0.296550  -0.936798  -0.809347
         |     0.2885      0.1776      0.3834     0.1744     0.2092
         |
       7 |  -0.867458    0.650583  -0.729396  -1.300823  -1.304961  -0.320211
         |     0.1928      0.2577      0.2329     0.0967     0.0960     0.3744
         |
       8 |  -1.041294    0.325541  -0.957487  -1.460253  -1.480649  -0.544963
         |     0.1489      0.3724      0.1692     0.0721     0.0694     0.2929
         |
       9 |  -0.291544    1.661935    0.154551  -0.716903  -0.528838   0.412115
         |     0.3853      0.0483      0.4386     0.2367     0.2985     0.3401
Col Mean-|
Row Mean |        7           8
---------+----------------------
       8 |  -0.263754
         |     0.3960
         |
       9 |   0.857955    1.074198
         |     0.1955      0.1414

alpha =   0.05
Reject Ho if p = P(Z <= |z|) <= alpha/2

.
. dunntest iq5, by(iregion)

Warning: by() values are unlabeled, option nolabel implicit


Kruskal-Wallis equality-of-populations rank test

  +-------------------------+
  | iregion | Obs | Rank Sum |
  |---------+-----+----------|
  |       1 |  47 | 25000.00 |
  |       2 | 123 | 70157.00 |
  |       3 | 190 | 97806.00 |
  |       4 |  60 | 31315.00 |
  |       5 | 196 | 99921.50 |
  |---------+-----+----------|
  |       6 |  74 | 41475.00 |
  |       7 | 102 | 54597.00 |
  |       8 |  77 | 40836.00 |
  |       9 | 189 | 99103.50 |
  +-------------------------+

chi-squared =     4.348 with 8 d.f.
probability =     0.8244

chi-squared with ties =     6.456 with 8 d.f.
probability =     0.5962


                Dunn's Pairwise Comparison of iq5 by iregion
                              (No adjustment)
Col Mean-|
Row Mean |         1          2           3           4            5           6
---------+-------------------------------------------------------------------------
       2 |  -0.894537
         |     0.1855
         |
       3 |   0.419717    1.916327
         |     0.3373      0.0277
```

```
         |
       4 |   0.204685   1.227342  -0.192492
         |     0.4189     0.1098     0.4237
         |
       5 |   0.542899   2.100075   0.194468   0.327393
         |     0.2936     0.0179     0.4229     0.3717
         |
       6 |  -0.610565   0.268597  -1.330089  -0.885045  -1.480943
         |     0.2707     0.3941     0.0917     0.1881     0.0693
         |
       7 |  -0.075772   1.045718  -0.665873  -0.327165  -0.831627   0.658314
         |     0.4698     0.1478     0.2527     0.3718     0.2028     0.2552
         |
       8 |   0.033979   1.098894  -0.459584  -0.195009  -0.608833   0.738209
         |     0.4864     0.1359     0.3229     0.4227     0.2713     0.2302
         |
       9 |   0.184904   1.584274  -0.372203  -0.065677  -0.569284   1.050261
         |     0.4267     0.0566     0.3549     0.4738     0.2846     0.1468
Col Mean-|
Row Mean |          7          8
---------+----------------------
       8 |   0.130148
         |     0.4482
         |
       9 |   0.354032   0.176403
         |     0.3617     0.4300

alpha =   0.05
Reject Ho if p = P(Z <= |z|) <= alpha/2

.
. dunntest iq6, by(iregion)

Warning: by() values are unlabeled, option nolabel implicit


Kruskal-Wallis equality-of-populations rank test

  +---------------------------+
  | iregion | Obs |  Rank Sum |
  |---------+-----+-----------|
  |       1 |  47 |  24290.50 |
  |       2 | 123 |  67846.50 |
  |       3 | 190 | 101167.00 |
  |       4 |  60 |  31261.00 |
  |       5 | 196 | 103413.00 |
  |---------+-----+-----------|
  |       6 |  74 |  36430.00 |
  |       7 | 102 |  52408.00 |
  |       8 |  77 |  40753.50 |
  |       9 | 189 | 102641.50 |
  +---------------------------+

chi-squared =     2.535 with 8 d.f.
probability =     0.9601

chi-squared with ties =     3.778 with 8 d.f.
probability =     0.8766


                Dunn's Pairwise Comparison of iq6 by iregion
                              (No adjustment)
Col Mean-|
Row Mean |          1          2          3          4          5          6
---------+------------------------------------------------------------------
       2 |  -0.810245
         |     0.2089
         |
       3 |  -0.383515   0.660725
         |     0.3507     0.2544
         |
       4 |  -0.086090   0.775858   0.308663
         |     0.4657     0.2189     0.3788
         |
       5 |  -0.265616   0.832852   0.189948  -0.178732
         |     0.3953     0.2025     0.4247     0.4291
         |
       6 |   0.525236   1.610354   1.170901   0.660455   1.034219
         |     0.2997     0.0537     0.1208     0.2545     0.1505
```

```
         |
       7 |   0.068329   1.127482   0.607136   0.177112   0.452013  -0.562680
         |     0.4728     0.1298     0.2719     0.4297     0.3256     0.2868
         |
       8 |  -0.268646   0.613941   0.094387  -0.191391  -0.048979  -0.907275
         |     0.3941     0.2696     0.4624     0.4241     0.4805     0.1821
         |
       9 |  -0.643588   0.293845  -0.412947  -0.594761  -0.605829  -1.479401
         |     0.2599     0.3844     0.3398     0.2760     0.2723     0.0695
Col Mean-|
Row Mean |          7          8
---------+----------------------
       8 |  -0.409188
         |     0.3412
         |
       9 |  -0.951871  -0.408107
         |     0.1706     0.3416

alpha =   0.05
Reject Ho if p = P(Z <= |z|) <= alpha/2

.
. dunntest iq7, by(iregion)

Warning: by() values are unlabeled, option nolabel implicit


Kruskal-Wallis equality-of-populations rank test

  +---------------------------+
  | iregion | Obs |  Rank Sum |
  |---------+-----+-----------|
  |       1 |  47 |  25775.50 |
  |       2 | 123 |  69441.50 |
  |       3 | 190 |  96261.50 |
  |       4 |  60 |  29885.00 |
  |       5 | 196 | 104560.50 |
  |---------+-----+-----------|
  |       6 |  74 |  36689.50 |
  |       7 | 102 |  55909.00 |
  |       8 |  77 |  41935.00 |
  |       9 | 189 |  99753.50 |
  +---------------------------+

chi-squared =     5.004 with 8 d.f.
probability =     0.7572

chi-squared with ties =     6.168 with 8 d.f.
probability =     0.6284


                Dunn's Pairwise Comparison of iq7 by iregion
                               (No adjustment)
Col Mean-|
Row Mean |          1          2          3          4          5          6
---------+------------------------------------------------------------------
       2 |  -0.342213
         |     0.3661
         |
       3 |   0.931783   1.818737
         |     0.1757     0.0345
         |
       4 |   0.938892   1.534078   0.209944
         |     0.1739     0.0625     0.4169
         |
       5 |   0.334313   0.982182  -0.957666  -0.871545
         |     0.3691     0.1630     0.1691     0.1917
         |
       6 |   1.024920   1.698322   0.287329   0.047674   1.003173
         |     0.1527     0.0447     0.3869     0.4810     0.1579
         |
       7 |   0.005924   0.446007  -1.228147  -1.117670  -0.436178  -1.245082
         |     0.4976     0.3278     0.1097     0.1319     0.3314     0.1066
         |
       8 |   0.074683   0.498964  -1.021316  -0.981768  -0.300926  -1.089410
         |     0.4702     0.3089     0.1536     0.1631     0.3817     0.1380
         |
       9 |   0.459648   1.153261  -0.748309  -0.728610   0.202295  -0.847727
         |     0.3229     0.1244     0.2271     0.2331     0.4198     0.1983
```

```
Col Mean-|
Row Mean |        7          8
---------+----------------------
       8 |   0.084653
         |     0.4663
         |
       9 |   0.601297   0.451909
         |     0.2738     0.3257

alpha =   0.05
Reject Ho if p = P(Z <= |z|) <= alpha/2

.
. dunntest iq8, by(iregion)

Warning: by() values are unlabeled, option nolabel implicit


Kruskal-Wallis equality-of-populations rank test

  +----------------------------+
  | iregion | Obs |  Rank Sum |
  |---------+-----+-----------|
  |       1 |  47 |  24173.50 |
  |       2 | 123 |  63543.50 |
  |       3 | 190 |  99851.00 |
  |       4 |  60 |  30860.50 |
  |       5 | 196 | 106283.50 |
  |---------+-----+-----------|
  |       6 |  74 |  37277.50 |
  |       7 | 102 |  58555.00 |
  |       8 |  77 |  38886.50 |
  |       9 | 189 | 100780.00 |
  +----------------------------+

chi-squared =     4.074 with 8 d.f.
probability =     0.8504

chi-squared with ties =     4.516 with 8 d.f.
probability =     0.8078


                Dunn's Pairwise Comparison of iq8 by iregion
                              (No adjustment)
Col Mean-|
Row Mean |        1          2          3          4          5          6
---------+------------------------------------------------------------------
       2 |  -0.045892
         |     0.4817
         |
       3 |  -0.236920  -0.265506
         |     0.4064     0.3953
         |
       4 |  -0.000210   0.049717   0.260358
         |     0.4999     0.4802     0.3973
         |
       5 |  -0.592588  -0.768275  -0.566239  -0.652046
         |     0.2767     0.2212     0.2856     0.2572
         |
       6 |   0.195439   0.301278   0.547699   0.210071   0.972587
         |     0.4225     0.3816     0.2919     0.4168     0.1654
         |
       7 |  -1.167548  -1.478256  -1.362451  -1.264884  -0.897613  -1.586690
         |     0.1215     0.0697     0.0865     0.1030     0.1847     0.0563
         |
       8 |   0.173304   0.274910   0.523165   0.186526   0.954118  -0.026870
         |     0.4312     0.3917     0.3004     0.4260     0.1700     0.4893
         |
       9 |  -0.399480  -0.494122  -0.258114  -0.439142   0.305373  -0.740665
         |     0.3448     0.3106     0.3982     0.3303     0.3800     0.2294
Col Mean-|
Row Mean |        7          8
---------+----------------------
       8 |   1.575938
         |     0.0575
         |
       9 |   1.145365  -0.718903
         |     0.1260     0.2361
```

```
alpha =   0.05
Reject Ho if p = P(Z <= |z|) <= alpha/2

.
. dunntest iq9, by(iregion)

Warning: by() values are unlabeled, option nolabel implicit


Kruskal-Wallis equality-of-populations rank test

  +----------------------------+
  | iregion | Obs |  Rank Sum |
  |---------+-----+-----------|
  |       1 |  47 |  20677.00 |
  |       2 | 123 |  72186.50 |
  |       3 | 190 | 102587.00 |
  |       4 |  60 |  28965.00 |
  |       5 | 196 |  99733.50 |
  |---------+-----+-----------|
  |       6 |  74 |  42108.50 |
  |       7 | 102 |  55248.00 |
  |       8 |  77 |  42429.00 |
  |       9 | 189 |  96276.50 |
  +----------------------------+

chi-squared =    13.497 with 8 d.f.
probability =     0.0958

chi-squared with ties =    15.670 with 8 d.f.
probability =     0.0473


                Dunn's Pairwise Comparison of iq9 by iregion
                              (No adjustment)
Col Mean-|
Row Mean |         1          2          3          4          5          6
---------+------------------------------------------------------------------
       2 |  -3.021716
         |     0.0013
         |
       3 |  -2.164465   1.430595
         |     0.0152     0.0763
         |
       4 |  -0.775061   2.331881   1.361625
         |     0.2192     0.0099     0.0867
         |
       5 |  -1.496111   2.392263   1.076742  -0.623663
         |     0.0673     0.0084     0.1408     0.2664
         |
       6 |  -2.440672   0.427811  -0.748920  -1.751408  -1.555611
         |     0.0073     0.3344     0.2270     0.0399     0.0599
         |
       7 |  -2.034428   1.191120  -0.049282  -1.276529  -0.947432   0.632439
         |     0.0210     0.1168     0.4803     0.1009     0.1717     0.2635
         |
       8 |  -2.116297   0.870093  -0.289594  -1.398130  -1.105946   0.390079
         |     0.0172     0.1921     0.3861     0.0810     0.1344     0.3482
         |
       9 |  -1.502790   2.358466   1.048006  -0.634183  -0.019200   1.533501
         |     0.0664     0.0092     0.1473     0.2630     0.4923     0.0626
Col Mean-|
Row Mean |         7          8
---------+----------------------
       8 |  -0.219074
         |     0.4133
         |
       9 |   0.925552   1.085736
         |     0.1773     0.1388

alpha =   0.05
Reject Ho if p = P(Z <= |z|) <= alpha/2

.
. dunntest iq10, by(iregion)

Warning: by() values are unlabeled, option nolabel implicit
```

```
Kruskal-Wallis equality-of-populations rank test

  +---------------------------+
  | iregion | Obs |  Rank Sum |
  |---------+-----+-----------|
  |       1 |  47 |  24342.50 |
  |       2 | 123 |  68159.50 |
  |       3 | 190 | 103335.00 |
  |       4 |  60 |  29614.00 |
  |       5 | 196 | 100986.00 |
  |---------+-----+-----------|
  |       6 |  74 |  36223.00 |
  |       7 | 102 |  54254.00 |
  |       8 |  77 |  40915.50 |
  |       9 | 189 | 102381.50 |
  +---------------------------+

chi-squared =     4.123 with 8 d.f.
probability =     0.8458

chi-squared with ties =     7.555 with 8 d.f.
probability =     0.4781


               Dunn's Pairwise Comparison of iq10 by iregion
                              (No adjustment)
Col Mean-|
Row Mean |          1          2          3          4          5          6
---------+------------------------------------------------------------------
       2 |  -0.935595
         |     0.1747
         |
       3 |  -0.705458   0.393271
         |     0.2403     0.3471
         |
       4 |   0.553976   1.704126   1.504759
         |     0.2898     0.0442     0.0662
         |
       5 |   0.073394   1.498376   1.245921  -0.650586
         |     0.4707     0.0670     0.1064     0.2577
         |
       6 |   0.675122   1.946495   1.757676   0.103700   0.835569
         |     0.2498     0.0258     0.0394     0.4587     0.2017
         |
       7 |  -0.351199   0.735705   0.431870  -1.043803  -0.604764  -1.230118
         |     0.3627     0.2310     0.3329     0.1483     0.2727     0.1093
         |
       8 |  -0.321760   0.694206   0.409844  -0.972509  -0.531464  -1.139406
         |     0.3738     0.2438     0.3410     0.1654     0.2975     0.1273
         |
       9 |  -0.646183   0.475741   0.093459  -1.439010  -1.150070  -1.686357
         |     0.2591     0.3171     0.4628     0.0751     0.1251     0.0459
Col Mean-|
Row Mean |          7          8
---------+----------------------
       8 |   0.015606
         |     0.4938
         |
       9 |  -0.353323  -0.338514
         |     0.3619     0.3675

alpha =   0.05
Reject Ho if p = P(Z <= |z|) <= alpha/2

-------------------------------------------------------------------------------------------------------------------
```

- Question – For each of the questions, 1-10, are there differences in the average response among the devices used?

```
. dunntest iq1, by(idevice) ma(bh) wrap

Warning: by() values are unlabeled, option nolabel implicit


Kruskal-Wallis equality-of-populations rank test

  +---------------------------+
```

```
  | idevice | Obs |  Rank Sum |
  |---------+-----+-----------|
  |       1 | 455 | 235385.00 |
  |       2 | 464 | 243130.00 |
  |       4 | 117 |  72496.00 |
  |       5 |  22 |  13796.00 |
  |       6 |   9 |   4971.00 |
  +---------------------------+

chi-squared =    12.894 with 4 d.f.
probability =     0.0118

chi-squared with ties =    22.109 with 4 d.f.
probability =     0.0002


                Dunn's Pairwise Comparison of iq1 by idevice
                            (Benjamini-Hochberg)
Col Mean-|
Row Mean |         1          2          4          5
---------+--------------------------------------------
       2 |  -0.428773
         |     0.4176
         |
       4 |  -4.193416  -3.928305
         |     0.0001     0.0002
         |
       5 |  -2.136598  -2.007905  -0.136539
         |     0.0544     0.0558     0.4457
         |
       6 |  -0.441873  -0.357900   0.826607   0.802829
         |     0.4704     0.4002     0.4085     0.3517

False Discovery Rate =   0.05
Reject Ho if p = P(Z <= |z|) <= FDR/2 with stopping rule

.
. dunntest iq2, by(idevice) ma(bh) wrap

Warning: by() values are unlabeled, option nolabel implicit


Kruskal-Wallis equality-of-populations rank test

  +---------------------------+
  | idevice | Obs |  Rank Sum |
  |---------+-----+-----------|
  |       1 | 455 | 238731.50 |
  |       2 | 464 | 243803.00 |
  |       4 | 117 |  69497.50 |
  |       5 |  22 |  13042.00 |
  |       6 |   9 |   4704.00 |
  +---------------------------+

chi-squared =     6.023 with 4 d.f.
probability =     0.1975

chi-squared with ties =     8.683 with 4 d.f.
probability =     0.0695


                Dunn's Pairwise Comparison of iq2 by idevice
                            (Benjamini-Hochberg)
Col Mean-|
Row Mean |         1          2          4          5
---------+--------------------------------------------
       2 |  -0.044463
         |     0.6890
         |
       4 |  -2.605346  -2.582173
         |     0.0459     0.0245
         |
       5 |  -1.216133  -1.203232   0.019744
         |     0.3732     0.2861     0.4921
         |
       6 |   0.023358   0.032079   0.803447   0.690797
         |     0.5452     0.6090     0.4217     0.4081

False Discovery Rate =   0.05
```

```
Reject Ho if p = P(Z <= |z|) <= FDR/2 with stopping rule

.
. dunntest iq3, by(idevice) ma(bh) wrap

Warning: by() values are unlabeled, option nolabel implicit


Kruskal-Wallis equality-of-populations rank test

  +---------------------------+
  | idevice | Obs |  Rank Sum |
  |---------+-----+-----------|
  |       1 | 455 | 231099.50 |
  |       2 | 464 | 249881.00 |
  |       4 | 117 |  70070.00 |
  |       5 |  22 |  13920.00 |
  |       6 |   9 |   4807.50 |
  +---------------------------+

chi-squared =    10.808 with 4 d.f.
probability =     0.0288

chi-squared with ties =    20.278 with 4 d.f.
probability =     0.0004


                Dunn's Pairwise Comparison of iq3 by idevice
                            (Benjamini-Hochberg)
Col Mean-|
Row Mean |          1          2          4          5
---------+--------------------------------------------
       2 |  -2.063320
         |     0.0489
         |
       4 |  -3.901314  -2.593174
         |     0.0005     0.0238
         |
       5 |  -2.541578  -1.918820  -0.647263
         |     0.0184     0.0550     0.3234
         |
       6 |  -0.346709   0.057717   0.831681   1.107209
         |     0.4049     0.4770     0.2897     0.2235

False Discovery Rate =   0.05
Reject Ho if p = P(Z <= |z|) <= FDR/2 with stopping rule

.
. dunntest iq4, by(idevice) ma(bh) wrap

Warning: by() values are unlabeled, option nolabel implicit


Kruskal-Wallis equality-of-populations rank test

  +---------------------------+
  | idevice | Obs |  Rank Sum |
  |---------+-----+-----------|
  |       1 | 455 | 233917.50 |
  |       2 | 464 | 245190.00 |
  |       4 | 117 |  71356.50 |
  |       5 |  22 |  13558.00 |
  |       6 |   9 |   5756.00 |
  +---------------------------+

chi-squared =    11.767 with 4 d.f.
probability =     0.0192

chi-squared with ties =    15.571 with 4 d.f.
probability =     0.0037


                Dunn's Pairwise Comparison of iq4 by idevice
                            (Benjamini-Hochberg)
Col Mean-|
Row Mean |         1          2          4          5
---------+--------------------------------------------
       2 |  -0.810343
         |     0.2984
```

```
         |
       4 |  -3.449252  -2.939310
         |     0.0028     0.0082
         |
       5 |  -1.747119  -1.502874  -0.102617
         |     0.1344     0.1661     0.4591
         |
       6 |  -1.391205  -1.232608  -0.320191  -0.219652
         |     0.1642     0.1814     0.4680     0.4590

False Discovery Rate =   0.05
Reject Ho if p = P(Z <= |z|) <= FDR/2 with stopping rule

.
. dunntest iq5, by(idevice) ma(bh) wrap

Warning: by() values are unlabeled, option nolabel implicit


Kruskal-Wallis equality-of-populations rank test

  +---------------------------+
  | idevice | Obs |  Rank Sum |
  |---------+-----+-----------|
  |       1 | 455 | 233689.00 |
  |       2 | 464 | 246682.00 |
  |       4 | 117 |  72399.00 |
  |       5 |  22 |  13029.00 |
  |       6 |   9 |   3979.00 |
  +---------------------------+

chi-squared =    12.465 with 4 d.f.
probability =     0.0142

chi-squared with ties =    18.400 with 4 d.f.
probability =     0.0010


                Dunn's Pairwise Comparison of iq5 by idevice
                            (Benjamini-Hochberg)
Col Mean-|
Row Mean |       1          2          4          5
---------+--------------------------------------------
       2 |  -1.078030
         |     0.2007
         |
       4 |  -4.001036  -3.321473
         |     0.0003     0.0022
         |
       5 |  -1.420055  -1.094722   0.450750
         |     0.1556     0.2280     0.3261
         |
       6 |   0.837348   1.048842   2.013779   1.495773
         |     0.2236     0.1839     0.0734     0.1684

False Discovery Rate =   0.05
Reject Ho if p = P(Z <= |z|) <= FDR/2 with stopping rule

.
. dunntest iq6, by(idevice) ma(bh) wrap

Warning: by() values are unlabeled, option nolabel implicit


Kruskal-Wallis equality-of-populations rank test

  +---------------------------+
  | idevice | Obs |  Rank Sum |
  |---------+-----+-----------|
  |       1 | 455 | 232150.00 |
  |       2 | 464 | 249498.50 |
  |       4 | 117 |  70802.00 |
  |       5 |  22 |  12735.50 |
  |       6 |   9 |   4592.00 |
  +---------------------------+

chi-squared =     9.534 with 4 d.f.
probability =     0.0491
```

```
chi-squared with ties =    14.174 with 4 d.f.
probability =     0.0068


                 Dunn's Pairwise Comparison of iq6 by idevice
                              (Benjamini-Hochberg)
Col Mean-|
Row Mean |        1          2          4          5
---------+--------------------------------------------
       2 |  -1.648801
         |     0.1653
         |
       4 |  -3.623520  -2.579191
         |     0.0015     0.0248
         |
       5 |  -1.244659  -0.746660   0.447117
         |     0.2666     0.3794     0.4092
         |
       6 |  -0.000029   0.323201   1.085795   0.686639
         |     0.5000     0.4147     0.2776     0.3516

False Discovery Rate =   0.05
Reject Ho if p = P(Z <= |z|) <= FDR/2 with stopping rule

.
. dunntest iq7, by(idevice) ma(bh) wrap

Warning: by() values are unlabeled, option nolabel implicit


Kruskal-Wallis equality-of-populations rank test

  +---------------------------+
  | idevice | Obs |  Rank Sum |
  |---------+-----+-----------|
  |       1 | 455 | 241171.00 |
  |       2 | 464 | 241784.00 |
  |       4 | 117 |  70870.00 |
  |       5 |  22 |  12133.00 |
  |       6 |   9 |   3820.00 |
  +---------------------------+

chi-squared =     8.437 with 4 d.f.
probability =     0.0768

chi-squared with ties =    10.374 with 4 d.f.
probability =     0.0346


                 Dunn's Pairwise Comparison of iq7 by idevice
                              (Benjamini-Hochberg)
Col Mean-|
Row Mean |        1          2          4          5
---------+--------------------------------------------
       2 |   0.488676
         |     0.3473
         |
       4 |  -2.627194  -2.944079
         |     0.0215     0.0162
         |
       5 |  -0.353648  -0.501570   0.839686
         |     0.3618     0.3850     0.2865
         |
       6 |   1.128879   1.033292   1.885785   1.155457
         |     0.2589     0.2512     0.0989     0.3099

False Discovery Rate =   0.05
Reject Ho if p = P(Z <= |z|) <= FDR/2 with stopping rule

.
. dunntest iq8, by(idevice) ma(bh) wrap

Warning: by() values are unlabeled, option nolabel implicit


Kruskal-Wallis equality-of-populations rank test

  +---------------------------+
  | idevice | Obs |  Rank Sum |
```

```
  |---------+-----+-----------|
  |       1 | 455 | 236191.50 |
  |       2 | 464 | 255170.50 |
  |       4 | 117 |  60562.50 |
  |       5 |  22 |  13139.50 |
  |       6 |   9 |   4714.00 |
  +---------------------------+

chi-squared =     3.571 with 4 d.f.
probability =     0.4671

chi-squared with ties =     3.957 with 4 d.f.
probability =     0.4119


                Dunn's Pairwise Comparison of iq8 by idevice
                            (Benjamini-Hochberg)
Col Mean-|
Row Mean |        1          2          4          5
---------+--------------------------------------------
       2 |  -1.596325
         |     0.5521
         |
       4 |   0.048571   1.066739
         |     0.5340     0.3576
         |
       5 |  -1.222802  -0.740661  -1.170335
         |     0.5535     0.4589     0.4031
         |
       6 |  -0.047444   0.265489  -0.060723   0.634244
         |     0.4811     0.5647     0.5947     0.4383

False Discovery Rate =   0.05
Reject Ho if p = P(Z <= |z|) <= FDR/2 with stopping rule

.
. dunntest iq9, by(idevice) ma(bh) wrap

Warning: by() values are unlabeled, option nolabel implicit


Kruskal-Wallis equality-of-populations rank test

  +---------------------------+
  | idevice | Obs |  Rank Sum |
  |---------+-----+-----------|
  |       1 | 455 | 233402.00 |
  |       2 | 464 | 251754.00 |
  |       4 | 117 |  69053.00 |
  |       5 |  22 |  11048.00 |
  |       6 |   9 |   4521.00 |
  +---------------------------+

chi-squared =     6.698 with 4 d.f.
probability =     0.1527

chi-squared with ties =     7.761 with 4 d.f.
probability =     0.1007


                Dunn's Pairwise Comparison of iq9 by idevice
                            (Benjamini-Hochberg)
Col Mean-|
Row Mean |       1          2          4          5
---------+--------------------------------------------
       2 |  -1.567210
         |     0.1951
         |
       4 |  -2.602321  -1.607996
         |     0.0463     0.2696
         |
       5 |   0.172649   0.646611   1.322982
         |     0.5393     0.4316     0.2323
         |
       6 |   0.110391   0.417646   0.887233  -0.001338
         |     0.5067     0.4830     0.3750     0.4995

False Discovery Rate =   0.05
Reject Ho if p = P(Z <= |z|) <= FDR/2 with stopping rule
```

```
.
. dunntest iq10, by(idevice) ma(bh) wrap

Warning: by() values are unlabeled, option nolabel implicit


Kruskal-Wallis equality-of-populations rank test

  +---------------------------+
  | idevice | Obs |  Rank Sum |
  |---------+-----+-----------|
  |       1 | 455 | 230212.00 |
  |       2 | 464 | 251454.50 |
  |       4 | 117 |  70292.50 |
  |       5 |  22 |  13460.00 |
  |       6 |   9 |   4359.00 |
  +---------------------------+

chi-squared =    11.207 with 4 d.f.
probability =     0.0243

chi-squared with ties =    20.357 with 4 d.f.
probability =     0.0004


               Dunn's Pairwise Comparison of iq10 by idevice
                            (Benjamini-Hochberg)
Col Mean-|
Row Mean |       1          2          4          5
---------+--------------------------------------------
       2 |  -2.384264
         |     0.0285
         |
       4 |  -4.001160  -2.488534
         |     0.0003     0.0321
         |
       5 |  -2.120896  -1.400904  -0.207547
         |     0.0424     0.1152     0.4178
         |
       6 |   0.280999   0.748461   1.472429   1.409124
         |     0.4326     0.2839     0.1409     0.1323

False Discovery Rate =   0.05
Reject Ho if p = P(Z <= |z|) <= FDR/2 with stopping rule
```

National Survey Statistics on Factor Analysis Produced Variables

- Question – For each of the factor variables (knowledge and other), are there differences in the average response by age?

  Answer – YES, there are significant differences among the age categories for both factor variables, and with the exception of group 4 vs group 5 for the factor variable "other" all groups differed significantly from each other. Difference

```
. dunntest iknowledge, by(iage)
Kruskal-Wallis probability =     0.0001

Dunn's Pairwise Comparison of iknowledge by iage
                              (No adjustment)
Col Mean-|
Row Mean |       2          3          4
---------+--------------------------------
       3 |  -3.047089
         |     0.0012
         |
       4 |  -6.647864  -3.042354
         |     0.0000     0.0012
         |
       5 |  -8.540506  -5.326895  -2.884203
         |     0.0000     0.0000     0.0020

alpha =   0.05
Reject Ho if p = P(Z <= |z|) <= alpha/2


. dunntest iother, by(iage)
Kruskal-Wallis probability =     0.0001

                Dunn's Pairwise Comparison of iother by iage
                              (No adjustment)
Col Mean-|
Row Mean |       2          3          4
---------+--------------------------------
       3 |  -3.687658
         |     0.0001
         |
       4 |  -6.409482  -2.160471
         |     0.0000     0.0154
         |
       5 |  -5.995882  -2.338749  -0.480036
         |     0.0000     0.0097     0.3156
```

- Question – For each of the factor variables (knowledge and other), are there differences in the average response by gender?

  Answer – YES, for both factor variables (knowledge and other) the differences in responses of the genders are very highly significantly different ($p < 0.0001$)

- Question – For each of the factor variables (knowledge and other), are there differences in the average response by income?

  Answer – YES, but only for the factor variable knowledge. Most of the differences among pairs are between group 1 and other groups and between group 3 and other groups.

```
. dunntest iknowledge, by(iincome)
Kruskal-Wallis probability =     0.0005
```

```
Dunn's Pairwise Comparison of iknowledge by iincome
                              (No adjustment)
Col Mean-|
Row Mean |          1          2          3          4          5          6
---------+------------------------------------------------------------------
       2 |  -2.497470
         |     0.0063
         |
       3 |  -1.980782   0.879087
         |     0.0238     0.1897
         |
       4 |  -3.815271  -1.257535  -2.470334
         |     0.0001     0.1043     0.0067
         |
       5 |  -3.893000  -1.495793  -2.613509  -0.363691
         |     0.0000     0.0674     0.0045     0.3580
         |
       6 |  -3.353408  -1.183058  -2.060025  -0.184688   0.114798
         |     0.0004     0.1184     0.0197     0.4267     0.4543
         |
       7 |  -3.552889  -1.742852  -2.457248  -0.959300  -0.688698  -0.722300
         |     0.0002     0.0407     0.0070     0.1687     0.2455     0.2351
         |
       8 |  -1.760408  -0.130388  -0.635829   0.591132   0.774389   0.656758
         |     0.0392     0.4481     0.2624     0.2772     0.2194     0.2557
         |
       9 |  -2.347848  -1.192059  -1.563387  -0.708333  -0.559877  -0.597431
         |     0.0094     0.1166     0.0590     0.2394     0.2878     0.2751
         |
      10 |  -3.169354  -1.756891  -2.259138  -1.163994  -0.964239  -0.987559
         |     0.0008     0.0395     0.0119     0.1222     0.1675     0.1617
         |
      11 |  -3.282179  -0.905285  -1.879430   0.235565   0.541013   0.359674
         |     0.0005     0.1827     0.0301     0.4069     0.2942     0.3595
Col Mean-|
Row Mean |          7          8          9         10
---------+--------------------------------------------
       8 |   1.160782
         |     0.1229
         |
       9 |  -0.140395  -0.960591
         |     0.4442     0.1684
         |
      10 |  -0.396438  -1.342428  -0.168444
         |     0.3459     0.0897     0.4331
         |
      11 |   1.061221  -0.433697   0.788364   1.244967
         |     0.1443     0.3323     0.2152     0.1066

alpha =   0.05
Reject Ho if p = P(Z <= |z|) <= alpha/2
```

- Question: For each of the factor variables (knowledge and other), are there differences in the average response among regions?

  Answer – NO, for both factor variables, there are no significant differences in responses among regions.

- Question: For each of the factor variables (knowledge and other), are there differences in the average response based upon type of device used?

  Answer – YES, for both factor variables there are significant differences in response provided on various devices.

```
. dunntest iknowledge, by(idevice)
Kruskal-Wallis probability =      0.0002

Dunn's Pairwise Comparison of iknowledge by idevice
                              (No adjustment)
Col Mean-|
Row Mean |          1          2          4          5
---------+--------------------------------------------
       2 |  -0.842399
```

```
         |     0.1998
         |
       4 |  -4.104772  -3.575691
         |     0.0000     0.0002
         |
       5 |  -2.253612  -1.999900  -0.286000
         |     0.0121     0.0228     0.3874
         |
       6 |  -1.116132  -0.951199   0.143918   0.293782
         |     0.1322     0.1708     0.4428     0.3845

alpha =   0.05
Reject Ho if p = P(Z <= |z|) <= alpha/2

. dunntest iother, by(idevice)
Kruskal-Wallis probability =     0.0423

Dunn's Pairwise Comparison of iother by idevice
                              (No adjustment)
Col Mean-|
Row Mean |       1          2          4         5
---------+-------------------------------------------
       2 |  -1.392887
         |     0.0818
         |
       4 |  -3.084003  -2.201813
         |     0.0010     0.0138
         |
       5 |  -0.728643  -0.307796   0.691191
         |     0.2331     0.3791     0.2447
         |
       6 |   0.005101   0.278162   0.929115   0.406324
         |     0.4980     0.3904     0.1764     0.3423

alpha =   0.05
Reject Ho if p = P(Z <= |z|) <= alpha/2
```

STATISTICS

- Question – For each of the factor variables (knowledge and other), are there differences in the average response by age?

```
. dunntest iknowledge, by(iage)

Warning: by() values are unlabeled, option nolabel implicit


Kruskal-Wallis equality-of-populations rank test

  +------------------------+
  | iage | Obs |  Rank Sum |
  |------+-----+-----------|
  |    2 | 297 | 126497.00 |
  |    3 | 230 | 115847.50 |
  |    4 | 343 | 198606.00 |
  |    5 | 197 | 128827.50 |
  +------------------------+

chi-squared =    75.931 with 3 d.f.
probability =     0.0001

chi-squared with ties =    85.400 with 3 d.f.
probability =     0.0001


              Dunn's Pairwise Comparison of iknowledge by iage
                              (No adjustment)
Col Mean-|
Row Mean |       2          3          4
---------+--------------------------------
       3 |  -3.047089
         |     0.0012
         |
       4 |  -6.647864  -3.042354
         |     0.0000     0.0012
```

```
         |
       5 |  -8.540506  -5.326895  -2.884203
         |     0.0000     0.0000     0.0020

alpha =   0.05
Reject Ho if p = P(Z <= |z|) <= alpha/2

.
. dunntest iother, by(iage)

Warning: by() values are unlabeled, option nolabel implicit


Kruskal-Wallis equality-of-populations rank test

  +-------------------------+
  | iage | Obs |  Rank Sum |
  |------+-----+-----------|
  |    2 | 297 | 128210.00 |
  |    3 | 230 | 122050.50 |
  |    4 | 343 | 201312.00 |
  |    5 | 197 | 118205.50 |
  +-------------------------+

chi-squared =    51.926 with 3 d.f.
probability =     0.0001

chi-squared with ties =    52.814 with 3 d.f.
probability =     0.0001


                Dunn's Pairwise Comparison of iother by iage
                              (No adjustment)
Col Mean-|
Row Mean |       2          3          4
---------+---------------------------------
       3 |  -3.687658
         |     0.0001
         |
       4 |  -6.409482  -2.160471
         |     0.0000     0.0154
         |
       5 |  -5.995882  -2.338749  -0.480036
         |     0.0000     0.0097     0.3156

alpha =   0.05
Reject Ho if p = P(Z <= |z|) <= alpha/2


=================================================================================================================
```

- Question – For each of the factor variables (knowledge and other), are there differences in the average response by gender?

```
. dunntest iknowledge, by(igender)

Warning: by() values are unlabeled, option nolabel implicit


Kruskal-Wallis equality-of-populations rank test

  +----------------------------+
  | igender | Obs |  Rank Sum |
  |---------+-----+-----------|
  |       1 | 497 | 240985.50 |
  |       2 | 570 | 328792.50 |
  +----------------------------+

chi-squared =    23.638 with 1 d.f.
probability =     0.0001

chi-squared with ties =    26.585 with 1 d.f.
probability =     0.0001


            Dunn's Pairwise Comparison of iknowledge by igender
                              (No adjustment)
Col Mean-|
```

```
Row Mean |              1
---------+-----------
       2 |  -5.156095
         |     0.0000

alpha =   0.05
Reject Ho if p = P(Z <= |z|) <= alpha/2

.
. dunntest iother, by(igender)

Warning: by() values are unlabeled, option nolabel implicit


Kruskal-Wallis equality-of-populations rank test

  +---------------------------+
  | igender | Obs |  Rank Sum |
  |---------+-----+-----------|
  |       1 | 497 | 238686.50 |
  |       2 | 570 | 331091.50 |
  +---------------------------+

chi-squared =    28.299 with 1 d.f.
probability =     0.0001

chi-squared with ties =    28.783 with 1 d.f.
probability =     0.0001


              Dunn's Pairwise Comparison of iother by igender
                              (No adjustment)
Col Mean-|
Row Mean |              1
---------+-----------
       2 |  -5.365020
         |     0.0000

alpha =   0.05
Reject Ho if p = P(Z <= |z|) <= alpha/2
```

===

- Question – For each of the factor variables (knowledge and other), are there differences in the average response by income?

```
. dunntest iknowledge, by(iincome)

Warning: by() values are unlabeled, option nolabel implicit


Kruskal-Wallis equality-of-populations rank test

  +---------------------------+
  | iincome | Obs |  Rank Sum |
  |---------+-----+-----------|
  |       1 |  85 |  35381.50 |
  |       2 | 124 |  64287.00 |
  |       3 | 220 | 107747.00 |
  |       4 | 194 | 108728.50 |
  |       5 | 138 |  78967.00 |
  |---------+-----+-----------|
  |       6 |  81 |  45972.00 |
  |       7 |  45 |  27296.00 |
  |       8 |  29 |  15261.50 |
  |       9 |  13 |   8052.50 |
  |      10 |  22 |  14004.00 |
  |---------+-----+-----------|
  |      11 | 116 |  64081.00 |
  +---------------------------+

chi-squared =    28.138 with 10 d.f.
probability =     0.0017

chi-squared with ties =    31.647 with 10 d.f.
probability =     0.0005
```

```
             Dunn's Pairwise Comparison of iknowledge by iincome
                              (No adjustment)
Col Mean-|
Row Mean |              1              2              3              4              5              6
---------+------------------------------------------------------------------
       2 |  -2.497470
         |     0.0063
         |
       3 |  -1.980782   0.879087
         |     0.0238     0.1897
         |
       4 |  -3.815271  -1.257535  -2.470334
         |     0.0001     0.1043     0.0067
         |
       5 |  -3.893000  -1.495793  -2.613509  -0.363691
         |     0.0000     0.0674     0.0045     0.3580
         |
       6 |  -3.353408  -1.183058  -2.060025  -0.184688   0.114798
         |     0.0004     0.1184     0.0197     0.4267     0.4543
         |
       7 |  -3.552889  -1.742852  -2.457248  -0.959300  -0.688698  -0.722300
         |     0.0002     0.0407     0.0070     0.1687     0.2455     0.2351
         |
       8 |  -1.760408  -0.130388  -0.635829   0.591132   0.774389   0.656758
         |     0.0392     0.4481     0.2624     0.2772     0.2194     0.2557
         |
       9 |  -2.347848  -1.192059  -1.563387  -0.708333  -0.559877  -0.597431
         |     0.0094     0.1166     0.0590     0.2394     0.2878     0.2751
         |
      10 |  -3.169354  -1.756891  -2.259138  -1.163994  -0.964239  -0.987559
         |     0.0008     0.0395     0.0119     0.1222     0.1675     0.1617
         |
      11 |  -3.282179  -0.905285  -1.879430   0.235565   0.541013   0.359674
         |     0.0005     0.1827     0.0301     0.4069     0.2942     0.3595
Col Mean-|
Row Mean |              7              8              9             10
---------+--------------------------------------------
       8 |   1.160782
         |     0.1229
         |
       9 |  -0.140395  -0.960591
         |     0.4442     0.1684
         |
      10 |  -0.396438  -1.342428  -0.168444
         |     0.3459     0.0897     0.4331
         |
      11 |   1.061221  -0.433697   0.788364   1.244967
         |     0.1443     0.3323     0.2152     0.1066

alpha =   0.05
Reject Ho if p = P(Z <= |z|) <= alpha/2

.
. dunntest iother, by(iincome)

Warning: by() values are unlabeled, option nolabel implicit


Kruskal-Wallis equality-of-populations rank test

  +---------------------------+
  | iincome | Obs |  Rank Sum |
  |---------+-----+-----------|
  |       1 |  85 |  40557.50 |
  |       2 | 124 |  68881.50 |
  |       3 | 220 | 111152.50 |
  |       4 | 194 | 109253.00 |
  |       5 | 138 |  76566.00 |
  |---------+-----+-----------|
  |       6 |  81 |  38956.50 |
  |       7 |  45 |  26963.00 |
  |       8 |  29 |  15964.00 |
  |       9 |  13 |   7397.50 |
  |      10 |  22 |  12425.50 |
  |---------+-----+-----------|
  |      11 | 116 |  61661.00 |
  +---------------------------+

chi-squared =    12.672 with 10 d.f.
```

```
probability =     0.2426

chi-squared with ties =    12.889 with 10 d.f.
probability =     0.2299


              Dunn's Pairwise Comparison of iother by iincome
                              (No adjustment)
Col Mean-|
Row Mean |          1          2          3          4          5          6
---------+------------------------------------------------------------------
       2 |  -1.820902
         |     0.0343
         |
       3 |  -0.719869   1.464701
         |     0.2358     0.0715
         |
       4 |  -2.164101  -0.218148  -1.924668
         |     0.0152     0.4137     0.0271
         |
       5 |  -1.843770   0.017718  -1.494472   0.244915
         |     0.0326     0.4929     0.0675     0.4033
         |
       6 |  -0.080037   1.707810   0.611758   2.033932   1.727440
         |     0.4681     0.0438     0.2703     0.0210     0.0420
         |
       7 |  -2.166306  -0.821450  -1.879091  -0.712417  -0.845545  -2.081181
         |     0.0151     0.2057     0.0301     0.2381     0.1989     0.0187
         |
       8 |  -1.116035   0.079540  -0.749513   0.208387   0.069584  -1.051661
         |     0.1322     0.4683     0.2268     0.4175     0.4723     0.1465
         |
       9 |  -1.009833  -0.152029  -0.731528  -0.067154  -0.160323  -0.964946
         |     0.1563     0.4396     0.2322     0.4732     0.4363     0.1673
         |
      10 |  -1.199166  -0.131556  -0.871672  -0.023795  -0.142123  -1.141432
         |     0.1152     0.4477     0.1917     0.4905     0.4435     0.1268
         |
      11 |  -1.247245   0.606437  -0.750743   0.881120   0.604470  -1.144015
         |     0.1062     0.2721     0.2264     0.1891     0.2728     0.1263
Col Mean-|
Row Mean |          7          8          9         10
---------+--------------------------------------------
       8 |   0.669238
         |     0.2517
         |
       9 |   0.313259  -0.181941
         |     0.3770     0.4278
         |
      10 |   0.432536  -0.165674   0.039694
         |     0.3327     0.4342     0.4842
         |
      11 |   1.260049   0.298282   0.419363   0.467740
         |     0.1038     0.3827     0.3375     0.3200

alpha =   0.05
Reject Ho if p = P(Z <= |z|) <= alpha/2

====================================================================================================================
```

- Question: For each of the factor variables (knowledge and other), are there differences in the average response among regions?

```
. dunntest iknowledge, by(iregion)

Warning: by() values are unlabeled, option nolabel implicit


Kruskal-Wallis equality-of-populations rank test

  +---------------------------+
  | iregion | Obs |  Rank Sum |
  |---------+-----+-----------|
  |       1 |  47 |  24583.50 |
  |       2 | 123 |  70842.50 |
  |       3 | 190 | 100915.00 |
  |       4 |  60 |  30070.50 |
  |       5 | 196 |  98718.00 |
```

```
  |---------+-----+-----------|
  |       6 |  74 |  38057.50 |
  |       7 | 102 |  54316.00 |
  |       8 |  77 |  42647.50 |
  |       9 | 189 | 100060.50 |
  +---------------------------+

chi-squared =     5.469 with 8 d.f.
probability =     0.7065

chi-squared with ties =     6.162 with 8 d.f.
probability =     0.6291


            Dunn's Pairwise Comparison of iknowledge by iregion
                              (No adjustment)
Col Mean-|
Row Mean |             1             2             3             4             5             6
---------+------------------------------------------------------------------
       2 |  -1.071609
         |     0.1419
         |
       3 |  -0.172251   1.345399
         |     0.4316     0.0892
         |
       4 |   0.390149   1.649590   0.702685
         |     0.3482     0.0495     0.2411
         |
       5 |   0.414702   2.183041   0.937194  -0.058582
         |     0.3392     0.0145     0.1743     0.4766
         |
       6 |   0.163190   1.455991   0.426919  -0.262248  -0.270564
         |     0.4352     0.0727     0.3347     0.3966     0.3934
         |
       7 |  -0.186328   1.126918  -0.039002  -0.669008  -0.820729  -0.414454
         |     0.4261     0.1299     0.4844     0.2517     0.2059     0.3393
         |
       8 |  -0.578186   0.528077  -0.584510  -1.062830  -1.296538  -0.844421
         |     0.2816     0.2987     0.2794     0.1439     0.0974     0.1992
         |
       9 |  -0.135699   1.395304   0.057851  -0.662132  -0.877640  -0.383263
         |     0.4460     0.0815     0.4769     0.2539     0.1901     0.3508
Col Mean-|
Row Mean |             7             8
---------+------------------------
       8 |  -0.491339
         |     0.3116
         |
       9 |   0.087340   0.628024
         |     0.4652     0.2650

alpha =   0.05
Reject Ho if p = P(Z <= |z|) <= alpha/2

.
. dunntest iother, by(iregion)

Warning: by() values are unlabeled, option nolabel implicit


Kruskal-Wallis equality-of-populations rank test

  +---------------------------+
  | iregion | Obs |  Rank Sum |
  |---------+-----+-----------|
  |       1 |  47 |  22561.50 |
  |       2 | 123 |  69595.50 |
  |       3 | 190 |  98283.50 |
  |       4 |  60 |  29825.50 |
  |       5 | 196 | 103603.00 |
  |---------+-----+-----------|
  |       6 |  74 |  38500.50 |
  |       7 | 102 |  56208.00 |
  |       8 |  77 |  40265.50 |
  |       9 | 189 | 101368.00 |
  +---------------------------+

chi-squared =     4.655 with 8 d.f.
probability =     0.7937
```

```
chi-squared with ties =     4.736 with 8 d.f.
probability =     0.7854


               Dunn's Pairwise Comparison of iother by iregion
                                (No adjustment)
Col Mean-|
Row Mean |          1            2            3            4            5            6
---------+------------------------------------------------------------------
       2 |  -1.651264
         |     0.0493
         |
       3 |  -0.754747   1.384344
         |     0.2252     0.0831
         |
       4 |  -0.289090   1.440613   0.450033
         |     0.3863     0.0748     0.3263
         |
       5 |  -0.986810   1.068340  -0.366535  -0.704618
         |     0.1619     0.1427     0.3570     0.2405
         |
       6 |  -0.712218   1.021777  -0.072157  -0.440535   0.201037
         |     0.2382     0.1534     0.4712     0.3298     0.4203
         |
       7 |  -1.329861   0.363767  -0.908316  -1.094902  -0.607562  -0.665397
         |     0.0918     0.3580     0.1819     0.1368     0.2717     0.2529
         |
       8 |  -0.764952   0.974207  -0.137978  -0.495255   0.138866  -0.053765
         |     0.2221     0.1650     0.4451     0.3102     0.4448     0.4786
         |
       9 |  -1.140280   0.839921  -0.612310  -0.874259  -0.250994  -0.386621
         |     0.1271     0.2005     0.2702     0.1910     0.4009     0.3495
Col Mean-|
Row Mean |          7            8
---------+----------------------
       8 |   0.615064
         |     0.2693
         |
       9 |   0.395481  -0.327411
         |     0.3462     0.3717

alpha =   0.05
Reject Ho if p = P(Z <= |z|) <= alpha/2



==================================================================================================================
```

- Question: For each of the factor variables (knowledge and other), are there differences in the average response based upon type of device used?

```
. dunntest iknowledge, by(idevice)

Warning: by() values are unlabeled, option nolabel implicit


Kruskal-Wallis equality-of-populations rank test

  +---------------------------+
  | idevice | Obs |  Rank Sum |
  |---------+-----+-----------|
  |       1 | 455 | 231846.00 |
  |       2 | 464 | 243925.50 |
  |       4 | 117 |  74083.00 |
  |       5 |  22 |  14355.00 |
  |       6 |   9 |   5568.50 |
  +---------------------------+

chi-squared =    19.255 with 4 d.f.
probability =     0.0007

chi-squared with ties =    21.656 with 4 d.f.
probability =     0.0002


            Dunn's Pairwise Comparison of iknowledge by idevice
```

```
                               (No adjustment)
Col Mean-|
Row Mean |        1           2           4           5
---------+--------------------------------------------
       2 |  -0.842399
         |     0.1998
         |
       4 |  -4.104772  -3.575691
         |     0.0000     0.0002
         |
       5 |  -2.253612  -1.999900  -0.286000
         |     0.0121     0.0228     0.3874
         |
       6 |  -1.116132  -0.951199   0.143918   0.293782
         |     0.1322     0.1708     0.4428     0.3845

alpha =   0.05
Reject Ho if p = P(Z <= |z|) <= alpha/2

.
. dunntest iother, by(idevice)

Warning: by() values are unlabeled, option nolabel implicit


Kruskal-Wallis equality-of-populations rank test

  +---------------------------+
  | idevice | Obs |  Rank Sum |
  |---------+-----+-----------|
  |       1 | 455 | 232086.50 |
  |       2 | 464 | 249706.50 |
  |       4 | 117 |  71108.00 |
  |       5 |  22 |  12291.00 |
  |       6 |   9 |   4586.00 |
  +---------------------------+

chi-squared =     9.727 with 4 d.f.
probability =     0.0453

chi-squared with ties =     9.893 with 4 d.f.
probability =     0.0423


              Dunn's Pairwise Comparison of iother by idevice
                               (No adjustment)
Col Mean-|
Row Mean |        1           2           4          5
---------+--------------------------------------------
       2 |  -1.392887
         |     0.0818
         |
       4 |  -3.084003  -2.201813
         |     0.0010     0.0138
         |
       5 |  -0.728643  -0.307796   0.691191
         |     0.2331     0.3791     0.2447
         |
       6 |   0.005101   0.278162   0.929115   0.406324
         |     0.4980     0.3904     0.1764     0.3423

alpha =   0.05
Reject Ho if p = P(Z <= |z|) <= alpha/2
```

STROBE Statement—Checklist of items that should be included in reports of ***cross-sectional studies***, ADAPTED FOR A SURVEY STUDY: Informed consent, shared-decision making and a reasonable patient's wished based on a national survey in the United States using a hypothetical scenario.
An (X) indicates that the checklist item is included in the manuscript if applicable for a survey study.

	Item No	Recommendation
Title and abstract	1	(*a*) Indicate the study's design with a commonly used term in the title or the abstract X
		(*b*) Provide in the abstract an informative and balanced summary of what was done and what was found X
Introduction		
Background/rationale	2	Explain the scientific background and rationale for the investigation being reported X
Objectives	3	State specific objectives, including any prespecified hypotheses X
Methods		
Study design	4	Present key elements of study design early in the paper X
Setting	5	Describe the setting, locations, and relevant dates, including periods of recruitment, exposure, follow-up, and data collection X
Participants	6	(*a*) Give the eligibility criteria, and the sources and methods of selection of participants X
Variables	7	Clearly define all outcomes, exposures, predictors, potential confounders, and effect modifiers. Give diagnostic criteria, if applicable X
Data sources/ measurement	8*	For each variable of interest, give sources of data and details of methods of assessment (measurement). Describe comparability of assessment methods if there is more than one group X
Bias	9	Describe any efforts to address potential sources of bias X
Study size	10	Explain how the study size was arrived at X
Quantitative variables	11	Explain how quantitative variables were handled in the analyses. If applicable, describe which groupings were chosen and why X
Statistical methods	12	(*a*) Describe all statistical methods, including those used to control for confounding X
		(*b*) Describe any methods used to examine subgroups and interactions X
		(*c*) Explain how missing data were addressed NOT APPLICABLE
		(*d*) If applicable, describe analytical methods taking account of sampling strategy X
		(*e*) Describe any sensitivity analyses NOT APPLICABLE
Results		
Participants	13*	(a) Report numbers of individuals at each stage of study—eg numbers potentially eligible, examined for eligibility, confirmed eligible, included in the study, completing follow-up, and analysed NOT APPLICABLE
		(b) Give reasons for non-participation at each stage NOT APPLICABLE
		(c) Consider use of a flow diagram NOT USEFUL
Descriptive data	14*	(a) Give characteristics of study participants (eg demographic, clinical, social) and information on exposures and potential confounders X
		(b) Indicate number of participants with missing data for each variable of interest X
Outcome data	15*	Report numbers of outcome events or summary measures X
Main results	16	(*a*) Give unadjusted estimates and, if applicable, confounder-adjusted estimates and their precision (eg, 95% confidence interval). Make clear which confounders were

		adjusted for and why they were included NOT APPLICABLE
		(*b*) Report category boundaries when continuous variables were categorized NOT APPLICABLE
		(*c*) If relevant, consider translating estimates of relative risk into absolute risk for a meaningful time period *NOT RELEVANT*
Other analyses	17	Report other analyses done—eg analyses of subgroups and interactions, and sensitivity analyses X
Discussion		
Key results	18	Summarise key results with reference to study objectives X
Limitations	19	Discuss limitations of the study, taking into account sources of potential bias or imprecision. Discuss both direction and magnitude of any potential bias X
Interpretation	20	Give a cautious overall interpretation of results considering objectives, limitations, multiplicity of analyses, results from similar studies, and other relevant evidence X
Generalisability	21	Discuss the generalisability (external validity) of the study results X
Other information		
Funding	22	Give the source of funding and the role of the funders for the present study and, if applicable, for the original study on which the present article is based X

*Give information separately for exposed and unexposed groups.

Note: An Explanation and Elaboration article discusses each checklist item and gives methodological background and published examples of transparent reporting. The STROBE checklist is best used in conjunction with this article (freely available on the Web sites of PLoS Medicine at http://www.plosmedicine.org/, Annals of Internal Medicine at http://www.annals.org/, and Epidemiology at http://www.epidem.com/). Information on the STROBE Initiative is available at www.strobe-statement.org.

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Informed Consent, Shared-Decision Making and a Reasonable Patient's Wishes Based on a Cross-sectional, National Survey in the United States Using a Hypothetical Scenario

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Informed Consent, Shared-Decision Making and a Reasonable Patient's Wishes Based on a Cross-sectional, National Survey in the United States Using a Hypothetical Scenario

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Abstract

Objective: In approximately half the states in the U.S., and more recently in the U.K., informed consent is legally defined as what a reasonable patient would wish to know. Our objective was to discern the information needs of a hospitalized, "reasonable patient" during the informed-consent process.

Design: We performed a cross-sectional study to develop a survey instrument and better define "reasonable person" in relation to informed consent in a hypothetical scenario where an invasive procedure may be an option.

Setting: A 10-question survey was administered from April 19 through October 22, 2018 to three groups: student nurses (n=76), health professions educators (n=63), and a U.S. national population (n=1067).

Primary and secondary outcome measures: The primary outcome measure was the average intensity, on a 5-point scale, by which survey groups wished to have each of 10 questions answered. The secondary outcome was to discern relationships between survey demographics and the intensity by which participants wanted an answer.

Results: Despite substantial demographic differences in the nursing-student group and health-professions-educator group, the average intensity scores were within 0.2 units on 9 of 10 questions. The national survey revealed a strong desire to have an answer to each question (range 3.98 to 4.60 units). It showed that women desired answers more than men and older adults desired answers more than younger adults.

Conclusions: Based on responses to 10 survey questions regarding wishes of people in a situation where an invasive procedure may be necessary, the vast majority want an answer to

each question. They wanted to know about all treatment options, risky drugs, decision aids, who will perform the procedure, and the cost. They wanted their advocate present, periodic review of their medical record, a full day to review documents, and expected outcomes and restrictions after the procedure.

Key Words: Informed consent, shared-decision making, reasonable patient, overuse of procedures

Strengths and limitations of this study:

- Based on two targeted surveys and a national survey, findings are consistent across demographic groups and across the United States, making our conclusions robust.
- The findings form a template that could be used by clinicians when engaged in shared-decision making to elicit truly informed consent from the patient.
- The survey questions had to be limited to be practical, so in any specific, real-life situation additional questions may be asked by a reasonable patient.
- Findings about the out-of-pocket costs of a procedure probably apply only to patients in the United States where out-of-pocket costs may be enormous.
- Our survey was limited by requirements to read English and have electronic access.

Funding statement: The study was supported by Patient Safety America, Houston, TX USA. A donation ($1,400) from Dr. James to support the SurveyMonkey® platform provided the funds required. His roles are given below in the "Author's contribution" section.

Competing interests: Dr. James founded Patient Safety America as a no-budget organization dedicated to educating people about problems in the U.S. healthcare industry. He serves as its unpaid CEO and leader. He has no conflicts of interest, advocating only for improved care.

Author's contribution: JTJ conceived the study and developed the questions. DJE formed the survey instrument to suit each of the situations where questions were to be presented to a survey audience. JTJ and RRS analyzed the data. JTJ wrote most of the paper in close consultation with coauthors. All authors agreed to be accountable for accuracy of the work.

Data sharing statement: National survey data at: http://patientsafetyamerica.com/survey-data/.

Health-Professions-Educator survey at: https://www.surveymonkey.com/results/SM-DQJDBBQ7L/

Nursing-student survey available at: https://www.surveymonkey.com/results/SM-5F2SX9W3V/

Available 'Supplementary files' include the research proposal, 2 forms of the survey, and 6 statistical analysis files.

Introduction

The human right to self-determination in healthcare is a hallmark of instruments promulgated by the United Nations. Rights are specifically described for children, persons with disabilities and older persons. These call for the highest standards attainable for children's health,[1] for treatment of illness or rehabilitation of the disabled,[2] and for maintenance of optimum health as people age.[3] The patient's right to know certainly extends to knowing the risks and benefits of prescription medications. For example, based on a recent court decision in the U.K. involving off label and unlicensed medication prescribing, consent laws now call for patients to receive all information that a patient deems important, and not just what the physician thinks is important.[4] However, unless the patient is harmed by denial of sufficient information to exercise their rights to make an informed decision about off-label prescriptions, there is no legal standing for compensation. In our opinion, the human rights of patients to self-determination in healthcare can only be attained through a balanced process of shared-decision making between patient and clinician.

While the idea of shared-decision making between patient and clinician has been around many decades, based on peer-reviewed citations, the concept has gained momentum since 2012.[5] The culmination of shared-decision making is that the patient consents to the mutually-agreed procedures to be performed or not performed. The old standard calling for information that "reasonable clinicians" feel their patients need to know is giving way to the new standard defined by what a reasonable patient wishes to know. However, a study of recorded conversations between clinicians and a patients that may need percutaneous coronary intervention (PCI) found that only 3% of the patients received all 8 elements necessary for informed decision making.[6] A recent court ruling in the U.K has upheld the patient-centered, informed-consent standard and about half of the United States use “reasonable patient” as the basis for administering informed consent.[7] In the past, the “reasonable patient” standard has been ill-defined and abstract; our intent is to better-define the information wishes of a reasonable person when facing the possibility of an invasive procedure.[8] There is a natural conflict between respect for patient autonomy in making an informed decision and the practical aspects of how a clinician delivers information to a “reasonable patient” to fulfill the ethical principle of autonomy.

The question then becomes, “What does a reasonable patient wish to know?” Typically, that is answered after the fact in specific cases where a patient may allege that he was not given sufficient information to make an informed decision.[9] One example involved a case where a man’s family was not given enough information about his defibrillator replacement to make an informed decision.[10] Patient preferences were not elicited by the clinician. A court in the U.K. decided that a woman was not given sufficient information on the 1% risk of shoulder dystocia from a vaginal vs. a Caesarian delivery to make an informed decision.[11] To our knowledge, no investigators have attempted to define the information needs of a reasonable patient in a general way that applies to care during hospitalization. To some extent the survey was driven by stories of patient advocates who have experienced harm and, in retrospect, wish they had known more about the risks of their treatment, device, or medication. We hypothesized that such wishes could be generalized into information a “reasonable patient’ would want to know.

Goal

Our primary goal was to establish the descriptive intensity (scale of 1 to 5, with 1 being "definitely no" and 5 being "definitely yes") by which answers to general questions are desired by a reasonable patient before giving consent for an invasive procedure, prescription drugs, or medical devices that could pose a risk of avoidable harm. Our secondary goal was to characterize heterogeneity, such as gender and age, in the survey groups that may be associated with intensity variations in what a reasonable patient wishes to know.

Methods

Our survey-study proposal (Supplementary file 1) was approved by the Galveston College Institutional Review Board. Our search of peer-reviewed literature using "reasonable patient survey" (15 November 2018) discovered only 2 partially relevant articles. One involved wishes of patients about anesthesia risks in a Singapore hospital.[12] Another surveyed patients' opinions about pre-surgical informed-consent in a Jamaica teaching hospital.[13] In the latter study, 67% of the surveyed patients described their consent process as 'unsatisfactory.' We created a statement of a generic situation in which a hospitalized patient must make choices about their care after being stabilized upon entry via the emergency department: *You are hospitalized in a large, urban, teaching hospital after being brought into its emergency room last night. The condition that brought you to the ER has been stabilized, but additional procedures may be necessary. The following 10 questions determine what you would like to know as a reasonable patient.* We developed a 10-question survey based on adverse experiences reported by members of the Patient Safety Action Network (formerly members of the Safe Patient Project of Consumers Union) and our knowledge of shortcomings with current informed consent practices as reflected in medical literature.

The survey was developed in two forms. The first employed demographics to include age, gender, education level, race or ethnicity, and whether the survey taker has worked in a hospital (Supplementary file 2). This survey was administered via cell phone, without any means of coercion, to student nurses (and a few faculty) on April 19, 2018 at Galveston College, Galveston Texas during a presentation by Dr. James. All present in the lecture hall were verbally recruited to take the survey at the start of the presentation, and then the survey results were shared at the conclusion of the talk. It was also administered to participants in the Health Professions Educators Summer Symposium (HPESS) Community via email request on June 8, 2018. The master-list of past participants in summer symposia was used as the recruitment tool. The latter included primarily mature academics involved in educating physicians, nurses, and health-care administrators.

The second form of the survey, which was used for the U.S. national survey, employed an identical scenario and questions, but the demographics were adapted to those offered by SurveyMonkey® (SM) for a national survey (Supplementary file 3). These included age, gender, household income level, and region of the United States. The national platform included survey takers across the U.S. that had been previously recruited by SM as part of their nationally representative database. The vast majority of the national survey takers used cell phones to answer the questions. The third survey was administered to the national audience on October 22, 2018.

Each of the 10 questions could be answered at one of 5 intensity levels indicating the degree to which an answer is desired by the person taking the survey. The responses were as follows: definitely no (1.0), probably no (2.0), neutral (3.0), probably yes (4.0), and definitely yes (5.0). Formal statistical analyses were deemed unsuited to the qualitative nature of our study design. Final conclusions are word descriptions of the intensity of desire of a reasonable patient to have answers such as “probably yes” or “definitely yes.” Obvious trends in the data were captured graphically.

Statistics and Factor Analyses

The data subjected to analyses were collected in three surveys (student nurses, HPESS, and the national survey). For each survey, descriptive statistics were obtained and analyses of the results were performed using Stata (version 14.0; Stata Corp., College Station, TX). The means of the responses of the various groups for each subject category (e.g., age, gender, etc.) were tested for differences using methods that are appropriate for these categorical variables, which are not normally distributed. The nonparametric Kruskal–Wallis one-way analysis of variance by ranks was performed to test for differences between means and the Dunn test was used to identify pairs that differed significantly. Statistical significance, adjusted for false discovery, was established with $p < 0.025$.

Factor analysis with principal component factoring was utilized in all surveys to determine components that can explain the greatest portions of the total variance in responses among the questions. The goal of a factor analysis is to reduce the number of variables to explain and to interpret the results. Factor loadings was achieved by regression of scoring coefficients obtained with varimax rotation. The loaded factors (principal components) generated were analyzed as described above for other variables.

Patient and Public Involvement

The development of our research plan was a direct result of patient advocates’ experiences with failed informed consent. These experiences led to formulation of many of the questions posed in our survey. Our results will be disseminated to the HPESS community once the study has been published. Results will be disseminated to student nurses at Galveston College through a presentation this spring. Our findings and suggested actions from our findings will be disseminated to patient advocates whose shared ideas and experiences powered this study. Those groups include the following: Patient Council of the Right Care Alliance, Patient Safety Action Network, and members of Patient Safety America. We expect to widely share our findings with the general public (represented by our national survey) through media outlets such as ProPublica, with physicians through KevinMD and Veritas Health Care, and with nurses through Quality and Safety Education for Nurses (QSEN).

Results

We targeted two groups from which to obtain responses because of the access we had to them and the expectation that their demographics would be different. The response rate from the student nurses was 99% (76/77) because it was taken during a lecture in which support was available if anyone had difficulty. Only one did. The response rate of the HPESS Community to the email request was 63/146 = 43%. The low response is likely due to busy professionals not having time to read and respond to all emails sent to them. Combined, the response rate of the two targeted studies was 62%. Table 1 shows the diversity of demographics in the two groups that took initial surveys. The primary differences were in age, education level, race or ethnic origin, and hospital work experience (Supplemental file 4).

Table 1. Comparative demographics of targeted groups (2 sample test of proportions)

Demographic measure	Student Nurses (n = 76)	HPESS Community (n = 63)	P values
Under 35 years of age	77%	3%	<0.0001
Female	78%	70%	0.2755
High school graduate	34%	2%	<0.0001
College graduate	65%	5%	<0.0001
Advanced degree	1%	93%	<0.0001
White or Caucasian	51%	84%	<0.0001
Black or African American	16%	3%	0.0151
Hispanic or Latino	26%	2%	0.0001
Asian	4%	6%	0.5161
Have worked in a hospital	35%	86%	<0.0001

The national survey included 1211 persons who entered the survey and 1067 who completed it for a response rate of 88%. Nine participants did not answer location questions. The combined results of our three surveys consistently showed that a “reasonable patient” would want to know an answer to each of the 10 questions presented in our survey (table 2).

Table 2 allows the reader to view the results in two ways for each of the 10 questions. The first, shown in bracketed, red highlight, is the fraction of responders that indicated that they definitely wanted to know information (5.0 response) or have a certain right to access (e.g. medical record access). The second way to view results, in black lettering, indicates the numerical mean of all responses in each of the 3 surveys and the ranges of the means sorted by income groups and regions of the U.S. in the national survey. We used ranges as a measure of dispersion around the national means because it is likely lay readers will understand this more readily than the results of our formal statistical analysis. The three distinct surveys compare well regarding the wishes of patients. The highest intensity of desire to have an answer was to question 1 (know all treatment choices) in all three surveys (range 4.58-4.94). In all three surveys, the lowest intensity of desire to have an answer was to question 8 (medical record access) (range 3.98-4.07), and the second lowest intensity was to question 9 (advanced review of documents) (range 4.18-4.29). Even the lowest intensity desire for an answer was near 4.0, which implies that on weighted-average basis, the putative reasonable patient would *probably* want to have access to his medical record and be able to make entries.

Table 2. Average response levels in three surveys. 4.0 indicates the person "probably" wants an answer, and 5.0 indicates the person "definitely" wants an answer. The percentage of the 5.0 responses are shown in bold red. In the national survey, 71 % of the reported income levels were from \$10,000 to \$99,000. Of the 9 geographic regions of the U.S., 54% of responses were from 3 of those – east north central, south Atlantic, and Pacific. Footnotes: [a]n=75, [b]n=62

Number and description of survey question **The percentages of individuals that 'definitely' (5.0) wanted an answer to each question below is shown in bold red in the columns.**	Student Nurses (n = 76) **[% 5.0]**	HPESS Group (n = 63) **[% 5.0]**	National Group (n = 1067) **[%5.0]**	National ranges over 10 income Groups	National ranges over 9 regions of the U.S.
1. Would you like to know all your treatment choices, including alternatives and risks and benefits of each choice for a patient like you. Your choices may include invasive procedures (surgery, endoscopic procedures, insertion of a medical device), non-invasive treatments, and what happens if you do nothing?	4.92 **[92%]**	4.94 **[95%]**	4.58 **[75%]**	4.33-4.97	4.51-4.65
2. Drugs that have not been approved by the Food and Drug Administration for your condition are off-label for you. Drugs prescribed off-label are about twice as likely to cause serious side-effects as drugs prescribed on-label. Would you like to know if any drugs prescribed to you are off-label, and what their side effects may be?	4.89[a] **[89%]**	4.51 **[67%]**	4.40 **[67%]**	4.07-4.71	4.26-4.57
3. Drugs assigned a "black box" warning by the FDA pose an especially serious risk of harm. If you are prescribed such a drug, would you want to know the reasons for the black box warning and if there are alternatives before you take it?	4.83 **[83%]**	4.67 **[79%]**	4.57 **[78%]**	4.27-4.92	4.43-4.69
4. Decision aids are created to assist patients with complex medical decisions and to help them understand the risks and benefits of treatment options. If there is a decision-aid available for your illness, would you like to review it?	4.66 **[73%]**	4.65 **[70%]**	4.41 **[61%]**	4.07-4.69	4.28-4.57
5. If you are considering an invasive procedure, would you like to know who will be performing it, their skill level, and how trainee doctors, if any, will be involved?	4.83 **[84%]**	4.78 **[84%]**	4.49 **[68%]**	4.34-4.82	4.41-4.63
6. Assuming you have decided on a procedure or treatment, would you like to know what your total, out-of-pocket costs will be?	4.71 **[79%]**	4.60[b] **[68%]**	4.48 **[69%]**	4.21-4.76	4.41-4.52
7. You have a trusted family member that is willing to act as your advocate. Would you like for that person to be present during shared-decision-making about your medical care?	4.65[a] **[73%]**	4.54 **[62%]**	4.31 **[54%]**	4.09-4.69	4.20-4.43
8. If you are well enough, would you like to be offered a chance to review and make entries in your medical records each day while you are hospitalized?	4.07 **[47%]**	4.06 **[48%]**	3.98 **[38%]**	3.41-4.23	3.89-4.11
9. Before signing any documents permitting invasive, non-emergency procedures would you like to review these at least one full day in advance of the procedure?	4.29 **[49%]**	4.19 **[52%]**	4.18 **[47%]**	3.91-4.41	3.87-4.34
10. If you are considering an invasive procedure, would you like to know your expected difficulties, recovery times, pain management, and restrictions after the procedure while hospitalized and after discharge from the hospital? This includes the risk of infection from the invasive procedure.	4.84 **[86%]**	4.89 **[90%]**	4.60 **[76%]**	4.32-4.85	4.49-4.70

Below we provide brief descriptions of the statistical analyses and factor analyses for each of the 3 surveys. The details of these analyses are in supplementary files. Question numbers are found in table 2. Statistical analysis of the responses to survey questions obtained from student nurses (Supplementary file 5) revealed no significant differences among age groups, level of education, experience working in a hospital, or between genders, in their responses to any of the 10 questions. Not considering 'another race' as a response suitable for comparisons, the only differences in pairs were for question 1. 'White or Caucasian' was different from 'Black or African American' ($p = 0.011$) and 'Black or African American' was different from 'Asian or Asian American' ($p = 0.020$).

Factor analysis with principal component factoring identified 3 factors each with Eigenvalues greater than 1, which cumulatively accounted for 64% of total variance among responses provided by the student nurses. Varimax factor loading of 3 factor variables labeled as "knowledge", "participation", and "total cost" were generated and analyzed as above for differences in responses among groups (Supplementary file 6). No significant differences were found among age groups, levels of education, or between genders, in their responses to any of the factor variables. The only significant differences, again disregarding comparisons to 'Another race,' existed among races and ethnicities in their responses associated with "knowledge" ($p = 0.0091$) where 'White or Caucasian' differed from 'Black or African American' ($p = 0.0211$).

The responses of the HPESS survey did not differ significantly between genders, or among various ethnicities for any of the ten questions (Supplementary file 7). Responses differed significantly among age groups only for questions 1 ($p = 0.0171$) and 2 ($p = 0.0024$). Responses differed significantly by education level for questions 1 ($p = 0.0015$), 2 ($p = 0.0139$), 3 (p = 0.0170) and 10 (p = 0.0347). Among respondents to the HPESS survey, significant differences in responses to questions 1 (p = 0.003), 2 (p = 0.0024), and 5 (p = 0.0002) were provided by respondents who differed according to their employment as hospital workers.

Factor analysis of the HPESS data with principal component factoring identified no statistically significant differences for either of two factor variables "knowledge" and "participation" when responses were compared by age, gender, or level of education (Supplementary file 8). A significant difference among ethnic groups was found for "knowledge" (p = 0.0394) but post hoc analysis with Dunn's test failed to identify any pairs of groups that differed significantly.

In the national survey, responses differed significantly for all questions among age groups (p = 0.001 for questions 1 - 7 and 10; p = 0.0041 and 0.0052 for questions 8 and 9 respectively), between genders (p = 0.001 for questions 1, 2, 4, 7, 8 and 10; p = 0.0043, 0.0002, 0.0030 and 0.0014 for questions 3, 5, 6 and 9, respectively) (Supplementary file 9). Significant differences for questions 1 (p = 0.0001), 2 (p = 0.0384), 3 (p =0.0047), 4 (p = 0.0037), and 6 (p = 0.0190) were found among groups that differed by income level. Question 9 (p = 0.0473) was the only question for which responses differed significantly among regions of the U.S. Several salient generalizations from these comparisons are apparent. When comparing responses among various age groups, differences were found among all ages groups for most questions. When significant differences were found among response of groups of differing income levels the differences, most often, were between group 1 and the other groups. Differences between regions, in response to question 9, were most often between regions 1 and 2 and the other regions.

Factor analysis of the national data with principal component factoring demonstrated significant differences among the age categories for both factor variables ("knowledge", and "other", p = 0.0001 for both variables) (Supplementary file 10). All groups differed significantly from each other, with the exception of group 4 vs group 5 for the factor variable "other". For both factor variables the differences in responses of the genders are very highly significantly different (p <0.0001). When considering responses from groups of differing income levels, significant differences were found for the variable "knowledge" (p = 0.0005). Most of the differences among pairs are between group 1 and other groups and between group 3 and other groups. There were no significant differences in responses to factor variables among regions.

Discussion

Despite the different demographics in the two targeted surveys (table 1), especially in age, education level and hospital work experience, the responses were comparable in the two groups (table 2). Only one of the 10 questions (number 2) had a response level that differed by more than 0.20 units. This was the question of whether a reasonable patient would want to know about any off-label drugs prescribed. The difference was 0.38 units. The higher education level and more hospital experience of the HPESS Community may have made this group slightly less concerned about the additional risk that may be associated with off-label prescriptions. Statistical analysis of the nurse-student survey revealed two paired demographic differences. Two race/ethnic pairs (white vs. black and black vs. Asian) were associated with differences in intensity of response to question 1, which is about knowing all choices for treatment including risks and benefits. Statistical analysis of the HPESS community survey disclosed differences between pairs in the age, education-level and hospital-work-experience groups. While these statistical findings may be interesting, the reality is that the core message remains unchanged: patients of all types studied wish to know many details about their care choices when facing the possibility of an invasive procedure.

The results of the national survey regarding demographics of gender (figure 1) and age (figure 2) demonstrated distinct trends for all 10 questions. Without exception, women wanted more information than men, and older adults wanted more information than younger adults. Similarly, statistical analysis supported associations between age and gender on the intensity of responses to most questions, and it revealed an effect of income for some of the survey questions. The gender associations may be due to women being higher users of hospital care and hospitals tending to offer many more services targeted to women than to men.[14] Older adults may be more likely to be cautious compared to younger adults because of more lifetime hospital experiences.

Our survey provides insight into some patient concerns that are not typically part of informed consent. In the wake of the opioid epidemic, the public is more aware of the potential dangers of prescription drugs. Thus, it should not be surprising that patients would want to know if the drugs prescribed to them are off-label or have a black-box warning. The U.S. Food and Drug Administration assigned “black box” warnings to immediate-release opioids in 2016.[15] There is also growing attention to surprise medical bills in the U.S., so a reasonable patient would likely to want an estimate of his out-of-pocket costs. Inordinate out-of-pocket costs, especially those that lead to bankruptcy, may have an adverse effect on clinical outcomes.[16] Hospital administration staff could assist with providing cost information. The opportunity to review and make entries in one’s medical record, while not part of the informed consent process, may relate. Many patients want to ensure that the data being recorded are accurate and complete;

moreover, many desire access to their data as a means of gaining a better understanding of their condition and engaging with their providers. Encouraging this access can convey strong support for the view that the patient is an integral part of his care team.

There is an important connection between informed consent and the overuse of medical procedures. The overuse of PCI in the U.S. is a prime example. Patients that may need PCI were less likely to choose this invasive option when they were better informed about their care options during hospitalization.[17] A study of patients in Northern England that may need PCI concluded that there is “a mismatch between legal and ethical principles of informed consent and current practice. The variation in patients’ experiences of the current place of informed consent in service delivery represents a missed opportunity for cardiologists to work in decision-making partnerships with patients. In light of recent changes in the law [to the reasonable patient standard], a new approach to informed consent is required.”[18]

The history of legally-defined informed consent for invasive procedures has evolved from a totally physician-centered concept (before the Era of Enlightenment) in which deception of the patient was deemed necessary, to the point where the process has now become patient-centered, in principle. A brief summary of some of the court decisions pertinent to involvement of the patient points to the next step in informed consent, which we feel we have defined with our survey.[19] As early as 1914, a New York court established that an “adult in sound mind has the right to determine what shall be done with his own body.” This was reinforced in 1960 by the decision of a court in Kansas that the patient, not the physician, must make the final decision about any operation. Of course, the patient’s decision may be biased by receiving limited information from the physician. Two court decisions in 1972, one in California and the other in

Washington, D.C., determined that the patient must be informed of pertinent risks of surgery and have the alternatives revealed to him or her. In 1983, a New Jersey court ruled that if a surgeon, other than the one the patient selected, performs the surgery, then the surgeon that obtained consent, but did not perform the surgery is liable for malpractice. The surgeon performing the surgery is liable for battery. The importance of the side effects of a drug (prednisone) came to a Massachusetts court's attention in 1986 when a patient suffered serious adverse effects of this drug used after eye surgery. It seems there was controversy about whether the physician should have known about the possible side effects, and then disclosed this potential complication of the drug to the patient.

While our survey questions originated primarily from adverse experiences of patients, it is clear that court decisions have pointed the way to a new era of the patient's voice being heard in the context of shared-decision making and informed consent. That voice says to clinicians who would perform an invasive procedure, "We patients want to know more than you have been telling us." We want to know all of our choices and their risks and benefits, we want to know the risks and benefits of drugs prescribed to us and devices placed in us, we want to view decision aids when available, we want to know the skill level of the physician(s) performing our procedure, and we want to know our costs. Moreover, we want an advocate present during shared-decision making, we want full access to our medical records, we want to review consent documents at least 24 hours before signing them, and we want to know the expected outcomes of the invasive procedure to include recovery times, pain management, and infection risks.

Limitations

In order to respect the time of responders to our survey, we limited it to 10 questions applicable to an informed consent discussion in a hypothetical situation. In real clinical settings, it is likely that our "template" will need to be augmented with questions specific to the situation the patient faces. These should be designed to elicit the patient's preferences. We also recognize that some of the answers are out of the clinician's hands; for example, clinicians in the U.S. are seldom going to know the patient's out-of-pocket costs. We also recognize that clinicians may need the assistance of pharmacists in conveying the benefits, risks, and alternatives to off-label or black-box-warning drugs. Surveys like ours involving a hypothetical scenario may be limited because in a real and stressful situation a patient may simply want to trust doctors' recommendations or may be afraid to ask too many questions. In a sense, our hypothetical "reasonable patient" has become a "frightened patient" when placed in a real situation, but that does not mean that he or she does not want to know answers to the all the questions in our survey.

Selection bias is always a possibility in surveys such as ours. Survey takers were recruited from the 3 different groups to which we had access. One clear bias is that the survey platform was electronic and written in English, eliminating any potential responses from people that do not have electronic access or do not read English well enough to participate in the survey. The number of adult Americans who cannot read has been estimated at about 32 million.[20] Our results do not apply to populations outside the U.S. where there may be higher or lower trust of the healthcare delivery system, or where people are desperate to get any medical care. Despite large demographic differences in the smaller survey populations (table 1) and the different methods of recruitment in all 3 surveys, the consistency of the results across the 3 surveys suggests that the data in table 2 are representative of the majority of people living in the U.S.

Conclusions

Through two targeted surveys and a U.S. national survey, we have affirmed that a reasonable patient will want to know far more information than is generally conveyed during typical shared-decision making that leads to no more than a partly informed decision by the patient. Survey respondents wanted to know risks and benefits of all treatment options, the risks and benefits of off-label and box-warning drugs. They wished to view decision aids, know precisely who will perform the procedure, and their anticipated out-of-pocket costs. Their desire was for an advocate to be present during shared-decision making, have periodic opportunities to review their medical record, have a full day to review informed-consent documents, and to be made aware of expected outcomes and restrictions after the procedure. We expect our findings to have implications for what defines a reasonable patient standard for informed consent.

Figure 1. National intensity scores above 4.0 vs. question number for gender differences in the national survey. Responses came from 497 males and 570 females.

Figure 2. National intensity scores above 4.0 vs. question number for age differences in the national survey. Responses came from 297, 230, 343, and 197 people in the four respective age groups.

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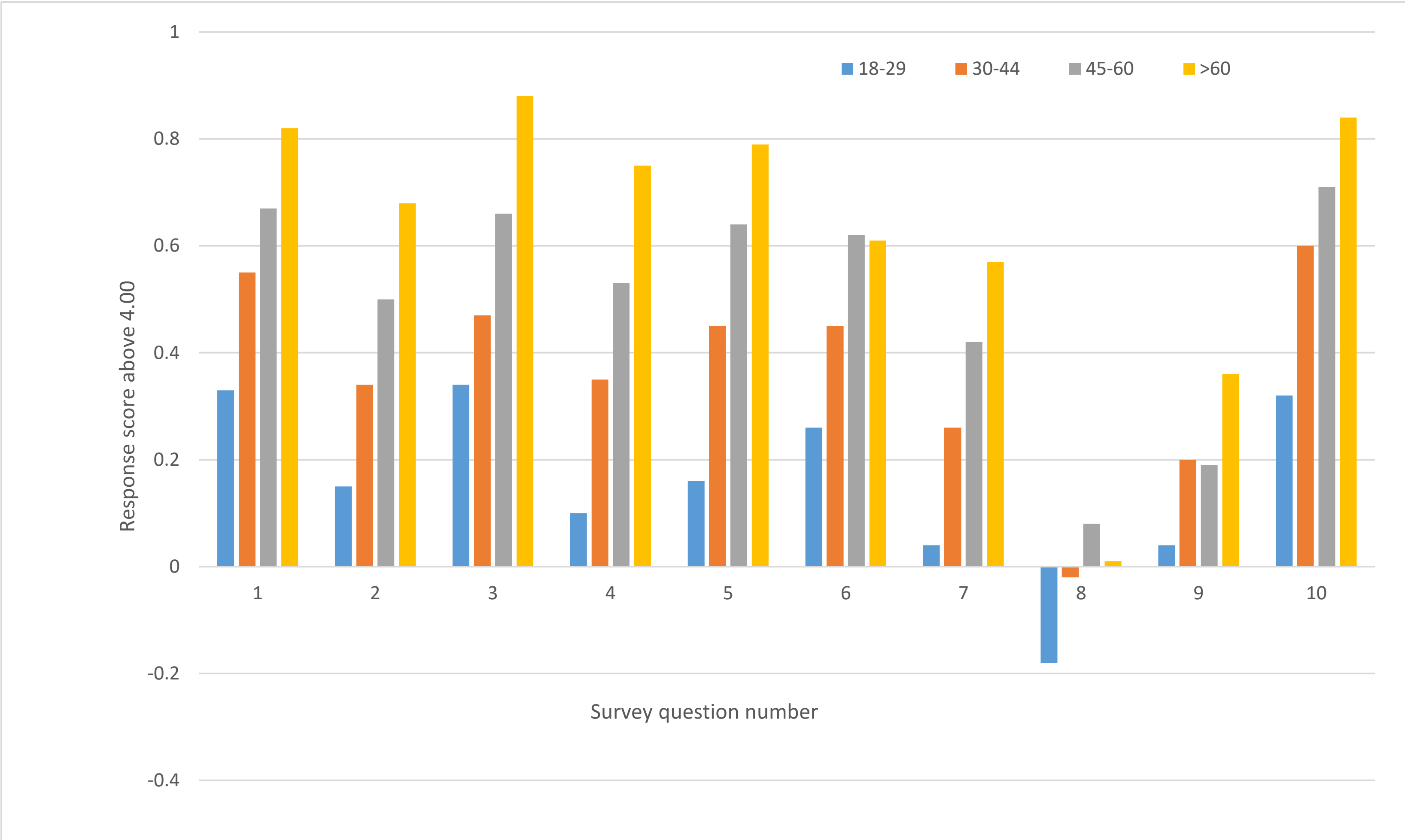
Figure 1. Effect of gender on survey responses


18-29
30-44
45-60
>60
Response score above 4.00
Survey question number
1
0.8
0.6
0.4
0.2
0
-0.2
-0.4
1
2
3
4
5
6
7
8
9
10

A Baseline for the "Reasonable Patient Standard"

Investigators: John T. James, PhD, Patient Safety America, Houston, TX (retired NASA Chief Toxicologist) and Darwin J. Eakins, MS, (retired statistical expert, University of Kansas), Survey Consultant, Lawrence, KS

Background: Recent changes in the law on informed consent in the U.K. to favor a "reasonable patient standard" over a "reasonable clinicians' standard" prompted experts on informed consent to survey the situation in the U.S. Laws defining informed consent vary from state to state. Laws in half the states favor the reasonable-patient-standard (RPS) and others favor the reasonable-clinicians-standard.[i] A debate ensued about the problems with the RPS because it is going to vary from patient to patient. As part of the debate, an opponent of the RPS stated that perhaps a baseline RPS could be formulated.[ii] It is our intent to begin to define a general baseline for the RPS. This is essential if patient-centered-care and shared-decision making are to become a reality. Texas is a RPS state.[iii] Please note that for our purposes a "reasonable person" and a "reasonable patient" are identical.

Methods: We will use the Survey Monkey Platform to capture the demographics of each survey participant, and then they will answer 10 questions related to what they would like to know when facing the possibility of an invasive procedure while hospitalized. There are two identical versions of the survey, one intended to be taken simultaneously by an audience, and the other to be taken by individuals to whom the survey-link is sent via email. The survey platform prevents individuals from taking the survey more than once from their electronic device or computer. A link to the beta-version of the survey is given here: https://www.surveymonkey.com/r/8Y5Q3MF. Those taking the survey have 5 choices to express the degree to which they would like to know an answer to the question posed in the survey. Those responses range in 5 levels from "Definitely no" to "Definitely yes."

Recruitment: Our plan is to survey up to 1,000 adults in a variety of categories. These have not been fully fixed at this point, but our target groups are as follows: students of nursing, mature and retired nurses, health professions educators, retired individuals, people with knowledge of patient safety issues, and a nationally representative group of adults. Subjects will be recruited vis email or at presentations to groups, such as nursing students (see below). Our **primary hypothesis** is that across the survey groups and for most of the questions the participants will answer either "probably yes" or "definitely yes" to the questions. Our secondary goal is to discover groups that differ significantly from the overall average. We will use t-tests to determine statistical ($P<0.05$) differences between groups for selected questions that seem worth exploring.

Results: At this point the survey has been administered to nursing students attending a lecture on informed consent at Galveston College (April 19, 2018). There were 77 respondents to the survey, which was taken early in the lecture. Later in the lecture, the results of the survey were presented to the group of students. The data were readily available in graphical and numerical form to the audience. This was done to prove-out our ability to capture data in near-real time.

Funding: The research is being funding by Patient Safety America, Houston, TX. This will be less than $1,000 for the survey platform and additional costs if we choose to survey a nationally representative group to which we purchase access.

[i] https://jamanetwork.com/journals/jama/fullarticle/2516469

[ii] https://jamanetwork.com/journals/jama/article-abstract/2547748?redirect=true

[iii] CIVIL PRACTICE AND REMEDIES CODE
TITLE 4. LIABILITY IN TORT
CHAPTER 74. MEDICAL LIABILITY
SUBCHAPTER C. INFORMED CONSENT
Sec. 74.101. THEORY OF RECOVERY. In a suit against a physician or health care provider involving a health care liability claim that is based on the failure of the physician or health care provider to disclose or adequately disclose the risks and hazards involved in the medical care or surgical procedure rendered by the physician or health care provider, the only theory on which recovery may be obtained is that of negligence in failing to disclose the risks or hazards that could have influenced a reasonable person in making a decision to give or withhold consent.

Reasonable Patient Care - Phone

You are hospitalized in a large, urban, teaching hospital after being brought into its emergency room last night. The condition that brought you to the ER has been stabilized, but additional procedures may be necessary. The following 10 questions determine what you would like to know as a reasonable patient. The survey should take no more than 5 minutes. There are only sixteen (16) items.

Reasonable Patient Care - Phone

Age

Page 1 of 16

1. Age

- ◯ Under 18
- ◯ 18-24
- ◯ 25-34
- ◯ 35-44
- ◯ 45-54
- ◯ 55-64
- ◯ 65+

Reasonable Patient Care - Phone

Gender

Page 2 of 16

2. Gender

- ◯ Male
- ◯ Female

Reasonable Patient Care - Phone

Education

Page 3 of 16

3. Education

- ◯ HS Grad
- ◯ Advance Degree
- ◯ College Grad

Reasonable Patient Care - Phone

Race/Ethnicity

Page 4 of 16

4. Race/Ethnicity

- ◯ White or Caucasian
- ◯ American Indian or Alaska Native
- ◯ Black or African American
- ◯ Native Hawaiian or other Pacific Islander
- ◯ Hispanic or Latino
- ◯ Another race
- ◯ Asian or Asian American

Reasonable Patient Care - Phone

Worked in Hospital

Page 5 of 16

5. Have you worked in a hospital?

- ◯ Yes
- ◯ No
- ◯ If Yes, your job was:

Reasonable Patient Care - Phone

Alternatives/Risks/Benefits

Page 6 of 16

6. Would you like to know all your treatment choices, including alternatives and risks and benefits of each choice for a patient like you. Your choices may include invasive procedures (surgery, endoscopic procedures, insertion of a medical device), non-invasive treatments, and what happens if you do nothing?

- ◯ Definitely no
- ◯ Probably no
- ◯ Neutral
- ◯ Probably yes
- ◯ Definitely yes

Reasonable Patient Care - Phone

Drugs

Page 7 of 16

7. Drugs that have not been approved by the Food and Drug Administration for your condition are off-label for you. Drugs prescribed off-label are about twice as likely to cause serious side-effects as drugs prescribed on-label. Would you like to know if any drugs prescribed to you are off-label, and what their side effects may be?

- ◯ Definitely no
- ◯ Probably no
- ◯ Neutral
- ◯ Probably yes
- ◯ Definitely yes

Reasonable Patient Care - Phone

Drugs Assigned “Black Box” Warning

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8. Drugs assigned a “black box” warning by the FDA pose an especially serious risk of harm. If you are prescribed such a drug, would you want to know the reasons for the black box warning and if there are alternatives before you take it?

- ◯ Definitely no
- ◯ Probably no
- ◯ Neutral
- ◯ Probably yes
- ◯ Definitely yes

Reasonable Patient Care - Phone

Decisions Aids

Page 9 of 16

9. Decision aids are created to assist patients with complex medical decisions and to help them understand the risks and benefits of treatment options. If there is a decision-aid available for your illness, would you like to review it?

- Definitely no
- Probably no
- Neutral
- Probably yes
- Definitely yes

Reasonable Patient Care - Phone

Considering Invasive Procedure

Page 10 of 16

10. If you are considering an invasive procedure, would you like to know who will be performing it, their skill level, and how trainee doctors, if any, will be involved?

- Definitely no
- Probably no
- Neutral
- Probably yes
- Definitely yes

Reasonable Patient Care - Phone

Out-Of-Pocket Costs

Page 11 of 16

11. Assuming you have decided on a procedure or treatment, would you like to know what your total, out-of-pocket costs will be?

- Definitely no
- Probably no
- Neutral
- Probably yes
- Definitely yes

Reasonable Patient Care - Phone

Family Member as Advicate

Page 12 of 16

12. You have a trusted family member that is willing to act as your advocate. Would you like for that person to be present during shared-decision-making about your medical care?

- Definitely no
- Probably no
- Neutral
- Probably yes
- Definitely yes

Reasonable Patient Care - Phone

Make Entries In Medical Records

Page 13 of 16

13. If you are well enough, would you like to be offered a chance to review and make entries in your medical records each day while you are hospitalized?

- Definitely no
- Probably no
- Neutral
- Probably yes
- Definitely yes

Reasonable Patient Care - Phone

Documents Permitting Invasive Procedures

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14. Before signing any documents permitting invasive, non-emergency procedures would you like to review these at least one full day in advance of the procedure?

- Definitely no
- Probably no
- Neutral
- Probably yes
- Definitely yes

Reasonable Patient Care - Phone

Expected Difficulties /Recovery Times/Restrictions

Page 15 of 16

15. If you are considering an invasive procedure, would you like to know your expected difficulties, recovery times, pain management options, and restrictions after the procedure while hospitalized and after discharge from the hospital? This includes the risk of infection from the invasive procedure.

- ◯ Definitely no
- ◯ Probably no
- ◯ Neutral
- ◯ Probably yes
- ◯ Definitely yes

Reasonable Patient Care - Phone

Other Comments

Page 16 of 16

16. What else would you like to know as a reasonable patient?

Reasonable Patient 3

Reasonable Patient Care Survey

You are hospitalized in a large, urban, teaching hospital after being brought into its emergency room last night. The condition that brought you to the ER has been stabilized, but additional procedures may be necessary. The following 10 questions determine what you would like to know as a reasonable patient. The survey should take no more than 5 minutes.

* 1. Would you like to know all your treatment choices, including alternatives and risks and benefits of each choice for a patient like you. Your choices may include invasive procedures (surgery, endoscopic procedures, insertion of a medical device), non-invasive treatments, and what happens if you do nothing?

1=definitely no	2=probably no	3=neutral	4=probably yes	5=definitely yes
○	○	○	○	○

* 2. Drugs that have not been approved by the Food and Drug Administration for your condition are off-label for you. Drugs prescribed off-label are about twice as likely to cause serious side-effects as drugs prescribed on-label. Would you like to know if any drugs prescribed to you are off-label, and what their side effects may be?

1-definitely no	2-probably no	3-neutral	4-probably yes	5-definitely yes
○	○	○	○	○

* 3. Drugs assigned a “black box” warning by the FDA pose an especially serious risk of harm. If you are prescribed such a drug, would you want to know the reasons for the black box warning and if there are alternatives before you take it?

1-definitely no	2-probably no	3-neutral	4-probably yes	5-definitely yes
○	○	○	○	○

* 4. Decision aids are created to assist patients with complex medical decisions and to help them understand the risks and benefits of treatment options. If there is a decision-aid available for your illness, would you like to review it?

1-definitely no	2-probably no	3-neutral	4-probably yes	5-definitely yes
○	○	○	○	○

* 5. If you are considering an invasive procedure, would you like to know who will be performing it, their skill level, and how trainee doctors, if any, will be involved?

1-definitely no	2-probably no	3-neutral	4-probably yes	5-definitely yes
○	○	○	○	○

* 6. Assuming you have decided on a procedure or treatment, would you like to know what your total, out-of-pocket costs will be?

1-definitely no	2-probably no	3-neutral	4-probably yes	5-definitely yes
○	○	○	○	○

* 7. You have a trusted family member that is willing to act as your advocate. Would you like for that person to be present during shared-decision-making about your medical care?

1-definitely no	2-probably no	3-neutral	4-probably yes	5-definitely yes
○	○	○	○	○

* 8. If you are well enough, would you like to be offered a chance to review and make entries in your medical records each day while you are hospitalized?

1-definitely no	2-probably no	3-neutral	4-probably yes	5-definitely yes
○	○	○	○	○

* 9. Before signing any documents permitting invasive, non-emergency procedures would you like to review these at least one full day in advance of the procedure?

1-definitely no	2-probably no	3-neutral	4-probably yes	5-definitely yes
○	○	○	○	○

* 10. If you are considering an invasive procedure, would you like to know your expected difficulties, recovery times, pain management, and restrictions after the procedure while hospitalized and after discharge from the hospital? This includes the risk of infection from the invasive procedure.

1-definitely no	2-probably no	3-neutral	4-probably yes	5-definitely yes
○	○	○	○	○

Table 1. Comparative demographics of targeted groups

Demographic measure	Student Nurses (n = 77)	HPESS Community (n = 63)	p-Value
Under 35 years of age	76.7%	3.2%	0.0000
Female	77.9%	69.8%	0.2755
High school graduate	33.8%	1.6%	0.0000
College graduate	64.9%	4.8%	0.0000
Advanced degree	1.3%	90.5%	0.0000
White or Caucasian	50.6%	84.1%	0.0000
Black or African American	15.6%	3.2%	0.0151
Hispanic or Latino	26.0%	1.6%	0.0001
Asian	3.9%	6.3%	0.5161
Have worked in a hospital	35.1%	85.7%	0.0000

Under 35 years of age

```
. prtesti 77 .767 63 .032

Two-sample test of proportions                    x: Number of obs =        77
                                                  y: Number of obs =        63
------------------------------------------------------------------------------
    Variable |       Mean   Std. Err.      z    P>|z|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
           x |       .767   .0481759                      .6725769    .8614231
           y |       .032   .0221739                     -.0114601    .0754601
-------------+----------------------------------------------------------------
        diff |       .735    .053034                      .6310553    .8389447
             |  under Ho:    .084248     8.72   0.000
------------------------------------------------------------------------------
        diff = prop(x) - prop(y)                                  z =   8.7242
    Ho: diff = 0

    Ha: diff < 0                 Ha: diff != 0                 Ha: diff > 0
 Pr(Z < z) = 1.0000         Pr(|Z| > |z|) = 0.0000          Pr(Z > z) = 0.0000

.
```

Female.

```
. prtesti 77 .779 63 .698

Two-sample test of proportions                    x: Number of obs =        77
                                                  y: Number of obs =        63
------------------------------------------------------------------------------
    Variable |       Mean   Std. Err.      z    P>|z|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
           x |       .779   .0472846                      .6863239    .8716761
           y |       .698   .0578443                      .5846272    .8113728
-------------+----------------------------------------------------------------
        diff |       .081   .0747114                     -.0654317    .2274317
             |  under Ho:   .0742776     1.09   0.275
------------------------------------------------------------------------------
        diff = prop(x) - prop(y)                                  z =   1.0905
    Ho: diff = 0

    Ha: diff < 0                 Ha: diff != 0                 Ha: diff > 0
 Pr(Z < z) = 0.8623         Pr(|Z| > |z|) = 0.2755          Pr(Z > z) = 0.1377

.
.
```

High school graduate

```
. prtesti 77 .338 63 .016

Two-sample test of proportions                    x: Number of obs =       77
                                                  y: Number of obs =       63
------------------------------------------------------------------------------
    Variable |       Mean   Std. Err.      z    P>|z|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
           x |       .338   .0539066                       .232345     .443655
           y |       .016   .0158084                     -.0149838    .0469838
-------------+----------------------------------------------------------------
        diff |       .322   .0561767                      .2118956    .4321044
             |  under Ho:   .0670578     4.80   0.000
------------------------------------------------------------------------------
        diff = prop(x) - prop(y)                                  z =   4.8018
    Ho: diff = 0

    Ha: diff < 0                 Ha: diff != 0                 Ha: diff > 0
 Pr(Z < z) = 1.0000         Pr(|Z| > |z|) = 0.0000          Pr(Z > z) = 0.0000

.
.
```

. College graduate

```
. prtesti 77 .649 63 .048

Two-sample test of proportions                    x: Number of obs =       77
                                                  y: Number of obs =       63
------------------------------------------------------------------------------
    Variable |       Mean   Std. Err.      z    P>|z|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
           x |       .649   .0543914                      .5423947    .7556053
           y |       .048    .026932                     -.0047858    .1007858
-------------+----------------------------------------------------------------
        diff |       .601    .060694                      .4820419    .7199581
             |  under Ho:   .0823973     7.29   0.000
------------------------------------------------------------------------------
        diff = prop(x) - prop(y)                                  z =   7.2939
    Ho: diff = 0

    Ha: diff < 0                 Ha: diff != 0                 Ha: diff > 0
 Pr(Z < z) = 1.0000         Pr(|Z| > |z|) = 0.0000          Pr(Z > z) = 0.0000

.
.
```

. Advanced degree

```
. prtesti 77 .013 63 .905

Two-sample test of proportions                    x: Number of obs =       77
                                                  y: Number of obs =       63
------------------------------------------------------------------------------
    Variable |       Mean   Std. Err.      z    P>|z|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
           x |       .013   .0129088                     -.0123007    .0383007
           y |       .905   .0369416                      .8325958    .9774042
-------------+----------------------------------------------------------------
        diff |      -.892   .0391321                     -.9686974   -.8153026
             |  under Ho:   .0836872   -10.66   0.000
------------------------------------------------------------------------------
        diff = prop(x) - prop(y)                                  z = -10.6587
    Ho: diff = 0

    Ha: diff < 0                 Ha: diff != 0                 Ha: diff > 0
 Pr(Z < z) = 0.0000         Pr(|Z| > |z|) = 0.0000          Pr(Z > z) = 1.0000

.
.
.
.
```

. **White or Caucasian**

```
. . prtesti 77 .506 63 .841

Two-sample test of proportions                     x: Number of obs =        77
                                                   y: Number of obs =        63
------------------------------------------------------------------------------
    Variable |       Mean   Std. Err.      z    P>|z|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
           x |       .506   .0569762                      .3943287    .6176713
           y |       .841   .0460709                      .7507028    .9312972
-------------+----------------------------------------------------------------
        diff |      -.335   .0732722                     -.4786108   -.1913892
             |  under Ho:   .0806592    -4.15   0.000
------------------------------------------------------------------------------
        diff = prop(x) - prop(y)                                  z =  -4.1533
    Ho: diff = 0

    Ha: diff < 0                 Ha: diff != 0                 Ha: diff > 0
 Pr(Z < z) = 0.0000         Pr(|Z| > |z|) = 0.0000          Pr(Z > z) = 1.0000

.
```

. . **Black or African American**

```
. prtesti 77 .156 63 .032

Two-sample test of proportions                     x: Number of obs =        77
                                                   y: Number of obs =        63
------------------------------------------------------------------------------
    Variable |       Mean   Std. Err.      z    P>|z|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
           x |       .156   .0413512                      .0749531    .2370469
           y |       .032   .0221739                     -.0114601    .0754601
-------------+----------------------------------------------------------------
        diff |       .124   .0469213                       .032036     .215964
             |  under Ho:     .05101     2.43   0.015
------------------------------------------------------------------------------
        diff = prop(x) - prop(y)                                  z =   2.4309
    Ho: diff = 0

    Ha: diff < 0                 Ha: diff != 0                 Ha: diff > 0
 Pr(Z < z) = 0.9925         Pr(|Z| > |z|) = 0.0151          Pr(Z > z) = 0.0075

.
```

. **Hispanic or Latino**

```
. prtesti 77 .260 63 .016

Two-sample test of proportions                     x: Number of obs =        77
                                                   y: Number of obs =        63
------------------------------------------------------------------------------
    Variable |       Mean   Std. Err.      z    P>|z|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
           x |        .26    .049987                      .1620273    .3579727
           y |       .016   .0158084                     -.0149838    .0469838
-------------+----------------------------------------------------------------
        diff |       .244   .0524272                      .1412447    .3467553
             |  under Ho:   .0606934     4.02   0.000
------------------------------------------------------------------------------
        diff = prop(x) - prop(y)                                  z =   4.0202
    Ho: diff = 0

    Ha: diff < 0                 Ha: diff != 0                 Ha: diff > 0
 Pr(Z < z) = 1.0000         Pr(|Z| > |z|) = 0.0001          Pr(Z > z) = 0.0000

.
.
. .
```

.
. **Asian**
```
. prtesti 77 .039 63 .063

Two-sample test of proportions                    x: Number of obs =        77
                                                  y: Number of obs =        63
------------------------------------------------------------------------------
    Variable |       Mean   Std. Err.      z    P>|z|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
           x |       .039   .0220622                     -.0042411    .0822411
           y |       .063   .0306105                      .0030046    .1229954
-------------+----------------------------------------------------------------
        diff |      -.024   .0377325                     -.0979543    .0499543
             |  under Ho:   .0369548    -0.65   0.516
------------------------------------------------------------------------------
        diff = prop(x) - prop(y)                                  z =  -0.6494
    Ho: diff = 0

    Ha: diff < 0                 Ha: diff != 0                 Ha: diff > 0
 Pr(Z < z) = 0.2580         Pr(|Z| > |z|) = 0.5161          Pr(Z > z) = 0.7420
```
.
.
. **Have worked in a hospital**
```
. prtesti 77 .351 63 .857

Two-sample test of proportions                    x: Number of obs =        77
                                                  y: Number of obs =        63
------------------------------------------------------------------------------
    Variable |       Mean   Std. Err.      z    P>|z|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
           x |       .351   .0543914                      .2443947    .4576053
           y |       .857    .044105                      .7705557    .9434443
-------------+----------------------------------------------------------------
        diff |      -.506   .0700263                      -.643249    -.368751
             |  under Ho:   .0838824    -6.03   0.000
------------------------------------------------------------------------------
        diff = prop(x) - prop(y)                                  z =  -6.0323
    Ho: diff = 0

    Ha: diff < 0                 Ha: diff != 0                 Ha: diff > 0
 Pr(Z < z) = 0.0000         Pr(|Z| > |z|) = 0.0000          Pr(Z > z) = 1.0000
```

Nurse-Student Statistics Report

Summary

- Question – For each of the questions, 1-10, is there a difference in the average response by age?

  Answer – NO, there are no significant differences among age groups in their responses to any of the 10 questions.

- Question – For each of the questions, 1-10, is there a difference in the average response by gender?

  Answer – NO, there are no significant differences between the genders in their responses to any of the 10 questions.

- Question – For each of the questions, 1-10, is there a difference in the average response by level of education

  Answer – NO, there are no significant differences among the education levels in their responses to any of the 10 questions.

- Question: For each of the questions, is there a difference in the average response based upon racer or ethnicity

  Answer – YES, for questions 1, 5, and 6,

```
. dunntest iq1, by(ieth) ma(bh) wrap
K-Wallis probability =      0.0038

                 Dunn's Pairwise Comparison of iq1 by ieth
                            (Benjamini-Hochberg)
Col Mean-|
Row Mean |       1          2          3          4
---------+--------------------------------------------
       2 |   3.061273
         |     0.0110
         |
       3 |  -0.085671  -1.871072
         |     0.5176     0.0613
         |
       4 |  -0.166771  -2.646096   0.000000
         |     0.5422     0.0204     0.5000
         |
       7 |   2.553091  -0.755791   1.387066   2.097047
         |     0.0178     0.3213     0.1379     0.0450

False Discovery Rate =   0.05
Reject Ho if p = P(Z <= |z|) <= FDR/2 with stopping rule

. dunntest iq5, by(ieth) ma(bh) wrap
K-Wallis probability =      0.0001
Dunn's Pairwise Comparison of iq5 by ieth
                            (Benjamini-Hochberg)
Col Mean-|
Row Mean |      1          2          3          4
---------+--------------------------------------------
       2 |   1.713447
         |     0.0866
         |
       3 |   2.264929   0.858920
         |     0.0294     0.2440
         |
       4 |  -0.476526  -1.710491  -2.265841
         |     0.3521     0.0726     0.0391
         |
       7 |   4.334614   1.465931   0.247897   3.691637
```

```
         |     0.0001     0.1019     0.4021     0.0006

False Discovery Rate =   0.05
Reject Ho if p = P(Z <= |z|) <= FDR/2 with stopping rule

. dunntest iq6, by(ieth) ma(bh) wrap
Kwallis probability =     0.0245

                 Dunn's Pairwise Comparison of iq6 by ieth
                            (Benjamini-Hochberg)
Col Mean-|
Row Mean |        1          2          3          4
---------+--------------------------------------------
       2 |   0.459251
         |     0.3589
         |
       3 |  -0.624727  -0.785168
         |     0.3326     0.3088
         |
       4 |  -1.215526  -1.110396   0.000000
         |     0.2242     0.2224     0.5000
         |
       7 |   2.934536   1.546239   2.055206   3.107180
         |     0.0084     0.1526     0.0664     0.0094

False Discovery Rate =   0.05
Reject Ho if p = P(Z <= |z|) <= FDR/2 with stopping rule
```

- Question – For each of the questions, 1-10, is there a difference in the average response if respondent is or was a hospital worker?

  Answer – NO, there are no significant differences among groups, based upon hospital work experience, in their responses to any of the 10 questions.

Statistics

- Question – For each of the questions, 1-10, is there a difference in the average response by age among those who identified their age group?

```
. dunntest iq1, by(iage) ma(bh) wrap

Warning: by() values are unlabeled, option nolabel implicit


Kruskal-Wallis equality-of-populations rank test

  +-----------------------+
  | iage | Obs | Rank Sum |
  |------+-----+----------|
  |    3 |   2 |    67.00 |
  |    4 |  12 |   402.00 |
  |    5 |  14 |   405.50 |
  |    6 |  25 |   806.50 |
  |    7 |  10 |   335.00 |
  +-----------------------+

chi-squared =     0.550 with 4 d.f.
probability =     0.9685

chi-squared with ties =     4.037 with 4 d.f.
probability =     0.4010


                 Dunn's Pairwise Comparison of iq1 by iage
                            (Benjamini-Hochberg)
Col Mean-|
Row Mean |            3             4             5             6
---------+--------------------------------------------
       4 |   0.000000
```

```
         |     0.6250
         |
       5 |   0.887093   1.704583
         |     0.4688     0.4414
         |
       6 |   0.249476   0.522019  -1.459674
         |     0.5736     0.6017     0.2406
         |
       7 |   0.000000   0.000000  -1.619603  -0.489962
         |     0.5556     0.5000     0.2633     0.5201

False Discovery Rate =   0.05
Reject Ho if p = P(Z <= |z|) <= FDR/2 with stopping rule

.
. dunntest iq2, by(iage) ma(bh) wrap

Warning: by() values are unlabeled, option nolabel implicit


Kruskal-Wallis equality-of-populations rank test

  +-----------------------+
  | iage | Obs | Rank Sum |
  |------+-----+----------|
  |    3 |   2 |    57.00 |
  |    4 |  12 |   320.50 |
  |    5 |  14 |   396.50 |
  |    6 |  25 |   857.50 |
  |    7 |  10 |   384.50 |
  +-----------------------+

chi-squared =     3.269 with 4 d.f.
probability =     0.5139

chi-squared with ties =     4.720 with 4 d.f.
probability =     0.3173


                 Dunn's Pairwise Comparison of iq2 by iage
                            (Benjamini-Hochberg)
Col Mean-|
Row Mean |            3            4            5            6
---------+--------------------------------------------
       4 |   0.153782
         |     0.4877
         |
       5 |   0.015486  -0.268804
         |     0.4938     0.4926
         |
       6 |  -0.517415  -1.417114  -1.174105
         |     0.4320     0.2607     0.3004
         |
       7 |  -0.842084  -1.797699  -1.603668  -0.727096
         |     0.3997     0.3611     0.2720     0.3893

False Discovery Rate =   0.05
Reject Ho if p = P(Z <= |z|) <= FDR/2 with stopping rule

.
. dunntest iq3, by(iage) ma(bh) wrap

Warning: by() values are unlabeled, option nolabel implicit


Kruskal-Wallis equality-of-populations rank test

  +-----------------------+
  | iage | Obs | Rank Sum |
  |------+-----+----------|
  |    3 |   2 |    20.00 |
  |    4 |  12 |   428.00 |
  |    5 |  14 |   405.50 |
  |    6 |  25 |   806.00 |
  |    7 |  10 |   356.50 |
  +-----------------------+

chi-squared =     4.146 with 4 d.f.
probability =     0.3866
```

```
chi-squared with ties =     8.316 with 4 d.f.
probability =     0.0807


                 Dunn's Pairwise Comparison of iq3 by iage
                            (Benjamini-Hochberg)
Col Mean-|
Row Mean |             3             4             5             6
---------+------------------------------------------------------
       4 |  -2.596467
         |     0.0471
         |
       5 |  -1.938328   1.316342
         |     0.0657     0.1881
         |
       6 |  -2.338350   0.753882  -0.758192
         |     0.0323     0.2818     0.3202
         |
       7 |  -2.558488   0.003007  -1.247607  -0.704145
         |     0.0263     0.4988     0.1768     0.2674

False Discovery Rate =   0.05
Reject Ho if p = P(Z <= |z|) <= FDR/2 with stopping rule

.
. dunntest iq4, by(iage) ma(bh) wrap

Warning: by() values are unlabeled, option nolabel implicit


Kruskal-Wallis equality-of-populations rank test

  +-----------------------+
  | iage | Obs | Rank Sum |
  |------+-----+----------|
  |    3 |   2 |    52.50 |
  |    4 |  12 |   305.00 |
  |    5 |  14 |   419.50 |
  |    6 |  25 |   854.50 |
  |    7 |  10 |   384.50 |
  +-----------------------+

chi-squared =     3.509 with 4 d.f.
probability =     0.4765

chi-squared with ties =     5.484 with 4 d.f.
probability =     0.2411


                 Dunn's Pairwise Comparison of iq4 by iage
                            (Benjamini-Hochberg)
Col Mean-|
Row Mean |             3             4             5             6
---------+------------------------------------------------------
       4 |   0.074414
         |     0.4703
         |
       5 |  -0.335113  -0.788405
         |     0.4097     0.3587
         |
       6 |  -0.735992  -1.701869  -0.861331
         |     0.2886     0.2219     0.3891
         |
       7 |  -1.074190  -2.076021  -1.397796  -0.778325
         |     0.3534     0.1895     0.2703     0.3117

False Discovery Rate =   0.05
Reject Ho if p = P(Z <= |z|) <= FDR/2 with stopping rule

.
. dunntest iq5, by(iage) ma(bh) wrap

Warning: by() values are unlabeled, option nolabel implicit


Kruskal-Wallis equality-of-populations rank test

  +-----------------------+
```

```
  | iage | Obs | Rank Sum |
  |------+-----+----------|
  |    3 |   2 |    39.50 |
  |    4 |  12 |   326.00 |
  |    5 |  14 |   419.50 |
  |    6 |  25 |   861.00 |
  |    7 |  10 |   370.00 |
  +------------------------+

chi-squared =     3.087 with 4 d.f.
probability =     0.5433

chi-squared with ties =     7.650 with 4 d.f.
probability =     0.1053


                 Dunn's Pairwise Comparison of iq5 by iage
                            (Benjamini-Hochberg)
Col Mean-|
Row Mean |          3           4           5           6
---------+--------------------------------------------
       4 |  -0.833898
         |     0.2527
         |
       5 |  -1.160351   -0.610687
         |     0.2049      0.3008
         |
       6 |  -1.716672   -1.778507   -1.151401
         |     0.1075      0.1255      0.1783
         |
       7 |  -1.912387   -1.972161   -1.459248   -0.587541
         |     0.1396      0.2430      0.1445      0.2784

False Discovery Rate =   0.05
Reject Ho if p = P(Z <= |z|) <= FDR/2 with stopping rule

.
. dunntest iq6, by(iage) ma(bh) wrap

Warning: by() values are unlabeled, option nolabel implicit


Kruskal-Wallis equality-of-populations rank test

  +------------------------+
  | iage | Obs | Rank Sum |
  |------+-----+----------|
  |    3 |   2 |    83.00 |
  |    4 |  12 |   402.50 |
  |    5 |  14 |   380.00 |
  |    6 |  25 |   742.50 |
  |    7 |   9 |   345.00 |
  +------------------------+

chi-squared =     3.125 with 4 d.f.
probability =     0.5372

chi-squared with ties =     4.632 with 4 d.f.
probability =     0.3272


                 Dunn's Pairwise Comparison of iq6 by iage
                            (Benjamini-Hochberg)
Col Mean-|
Row Mean |          3           4           5           6
---------+--------------------------------------------
       4 |   0.703165
         |     0.3012
         |
       5 |   1.281683    1.097642
         |     0.3333      0.3405
         |
       6 |   1.083624    0.738198   -0.516952
         |     0.2785      0.3837      0.3362
         |
       7 |   0.273361   -0.733301   -1.767517   -1.498732
         |     0.3923      0.3310      0.3857      0.3349

False Discovery Rate =   0.05
```

```
Reject Ho if p = P(Z <= |z|) <= FDR/2 with stopping rule

.
. dunntest iq7, by(iage) ma(bh) wrap

Warning: by() values are unlabeled, option nolabel implicit


Kruskal-Wallis equality-of-populations rank test

  +-----------------------+
  | iage | Obs | Rank Sum |
  |------+-----+----------|
  |    3 |   2 |    18.00 |
  |    4 |  12 |   342.00 |
  |    5 |  14 |   476.00 |
  |    6 |  25 |   827.00 |
  |    7 |  10 |   353.00 |
  +-----------------------+

chi-squared =     4.164 with 4 d.f.
probability =     0.3843

chi-squared with ties =     5.665 with 4 d.f.
probability =     0.2256


                 Dunn's Pairwise Comparison of iq7 by iage
                            (Benjamini-Hochberg)
Col Mean-|
Row Mean |            3            4            5            6
---------+--------------------------------------------
       4 |  -1.624636
         |     0.1303
         |
       5 |  -2.104451  -0.889632
         |     0.0883     0.3114
         |
       6 |  -2.085160  -0.829861   0.175376
         |     0.0618     0.2904     0.4304
         |
       7 |  -2.160529  -1.010574  -0.199794  -0.377545
         |     0.1537     0.3122     0.4676     0.4411

False Discovery Rate =   0.05
Reject Ho if p = P(Z <= |z|) <= FDR/2 with stopping rule

.
. dunntest iq8, by(iage) ma(bh) wrap

Warning: by() values are unlabeled, option nolabel implicit


Kruskal-Wallis equality-of-populations rank test

  +-----------------------+
  | iage | Obs | Rank Sum |
  |------+-----+----------|
  |    3 |   2 |    62.00 |
  |    4 |  12 |   319.50 |
  |    5 |  14 |   441.00 |
  |    6 |  25 |   806.50 |
  |    7 |  10 |   387.00 |
  +-----------------------+

chi-squared =     2.389 with 4 d.f.
probability =     0.6646

chi-squared with ties =     2.751 with 4 d.f.
probability =     0.6003


                 Dunn's Pairwise Comparison of iq8 by iage
                            (Benjamini-Hochberg)
Col Mean-|
Row Mean |            3            4            5            6
---------+--------------------------------------------
       4 |   0.335334
         |     0.5267
```

```
         |
       5 |  -0.038721  -0.725439
         |     0.4846     0.4682
         |
       6 |  -0.100377  -0.939317  -0.133283
         |     0.5111     0.4345     0.5587
         |
       7 |  -0.581934  -1.650916  -1.018004  -1.007582
         |     0.4672     0.4938     0.7717     0.5228

False Discovery Rate =   0.05
Reject Ho if p = P(Z <= |z|) <= FDR/2 with stopping rule

.
. dunntest iq9, by(iage) ma(bh) wrap

Warning: by() values are unlabeled, option nolabel implicit


Kruskal-Wallis equality-of-populations rank test

  +------------------------+
  | iage | Obs | Rank Sum |
  |------+-----+----------|
  |    3 |   2 |    58.00 |
  |    4 |  12 |   289.50 |
  |    5 |  14 |   451.00 |
  |    6 |  25 |   843.50 |
  |    7 |  10 |   374.00 |
  +------------------------+

chi-squared =     3.363 with 4 d.f.
probability =     0.4989

chi-squared with ties =     4.008 with 4 d.f.
probability =     0.4049


                 Dunn's Pairwise Comparison of iq9 by iage
                            (Benjamini-Hochberg)
Col Mean-|
Row Mean |             3             4             5             6
---------+--------------------------------------------
       4 |   0.380111
         |     0.4399
         |
       5 |  -0.253220  -1.224538
         |     0.4000     0.3679
         |
       6 |  -0.384128  -1.630434  -0.272188
         |     0.5006     0.2575     0.4364
         |
       7 |  -0.645800  -1.846324  -0.745866  -0.582520
         |     0.5184     0.3242     0.5697     0.4668

False Discovery Rate =   0.05
Reject Ho if p = P(Z <= |z|) <= FDR/2 with stopping rule

.
. dunntest iq10, by(iage) ma(bh) wrap

Warning: by() values are unlabeled, option nolabel implicit


Kruskal-Wallis equality-of-populations rank test

  +------------------------+
  | iage | Obs | Rank Sum |
  |------+-----+----------|
  |    3 |   2 |    70.00 |
  |    4 |  12 |   389.00 |
  |    5 |  14 |   394.00 |
  |    6 |  25 |   813.00 |
  |    7 |  10 |   350.00 |
  +------------------------+

chi-squared =     0.968 with 4 d.f.
probability =     0.9147
```

```
chi-squared with ties =     3.737 with 4 d.f.
probability =     0.4428


                 Dunn's Pairwise Comparison of iq10 by iage
                            (Benjamini-Hochberg)
Col Mean-|
Row Mean |            3             4             5             6
---------+-------------------------------------------------
       4 |   0.362629
         |     0.5121
         |
       5 |   0.972529   1.164725
         |     0.4135     0.4069
         |
       6 |   0.361822  -0.031546  -1.405830
         |     0.4484     0.5416     0.3994
         |
       7 |   0.000000  -0.646845  -1.775587  -0.710605
         |     0.5000     0.4314     0.3790     0.4773

False Discovery Rate =   0.05
Reject Ho if p = P(Z <= |z|) <= FDR/2 with stopping rule
```

- Question – For each of the questions, 1-10, is there a difference in the average response by gender?

```
. dunntest iq1, by(igender)

Warning: by() values are unlabeled, option nolabel implicit


Kruskal-Wallis equality-of-populations rank test

  +--------------------------+
  | igender | Obs | Rank Sum |
  |---------+-----+----------|
  |       1 |  19 |   636.50 |
  |       2 |  44 |  1379.50 |
  +--------------------------+

chi-squared =     0.182 with 1 d.f.
probability =     0.6695

chi-squared with ties =     1.338 with 1 d.f.
probability =     0.2474


                Dunn's Pairwise Comparison of iq1 by igender
                              (No adjustment)
Col Mean-|
Row Mean |            1
---------+-----------
       2 |   1.156689
         |     0.1237

alpha =   0.05
Reject Ho if p = P(Z <= |z|) <= alpha/2

.
. dunntest iq2, by(igender)

Warning: by() values are unlabeled, option nolabel implicit


Kruskal-Wallis equality-of-populations rank test

  +--------------------------+
  | igender | Obs | Rank Sum |
  |---------+-----+----------|
  |       1 |  19 |   565.00 |
  |       2 |  44 |  1451.00 |
  +--------------------------+

chi-squared =     0.415 with 1 d.f.
probability =     0.5196
```

```
chi-squared with ties =     0.599 with 1 d.f.
probability =     0.4390


                Dunn's Pairwise Comparison of iq2 by igender
                              (No adjustment)
Col Mean-|
Row Mean |            1
---------+-----------
       2 |  -0.773826
         |     0.2195

alpha =   0.05
Reject Ho if p = P(Z <= |z|) <= alpha/2

.
. dunntest iq3, by(igender)

Warning: by() values are unlabeled, option nolabel implicit


Kruskal-Wallis equality-of-populations rank test

  +---------------------------+
  | igender | Obs | Rank Sum |
  |---------+-----+----------|
  |       1 |  19 |   629.00 |
  |       2 |  44 |  1387.00 |
  +---------------------------+

chi-squared =     0.099 with 1 d.f.
probability =     0.7531

chi-squared with ties =     0.198 with 1 d.f.
probability =     0.6560


                Dunn's Pairwise Comparison of iq3 by igender
                              (No adjustment)
Col Mean-|
Row Mean |            1
---------+-----------
       2 |   0.445408
         |     0.3280

alpha =   0.05
Reject Ho if p = P(Z <= |z|) <= alpha/2

.
. dunntest iq4, by(igender)

Warning: by() values are unlabeled, option nolabel implicit


Kruskal-Wallis equality-of-populations rank test

  +---------------------------+
  | igender | Obs | Rank Sum |
  |---------+-----+----------|
  |       1 |  19 |   534.50 |
  |       2 |  44 |  1481.50 |
  +---------------------------+

chi-squared =     1.212 with 1 d.f.
probability =     0.2710

chi-squared with ties =     1.894 with 1 d.f.
probability =     0.1688


                Dunn's Pairwise Comparison of iq4 by igender
                              (No adjustment)
Col Mean-|
Row Mean |            1
---------+-----------
       2 |  -1.376105
         |     0.0844

alpha =   0.05
```

```
Reject Ho if p = P(Z <= |z|) <= alpha/2

.
. dunntest iq5, by(igender)

Warning: by() values are unlabeled, option nolabel implicit


Kruskal-Wallis equality-of-populations rank test

  +--------------------------+
  | igender | Obs | Rank Sum |
  |---------+-----+----------|
  |       1 |  19 |   614.50 |
  |       2 |  44 |  1401.50 |
  +--------------------------+

chi-squared =     0.009 with 1 d.f.
probability =     0.9225

chi-squared with ties =     0.023 with 1 d.f.
probability =     0.8782


                Dunn's Pairwise Comparison of iq5 by igender
                              (No adjustment)
Col Mean-|
Row Mean |             1
---------+-----------
       2 |   0.153230
         |     0.4391

alpha =   0.05
Reject Ho if p = P(Z <= |z|) <= alpha/2

.
. dunntest iq6, by(igender)

Warning: by() values are unlabeled, option nolabel implicit


Kruskal-Wallis equality-of-populations rank test

  +--------------------------+
  | igender | Obs | Rank Sum |
  |---------+-----+----------|
  |       1 |  19 |   587.50 |
  |       2 |  43 |  1365.50 |
  +--------------------------+

chi-squared =     0.028 with 1 d.f.
probability =     0.8666

chi-squared with ties =     0.042 with 1 d.f.
probability =     0.8380


                Dunn's Pairwise Comparison of iq6 by igender
                              (No adjustment)
Col Mean-|
Row Mean |             1
---------+-----------
       2 |  -0.204490
         |     0.4190

alpha =   0.05
Reject Ho if p = P(Z <= |z|) <= alpha/2

.
. dunntest iq7, by(igender)

Warning: by() values are unlabeled, option nolabel implicit


Kruskal-Wallis equality-of-populations rank test

  +--------------------------+
  | igender | Obs | Rank Sum |
  |---------+-----+----------|
```

```
  |       1 |  19 |   551.00 |
  |       2 |  44 |  1465.00 |
  +--------------------------+

chi-squared =     0.729 with 1 d.f.
probability =     0.3933

chi-squared with ties =     0.991 with 1 d.f.
probability =     0.3194


                Dunn's Pairwise Comparison of iq7 by igender
                              (No adjustment)
Col Mean-|
Row Mean |             1
---------+-----------
       2 |  -0.995685
         |     0.1597

alpha =   0.05
Reject Ho if p = P(Z <= |z|) <= alpha/2

.
. dunntest iq8, by(igender)

Warning: by() values are unlabeled, option nolabel implicit


Kruskal-Wallis equality-of-populations rank test

  +--------------------------+
  | igender | Obs | Rank Sum |
  |---------+-----+----------|
  |       1 |  19 |   561.00 |
  |       2 |  44 |  1455.00 |
  +--------------------------+

chi-squared =     0.495 with 1 d.f.
probability =     0.4815

chi-squared with ties =     0.570 with 1 d.f.
probability =     0.4501


                Dunn's Pairwise Comparison of iq8 by igender
                              (No adjustment)
Col Mean-|
Row Mean |             1
---------+-----------
       2 |  -0.755307
         |     0.2250

alpha =   0.05
Reject Ho if p = P(Z <= |z|) <= alpha/2

.
. dunntest iq9, by(igender)

Warning: by() values are unlabeled, option nolabel implicit


Kruskal-Wallis equality-of-populations rank test

  +--------------------------+
  | igender | Obs | Rank Sum |
  |---------+-----+----------|
  |       1 |  19 |   491.00 |
  |       2 |  44 |  1525.00 |
  +--------------------------+

chi-squared =     3.070 with 1 d.f.
probability =     0.0797

chi-squared with ties =     3.658 with 1 d.f.
probability =     0.0558


                Dunn's Pairwise Comparison of iq9 by igender
                              (No adjustment)
```

```
Col Mean-|
Row Mean |             1
---------+-----------
       2 |  -1.912701
         |     0.0279

alpha =   0.05
Reject Ho if p = P(Z <= |z|) <= alpha/2

.
. dunntest iq10, by(igender)

Warning: by() values are unlabeled, option nolabel implicit


Kruskal-Wallis equality-of-populations rank test

  +--------------------------+
  | igender | Obs | Rank Sum |
  |---------+-----+----------|
  |       1 |  19 |   603.00 |
  |       2 |  44 |  1413.00 |
  +--------------------------+

chi-squared =     0.006 with 1 d.f.
probability =     0.9403

chi-squared with ties =     0.022 with 1 d.f.
probability =     0.8830


               Dunn's Pairwise Comparison of iq10 by igender
                              (No adjustment)
Col Mean-|
Row Mean |             1
---------+-----------
       2 |  -0.147156
         |     0.4415

alpha =   0.05
Reject Ho if p = P(Z <= |z|) <= alpha/2
```

- Question – For each of the questions, 1-10, is there a difference in the average response by level of education

```
. dunntest iq1, by(ied) ma(bh) wrap

Warning: by() values are unlabeled, option nolabel implicit


Kruskal-Wallis equality-of-populations rank test

  +----------------------+
  | ied | Obs | Rank Sum |
  |-----+-----+----------|
  |   1 |   1 |    32.50 |
  |   2 |   3 |    97.50 |
  |   3 |  57 |  1761.00 |
  +----------------------+

chi-squared =     0.031 with 2 d.f.
probability =     0.9848

chi-squared with ties =     0.218 with 2 d.f.
probability =     0.8969


                  Dunn's Pairwise Comparison of iq1 by ied
                            (Benjamini-Hochberg)
Col Mean-|
Row Mean |             1             2
---------+----------------------
       2 |   0.000000
         |     0.5000
         |
       3 |   0.239229   0.407392
         |     0.6082     1.0000
```

```
False Discovery Rate =   0.05
Reject Ho if p = P(Z <= |z|) <= FDR/2 with stopping rule

.
. dunntest iq2, by(ied) ma(bh) wrap

Warning: by() values are unlabeled, option nolabel implicit


Kruskal-Wallis equality-of-populations rank test

  +----------------------+
  | ied | Obs | Rank Sum |
  |-----+-----+----------|
  |   1 |   1 |    40.50 |
  |   2 |   3 |   121.50 |
  |   3 |  57 |  1729.00 |
  +----------------------+

chi-squared =     1.226 with 2 d.f.
probability =     0.5418

chi-squared with ties =     1.853 with 2 d.f.
probability =     0.3959


                  Dunn's Pairwise Comparison of iq2 by ied
                            (Benjamini-Hochberg)
Col Mean-|
Row Mean |            1             2
---------+----------------------
       2 |   0.000000
         |     0.5000
         |
       3 |   0.698004   1.188657
         |     0.3639     0.3519

False Discovery Rate =   0.05
Reject Ho if p = P(Z <= |z|) <= FDR/2 with stopping rule

.
. dunntest iq3, by(ied) ma(bh) wrap

Warning: by() values are unlabeled, option nolabel implicit


Kruskal-Wallis equality-of-populations rank test

  +----------------------+
  | ied | Obs | Rank Sum |
  |-----+-----+----------|
  |   1 |   1 |    36.50 |
  |   2 |   3 |   109.50 |
  |   3 |  57 |  1745.00 |
  +----------------------+

chi-squared =     0.411 with 2 d.f.
probability =     0.8143

chi-squared with ties =     0.917 with 2 d.f.
probability =     0.6323


                  Dunn's Pairwise Comparison of iq3 by ied
                            (Benjamini-Hochberg)
Col Mean-|
Row Mean |            1             2
---------+----------------------
       2 |   0.000000
         |     0.5000
         |
       3 |   0.490961   0.836076
         |     0.4676     0.6047

False Discovery Rate =   0.05
Reject Ho if p = P(Z <= |z|) <= FDR/2 with stopping rule

.
```

```
. dunntest iq4, by(ied) ma(bh) wrap

Warning: by() values are unlabeled, option nolabel implicit


Kruskal-Wallis equality-of-populations rank test

  +----------------------+
  | ied | Obs | Rank Sum |
  |-----+-----+----------|
  |   1 |   1 |    40.00 |
  |   2 |   3 |   120.00 |
  |   3 |  57 |  1731.00 |
  +----------------------+

chi-squared =     1.100 with 2 d.f.
probability =     0.5769

chi-squared with ties =     1.741 with 2 d.f.
probability =     0.4187


                  Dunn's Pairwise Comparison of iq4 by ied
                            (Benjamini-Hochberg)
Col Mean-|
Row Mean |            1            2
---------+----------------------
       2 |   0.000000
         |     0.5000
         |
       3 |   0.676626   1.152253
         |     0.3740     0.3738

False Discovery Rate =   0.05
Reject Ho if p = P(Z <= |z|) <= FDR/2 with stopping rule

.
. dunntest iq5, by(ied) ma(bh) wrap

Warning: by() values are unlabeled, option nolabel implicit


Kruskal-Wallis equality-of-populations rank test

  +----------------------+
  | ied | Obs | Rank Sum |
  |-----+-----+----------|
  |   1 |   1 |    35.50 |
  |   2 |   3 |    73.50 |
  |   3 |  57 |  1782.00 |
  +----------------------+

chi-squared =     0.479 with 2 d.f.
probability =     0.7870

chi-squared with ties =     1.261 with 2 d.f.
probability =     0.5323


                  Dunn's Pairwise Comparison of iq5 by ied
                            (Benjamini-Hochberg)
Col Mean-|
Row Mean |            1            2
---------+----------------------
       2 |   0.870715
         |     0.2879
         |
       3 |   0.383900  -1.043578
         |     0.3505     0.4450

False Discovery Rate =   0.05
Reject Ho if p = P(Z <= |z|) <= FDR/2 with stopping rule

.
. dunntest iq6, by(ied) ma(bh) wrap

Warning: by() values are unlabeled, option nolabel implicit
```

```
Kruskal-Wallis equality-of-populations rank test

  +-----------------------+
  | ied | Obs | Rank Sum |
  |-----+-----+----------|
  |   1 |   1 |    40.50 |
  |   2 |   3 |    94.00 |
  |   3 |  56 |  1695.50 |
  +-----------------------+

chi-squared =     0.344 with 2 d.f.
probability =     0.8420

chi-squared with ties =     0.500 with 2 d.f.
probability =     0.7788


                  Dunn's Pairwise Comparison of iq6 by ied
                            (Benjamini-Hochberg)
Col Mean-|
Row Mean |             1             2
---------+----------------------
       2 |   0.548145
         |     0.4377
         |
       3 |   0.699677   0.123104
         |     0.7262     0.4510

False Discovery Rate =   0.05
Reject Ho if p = P(Z <= |z|) <= FDR/2 with stopping rule

.
. dunntest iq7, by(ied) ma(bh) wrap

Warning: by() values are unlabeled, option nolabel implicit


Kruskal-Wallis equality-of-populations rank test

  +-----------------------+
  | ied | Obs | Rank Sum |
  |-----+-----+----------|
  |   1 |   1 |    42.50 |
  |   2 |   3 |    99.50 |
  |   3 |  57 |  1749.00 |
  +-----------------------+

chi-squared =     0.482 with 2 d.f.
probability =     0.7857

chi-squared with ties =     0.659 with 2 d.f.
probability =     0.7194


                  Dunn's Pairwise Comparison of iq7 by ied
                            (Benjamini-Hochberg)
Col Mean-|
Row Mean |             1             2
---------+----------------------
       2 |   0.532085
         |     0.4460
         |
       3 |   0.771080   0.275878
         |     0.6610     0.3913

False Discovery Rate =   0.05
Reject Ho if p = P(Z <= |z|) <= FDR/2 with stopping rule

.
. dunntest iq8, by(ied) ma(bh) wrap

Warning: by() values are unlabeled, option nolabel implicit


Kruskal-Wallis equality-of-populations rank test

  +-----------------------+
  | ied | Obs | Rank Sum |
  |-----+-----+----------|
```

```
  |   1 |   1 |    47.00 |
  |   2 |   3 |   120.50 |
  |   3 |  57 |  1723.50 |
  +----------------------+

chi-squared =     1.717 with 2 d.f.
probability =     0.4237

chi-squared with ties =     1.981 with 2 d.f.
probability =     0.3713


                  Dunn's Pairwise Comparison of iq8 by ied
                            (Benjamini-Hochberg)
Col Mean-|
Row Mean |             1             2
---------+----------------------
       2 |   0.358033
         |     0.3602
         |
       3 |   1.005400   1.014200
         |     0.2360     0.4657

False Discovery Rate =   0.05
Reject Ho if p = P(Z <= |z|) <= FDR/2 with stopping rule

.
. dunntest iq9, by(ied) ma(bh) wrap

Warning: by() values are unlabeled, option nolabel implicit


Kruskal-Wallis equality-of-populations rank test

  +----------------------+
  | ied | Obs | Rank Sum |
  |-----+-----+----------|
  |   1 |   1 |    45.50 |
  |   2 |   3 |   136.50 |
  |   3 |  57 |  1709.00 |
  +----------------------+

chi-squared =     2.856 with 2 d.f.
probability =     0.2398

chi-squared with ties =     3.409 with 2 d.f.
probability =     0.1819


                  Dunn's Pairwise Comparison of iq9 by ied
                            (Benjamini-Hochberg)
Col Mean-|
Row Mean |             1             2
---------+----------------------
       2 |   0.000000
         |     0.5000
         |
       3 |   0.946695   1.612164
         |     0.2578     0.1604

False Discovery Rate =   0.05
Reject Ho if p = P(Z <= |z|) <= FDR/2 with stopping rule

.
. dunntest iq10, by(ied) ma(bh) wrap

Warning: by() values are unlabeled, option nolabel implicit


Kruskal-Wallis equality-of-populations rank test

  +----------------------+
  | ied | Obs | Rank Sum |
  |-----+-----+----------|
  |   1 |   1 |    33.50 |
  |   2 |   3 |   100.50 |
  |   3 |  57 |  1757.00 |
  +----------------------+
```

```
chi-squared =     0.085 with 2 d.f.
probability =     0.9584

chi-squared with ties =     0.375 with 2 d.f.
probability =     0.8288


                 Dunn's Pairwise Comparison of iq10 by ied
                            (Benjamini-Hochberg)
Col Mean-|
Row Mean |            1             2
---------+----------------------
       2 |   0.000000
         |     0.5000
         |
       3 |   0.314214   0.535088
         |     0.5650     0.8889

False Discovery Rate =   0.05
Reject Ho if p = P(Z <= |z|) <= FDR/2 with stopping rule

---------------------------------------------------------------------------------------------------------------
```

- Question: For each of the questions, is there a difference in the average response based upon racer or ethnicity

```
. dunntest iq1, by(ieth) ma(bh) wrap

Warning: by() values are unlabeled, option nolabel implicit


Kruskal-Wallis equality-of-populations rank test

  +-----------------------+
  | ieth | Obs | Rank Sum |
  |------+-----+----------|
  |    1 |  53 |  1744.50 |
  |    2 |   2 |    36.00 |
  |    3 |   1 |    33.50 |
  |    4 |   4 |   134.00 |
  |    7 |   3 |    68.00 |
  +-----------------------+

chi-squared =     2.110 with 4 d.f.
probability =     0.7155

chi-squared with ties =    15.496 with 4 d.f.
probability =     0.0038


                 Dunn's Pairwise Comparison of iq1 by ieth
                            (Benjamini-Hochberg)
Col Mean-|
Row Mean |            1             2             3             4
---------+--------------------------------------------
       2 |   3.061273
         |     0.0110
         |
       3 |  -0.085671  -1.871072
         |     0.5176     0.0613
         |
       4 |  -0.166771  -2.646096   0.000000
         |     0.5422     0.0204     0.5000
         |
       7 |   2.553091  -0.755791   1.387066   2.097047
         |     0.0178     0.3213     0.1379     0.0450

False Discovery Rate =   0.05
Reject Ho if p = P(Z <= |z|) <= FDR/2 with stopping rule

.
. dunntest iq2, by(ieth) ma(bh) wrap

Warning: by() values are unlabeled, option nolabel implicit


Kruskal-Wallis equality-of-populations rank test

  +-----------------------+
```

```
  | ieth | Obs | Rank Sum |
  |------+-----+----------|
  |    1 |  53 |  1798.50 |
  |    2 |   2 |    48.00 |
  |    3 |   1 |     2.00 |
  |    4 |   4 |    77.00 |
  |    7 |   3 |    90.50 |
  +-----------------------+

chi-squared =     5.615 with 4 d.f.
probability =     0.2298

chi-squared with ties =     8.107 with 4 d.f.
probability =     0.0877


                 Dunn's Pairwise Comparison of iq2 by ieth
                            (Benjamini-Hochberg)
Col Mean-|
Row Mean |            1            2            3            4
---------+--------------------------------------------
       2 |   0.904070
         |     0.2614
         |
       3 |   2.073966   1.177565
         |     0.1904     0.2987
         |
       4 |   1.856443   0.359560  -1.011444
         |     0.1585     0.3596     0.3118
         |
       7 |   0.416143  -0.442842  -1.599094  -0.937000
         |     0.3763     0.4112     0.1830     0.2906

False Discovery Rate =   0.05
Reject Ho if p = P(Z <= |z|) <= FDR/2 with stopping rule

.
. dunntest iq3, by(ieth) ma(bh) wrap

Warning: by() values are unlabeled, option nolabel implicit


Kruskal-Wallis equality-of-populations rank test

  +-----------------------+
  | ieth | Obs | Rank Sum |
  |------+-----+----------|
  |    1 |  53 |  1761.50 |
  |    2 |   2 |    14.50 |
  |    3 |   1 |    38.50 |
  |    4 |   4 |   120.00 |
  |    7 |   3 |    81.50 |
  +-----------------------+

chi-squared =     4.269 with 4 d.f.
probability =     0.3708

chi-squared with ties =     8.563 with 4 d.f.
probability =     0.0730


                 Dunn's Pairwise Comparison of iq3 by ieth
                            (Benjamini-Hochberg)
Col Mean-|
Row Mean |            1            2            3            4
---------+--------------------------------------------
       2 |   2.787277
         |     0.0266
         |
       3 |  -0.402941  -1.971406
         |     0.3817     0.0811
         |
       4 |   0.482159  -2.029656   0.587402
         |     0.3936     0.1060     0.3978
         |
       7 |   0.790144  -1.685695   0.758333   0.286623
         |     0.4294     0.1148     0.3735     0.3872

False Discovery Rate =   0.05
```

```
Reject Ho if p = P(Z <= |z|) <= FDR/2 with stopping rule

.
. dunntest iq4, by(ieth) ma(bh) wrap

Warning: by() values are unlabeled, option nolabel implicit


Kruskal-Wallis equality-of-populations rank test

  +-----------------------+
  | ieth | Obs | Rank Sum |
  |------+-----+----------|
  |    1 |  53 |  1803.00 |
  |    2 |   2 |    22.00 |
  |    3 |   1 |    41.50 |
  |    4 |   4 |    95.00 |
  |    7 |   3 |    54.50 |
  +-----------------------+

chi-squared =     6.055 with 4 d.f.
probability =     0.1951

chi-squared with ties =     9.464 with 4 d.f.
probability =     0.0505


                 Dunn's Pairwise Comparison of iq4 by ieth
                            (Benjamini-Hochberg)
Col Mean-|
Row Mean |             1             2             3             4
---------+--------------------------------------------
       2 |   2.179479
         |     0.1465
         |
       3 |  -0.505482  -1.698444
         |     0.3407     0.1490
         |
       4 |   1.350673  -1.004099   1.082780
         |     0.1768     0.2252     0.2324
         |
       7 |   1.821760  -0.535433   1.378175   0.498577
         |     0.1712     0.3702     0.2102     0.3090

False Discovery Rate =   0.05
Reject Ho if p = P(Z <= |z|) <= FDR/2 with stopping rule

.
. dunntest iq5, by(ieth) ma(bh) wrap

Warning: by() values are unlabeled, option nolabel implicit


Kruskal-Wallis equality-of-populations rank test

  +-----------------------+
  | ieth | Obs | Rank Sum |
  |------+-----+----------|
  |    1 |  53 |  1808.50 |
  |    2 |   2 |    39.50 |
  |    3 |   1 |     7.50 |
  |    4 |   4 |   148.00 |
  |    7 |   3 |    12.50 |
  +-----------------------+

chi-squared =    10.605 with 4 d.f.
probability =     0.0314

chi-squared with ties =    26.277 with 4 d.f.
probability =     0.0001


                 Dunn's Pairwise Comparison of iq5 by ieth
                            (Benjamini-Hochberg)
Col Mean-|
Row Mean |             1             2             3             4
---------+--------------------------------------------
       2 |   1.713447
         |     0.0866
```

```
         |
       3 |   2.264929   0.858920
         |     0.0294     0.2440
         |
       4 |  -0.476526  -1.710491  -2.265841
         |     0.3521     0.0726     0.0391
         |
       7 |   4.334614   1.465931   0.247897   3.691637
         |     0.0001     0.1019     0.4021     0.0006

False Discovery Rate =   0.05
Reject Ho if p = P(Z <= |z|) <= FDR/2 with stopping rule

.
. dunntest iq6, by(ieth) ma(bh) wrap

Warning: by() values are unlabeled, option nolabel implicit


Kruskal-Wallis equality-of-populations rank test

  +------------------------+
  | ieth | Obs | Rank Sum |
  |------+-----+----------|
  |    1 |  52 |  1672.00 |
  |    2 |   2 |    54.50 |
  |    3 |   1 |    41.50 |
  |    4 |   4 |   166.00 |
  |    7 |   3 |    19.00 |
  +------------------------+

chi-squared =     7.553 with 4 d.f.
probability =     0.1094

chi-squared with ties =    11.196 with 4 d.f.
probability =     0.0245


                 Dunn's Pairwise Comparison of iq6 by ieth
                            (Benjamini-Hochberg)
Col Mean-|
Row Mean |            1            2            3            4
---------+--------------------------------------------
       2 |   0.459251
         |     0.3589
         |
       3 |  -0.624727  -0.785168
         |     0.3326     0.3088
         |
       4 |  -1.215526  -1.110396   0.000000
         |     0.2242     0.2224     0.5000
         |
       7 |   2.934536   1.546239   2.055206   3.107180
         |     0.0084     0.1526     0.0664     0.0094

False Discovery Rate =   0.05
Reject Ho if p = P(Z <= |z|) <= FDR/2 with stopping rule

.
. dunntest iq7, by(ieth) ma(bh) wrap

Warning: by() values are unlabeled, option nolabel implicit


Kruskal-Wallis equality-of-populations rank test

  +------------------------+
  | ieth | Obs | Rank Sum |
  |------+-----+----------|
  |    1 |  53 |  1815.00 |
  |    2 |   2 |    47.00 |
  |    3 |   1 |    15.00 |
  |    4 |   4 |    77.00 |
  |    7 |   3 |    62.00 |
  +------------------------+

chi-squared =     5.167 with 4 d.f.
probability =     0.2705
```

```
chi-squared with ties =     7.030 with 4 d.f.
probability =     0.1343


                 Dunn's Pairwise Comparison of iq7 by ieth
                            (Benjamini-Hochberg)
Col Mean-|
Row Mean |          1           2           3           4
---------+--------------------------------------------
       2 |   0.949225
         |     0.4281
         |
       3 |   1.213236   0.441625
         |     0.3751     0.6588
         |
       4 |   1.840200   0.312276  -0.241888
         |     0.3287     0.5392     0.5055
         |
       7 |   1.455928   0.197500  -0.312276  -0.118029
         |     0.3635     0.4686     0.6290     0.4530

False Discovery Rate =   0.05
Reject Ho if p = P(Z <= |z|) <= FDR/2 with stopping rule

.
. dunntest iq8, by(ieth) ma(bh) wrap

Warning: by() values are unlabeled, option nolabel implicit


Kruskal-Wallis equality-of-populations rank test

  +-----------------------+
  | ieth | Obs | Rank Sum |
  |------+-----+----------|
  |    1 |  53 |  1804.00 |
  |    2 |   2 |    27.00 |
  |    3 |   1 |    48.50 |
  |    4 |   4 |    92.50 |
  |    7 |   3 |    44.00 |
  +-----------------------+

chi-squared =     7.123 with 4 d.f.
probability =     0.1295

chi-squared with ties =     8.202 with 4 d.f.
probability =     0.0845


                 Dunn's Pairwise Comparison of iq8 by ieth
                            (Benjamini-Hochberg)
Col Mean-|
Row Mean |          1           2           3           4
---------+--------------------------------------------
       2 |   1.669101
         |     0.1189
         |
       3 |  -0.838757  -1.672942
         |     0.2869     0.1572
         |
       4 |   1.232034  -0.650622   1.328647
         |     0.1816     0.3221     0.1840
         |
       7 |   1.910806  -0.074816   1.715276   0.648313
         |     0.2801     0.4702     0.2157     0.2871

False Discovery Rate =   0.05
Reject Ho if p = P(Z <= |z|) <= FDR/2 with stopping rule

.
. dunntest iq9, by(ieth) ma(bh) wrap

Warning: by() values are unlabeled, option nolabel implicit


Kruskal-Wallis equality-of-populations rank test

  +-----------------------+
  | ieth | Obs | Rank Sum |
```

```
  |------+-----+----------|
  |    1 |  53 |  1765.00 |
  |    2 |   2 |    58.00 |
  |    3 |   1 |    23.00 |
  |    4 |   4 |   108.50 |
  |    7 |   3 |    61.50 |
  +-----------------------+

chi-squared =     2.026 with 4 d.f.
probability =     0.7310

chi-squared with ties =     2.414 with 4 d.f.
probability =     0.6601


                 Dunn's Pairwise Comparison of iq9 by ieth
                            (Benjamini-Hochberg)
Col Mean-|
Row Mean |             1             2             3             4
---------+--------------------------------------------------
       2 |   0.355651
         |     0.6018
         |
       3 |   0.607788   0.291742
         |     0.9055     0.5503
         |
       4 |   0.709405   0.128933  -0.219717
         |     1.0000     0.4986     0.5163
         |
       7 |   1.284614   0.554503   0.128933   0.516561
         |     0.9946     0.7240     0.4487     0.6055

False Discovery Rate =   0.05
Reject Ho if p = P(Z <= |z|) <= FDR/2 with stopping rule

.
. dunntest iq10, by(ieth) ma(bh) wrap

Warning: by() values are unlabeled, option nolabel implicit


Kruskal-Wallis equality-of-populations rank test

  +-----------------------+
  | ieth | Obs | Rank Sum |
  |------+-----+----------|
  |    1 |  53 |  1700.00 |
  |    2 |   2 |    70.00 |
  |    3 |   1 |    35.00 |
  |    4 |   4 |   140.00 |
  |    7 |   3 |    71.00 |
  +-----------------------+

chi-squared =     0.808 with 4 d.f.
probability =     0.9373

chi-squared with ties =     3.122 with 4 d.f.
probability =     0.5376


                 Dunn's Pairwise Comparison of iq10 by ieth
                            (Benjamini-Hochberg)
Col Mean-|
Row Mean |             1             2             3             4
---------+--------------------------------------------------
       2 |  -0.435279
         |     0.5528
         |
       3 |  -0.310626   0.000000
         |     0.5401     0.5556
         |
       4 |  -0.604682   0.000000   0.000000
         |     0.5454     0.6250     0.5000
         |
       7 |   1.519075   1.331032   1.052274   1.590888
         |     0.3219     0.3053     0.3658     0.5582

False Discovery Rate =   0.05
Reject Ho if p = P(Z <= |z|) <= FDR/2 with stopping rule
```

```
-----------------------------------------------------------------------------------------------------------
```

- Question – For each of the questions, 1-10, is there a difference in the average response if respondent is or was a hospital worker?

```
. dunntest iq1, by(ihwork) ma(bh) wrap

Warning: by() values are unlabeled, option nolabel implicit


Kruskal-Wallis equality-of-populations rank test

  +-------------------------+
  | ihwork | Obs | Rank Sum |
  |--------+-----+----------|
  |      0 |  38 |  1211.00 |
  |      1 |  16 |   503.50 |
  |      2 |   9 |   301.50 |
  +-------------------------+

chi-squared =     0.076 with 2 d.f.
probability =     0.9629

chi-squared with ties =     0.556 with 2 d.f.
probability =     0.7574


                Dunn's Pairwise Comparison of iq1 by ihwork
                            (Benjamini-Hochberg)
Col Mean-|
Row Mean |             0             1
---------+----------------------
       1 |   0.198272
         |     0.4214
         |
       2 |  -0.650694  -0.720741
         |     0.3864     0.7066

False Discovery Rate =   0.05
Reject Ho if p = P(Z <= |z|) <= FDR/2 with stopping rule

.
. dunntest iq2, by(ihwork) ma(bh) wrap

Warning: by() values are unlabeled, option nolabel implicit


Kruskal-Wallis equality-of-populations rank test

  +-------------------------+
  | ihwork | Obs | Rank Sum |
  |--------+-----+----------|
  |      0 |  38 |  1229.50 |
  |      1 |  16 |   432.00 |
  |      2 |   9 |   354.50 |
  +-------------------------+

chi-squared =     2.667 with 2 d.f.
probability =     0.2635

chi-squared with ties =     3.851 with 2 d.f.
probability =     0.1458


                Dunn's Pairwise Comparison of iq2 by ihwork
                            (Benjamini-Hochberg)
Col Mean-|
Row Mean |             0             1
---------+----------------------
       1 |   1.177995
         |     0.1194
         |
       2 |  -1.243802  -1.949178
         |     0.1602     0.0769
```

```
False Discovery Rate =   0.05
Reject Ho if p = P(Z <= |z|) <= FDR/2 with stopping rule

.
. dunntest iq3, by(ihwork) ma(bh) wrap

Warning: by() values are unlabeled, option nolabel implicit


Kruskal-Wallis equality-of-populations rank test

  +-------------------------+
  | ihwork | Obs | Rank Sum |
  |--------+-----+----------|
  |      0 |  38 |  1187.00 |
  |      1 |  16 |   482.50 |
  |      2 |   9 |   346.50 |
  +-------------------------+

chi-squared =     1.359 with 2 d.f.
probability =     0.5068

chi-squared with ties =     2.727 with 2 d.f.
probability =     0.2558


                Dunn's Pairwise Comparison of iq3 by ihwork
                            (Benjamini-Hochberg)
Col Mean-|
Row Mean |             0             1
---------+----------------------
       1 |   0.280149
         |     0.3897
         |
       2 |  -1.513775  -1.547192
         |     0.0976     0.1827

False Discovery Rate =   0.05
Reject Ho if p = P(Z <= |z|) <= FDR/2 with stopping rule

.
. dunntest iq4, by(ihwork) ma(bh) wrap

Warning: by() values are unlabeled, option nolabel implicit


Kruskal-Wallis equality-of-populations rank test

  +-------------------------+
  | ihwork | Obs | Rank Sum |
  |--------+-----+----------|
  |      0 |  38 |  1109.50 |
  |      1 |  16 |   533.00 |
  |      2 |   9 |   373.50 |
  +-------------------------+

chi-squared =     3.388 with 2 d.f.
probability =     0.1838

chi-squared with ties =     5.295 with 2 d.f.
probability =     0.0708


                Dunn's Pairwise Comparison of iq4 by ihwork
                            (Benjamini-Hochberg)
Col Mean-|
Row Mean |             0             1
---------+----------------------
       1 |  -0.941750
         |     0.1732
         |
       2 |  -2.263389  -1.340169
         |     0.0354     0.1351

False Discovery Rate =   0.05
Reject Ho if p = P(Z <= |z|) <= FDR/2 with stopping rule

.
. dunntest iq5, by(ihwork) ma(bh) wrap
```

```
Warning: by() values are unlabeled, option nolabel implicit


Kruskal-Wallis equality-of-populations rank test

  +-------------------------+
  | ihwork | Obs | Rank Sum |
  |--------+-----+----------|
  |      0 |  38 |  1219.00 |
  |      1 |  16 |   464.00 |
  |      2 |   9 |   333.00 |
  +-------------------------+

chi-squared =     1.099 with 2 d.f.
probability =     0.5773

chi-squared with ties =     2.723 with 2 d.f.
probability =     0.2563


                Dunn's Pairwise Comparison of iq5 by ihwork
                            (Benjamini-Hochberg)
Col Mean-|
Row Mean |             0            1
---------+----------------------
       1 |   0.887196
         |     0.1875
         |
       2 |  -1.139947  -1.648784
         |     0.1907     0.1488

False Discovery Rate =   0.05
Reject Ho if p = P(Z <= |z|) <= FDR/2 with stopping rule

.
. dunntest iq6, by(ihwork) ma(bh) wrap

Warning: by() values are unlabeled, option nolabel implicit


Kruskal-Wallis equality-of-populations rank test

  +-------------------------+
  | ihwork | Obs | Rank Sum |
  |--------+-----+----------|
  |      0 |  38 |  1081.00 |
  |      1 |  16 |   540.00 |
  |      2 |   8 |   332.00 |
  +-------------------------+

chi-squared =     3.794 with 2 d.f.
probability =     0.1500

chi-squared with ties =     5.625 with 2 d.f.
probability =     0.0601


                Dunn's Pairwise Comparison of iq6 by ihwork
                            (Benjamini-Hochberg)
Col Mean-|
Row Mean |             0            1
---------+----------------------
       1 |  -1.200715
         |     0.1149
         |
       2 |  -2.264381  -1.207799
         |     0.0353     0.1703

False Discovery Rate =   0.05
Reject Ho if p = P(Z <= |z|) <= FDR/2 with stopping rule

.
. dunntest iq7, by(ihwork) ma(bh) wrap

Warning: by() values are unlabeled, option nolabel implicit


Kruskal-Wallis equality-of-populations rank test
```

```
  +-------------------------+
  | ihwork | Obs | Rank Sum |
  |--------+-----+----------|
  |      0 |  38 |  1189.00 |
  |      1 |  16 |   460.00 |
  |      2 |   9 |   367.00 |
  +-------------------------+

chi-squared =     2.624 with 2 d.f.
probability =     0.2693

chi-squared with ties =     3.570 with 2 d.f.
probability =     0.1678


                Dunn's Pairwise Comparison of iq7 by ihwork
                            (Benjamini-Hochberg)
Col Mean-|
Row Mean |            0            1
---------+----------------------
       1 |   0.542224
         |     0.2938
         |
       2 |  -1.628668  -1.836862
         |     0.0775     0.0993

False Discovery Rate =   0.05
Reject Ho if p = P(Z <= |z|) <= FDR/2 with stopping rule

.
. dunntest iq8, by(ihwork) ma(bh) wrap

Warning: by() values are unlabeled, option nolabel implicit


Kruskal-Wallis equality-of-populations rank test

  +-------------------------+
  | ihwork | Obs | Rank Sum |
  |--------+-----+----------|
  |      0 |  38 |  1080.00 |
  |      1 |  16 |   576.50 |
  |      2 |   9 |   359.50 |
  +-------------------------+

chi-squared =     3.913 with 2 d.f.
probability =     0.1413

chi-squared with ties =     4.506 with 2 d.f.
probability =     0.1051


                Dunn's Pairwise Comparison of iq8 by ihwork
                            (Benjamini-Hochberg)
Col Mean-|
Row Mean |            0            1
---------+----------------------
       1 |  -1.494891
         |     0.1012
         |
       2 |  -1.819713  -0.549796
         |     0.1032     0.2912

False Discovery Rate =   0.05
Reject Ho if p = P(Z <= |z|) <= FDR/2 with stopping rule

.
. dunntest iq9, by(ihwork) ma(bh) wrap

Warning: by() values are unlabeled, option nolabel implicit


Kruskal-Wallis equality-of-populations rank test

  +-------------------------+
  | ihwork | Obs | Rank Sum |
  |--------+-----+----------|
  |      0 |  38 |  1096.00 |
```

```
  |      1 |  16 |   545.00 |
  |      2 |   9 |   375.00 |
  +-------------------------+

chi-squared =     3.833 with 2 d.f.
probability =     0.1471

chi-squared with ties =     4.568 with 2 d.f.
probability =     0.1019


                Dunn's Pairwise Comparison of iq9 by ihwork
                            (Benjamini-Hochberg)
Col Mean-|
Row Mean |             0             1
---------+----------------------
       1 |  -1.043163
         |     0.1484
         |
       2 |  -2.060159  -1.086818
         |     0.0591     0.2078

False Discovery Rate =   0.05
Reject Ho if p = P(Z <= |z|) <= FDR/2 with stopping rule

.
. dunntest iq10, by(ihwork) ma(bh) wrap

Warning: by() values are unlabeled, option nolabel implicit


Kruskal-Wallis equality-of-populations rank test

  +-------------------------+
  | ihwork | Obs | Rank Sum |
  |--------+-----+----------|
  |      0 |  38 |  1206.00 |
  |      1 |  16 |   495.00 |
  |      2 |   9 |   315.00 |
  +-------------------------+

chi-squared =     0.303 with 2 d.f.
probability =     0.8596

chi-squared with ties =     1.169 with 2 d.f.
probability =     0.5574


                Dunn's Pairwise Comparison of iq10 by ihwork
                            (Benjamini-Hochberg)
Col Mean-|
Row Mean |             0             1
---------+----------------------
       1 |   0.287560
         |     0.3868
         |
       2 |  -0.943719  -1.045310
         |     0.2590     0.4438

False Discovery Rate =   0.05
Reject Ho if p = P(Z <= |z|) <= FDR/2 with stopping rule
```

Nurse Student Statistics on Factor Analysis Produced Variables

- Question – For each of the factor variables (knowledge, participation, and total cost), are there differences in the average response by age?

  Answer – NO, there are no significant differences among the age categories for any of the three factor variables.

- Question – For each of the factor variables (knowledge, participation, and total cost), are there differences in the average response by gender?

  Answer – NO, there are no significant differences between genders for any of the three factor variables.

- Question – For each of the factor variables (knowledge, participation, and total cost), are there differences in the average response by level of education?

  Answer – NO, there are no significant differences among the levels of education for any of the three factor variables.

- Question: For each of the factor variables (knowledge, participation, and total cost), are there differences in the average response based upon racer or ethnicity?

  Answer – YES, for the factor variable knowledge there is a significant difference between groups 1 and 2 and between groups 1 and 7, and for the factor variable total cost there are significant differences between the pairs of groups 1 and 7, 3 and 7, and 4 and 7

- Question: For each of the factor variables (knowledge, participation, and total cost), are there differences in the average response based experience working in a hospital?

  Answer – YES, for the factor variable "participation" there is a significant difference between group 0 and group 2

STATISTICS

- Question – For each of the factor variables (knowledge, participation, and total cost), are there differences in the average response by age?

```
. dunntest iknowledge, by(iage)


Kruskal-Wallis equality-of-populations rank test

  +-----------------------+
  | iage | Obs | Rank Sum |
  |------+-----+----------|
  |    3 |   2 |    27.50 |
  |    4 |  12 |   309.00 |
  |    5 |  14 |   417.50 |
  |    6 |  25 |   850.00 |
  |    7 |  10 |   412.00 |
  +-----------------------+

chi-squared =     6.392 with 4 d.f.
probability =     0.1717

chi-squared with ties =     8.092 with 4 d.f.
probability =     0.0883


              Dunn's Pairwise Comparison of iknowledge by iage
```

```
                              (No adjustment)
Col Mean-|
Row Mean |              3              4              5              6
---------+--------------------------------------------
       4 |  -0.964413
         |     0.1674
         |
       5 |  -1.305010  -0.635265
         |     0.0959     0.2626
         |
       6 |  -1.691486  -1.441963  -0.768369
         |     0.0454     0.0747     0.2211
         |
       7 |  -2.175239  -2.214869  -1.686889  -1.181160
         |     0.0148     0.0134     0.0458     0.1188

alpha =   0.05
Reject Ho if p = P(Z <= |z|) <= alpha/2

.
. dunntest iparticipate, by(iage)

Kruskal-Wallis equality-of-populations rank test

  +------------------------+
  | iage | Obs | Rank Sum |
  |------+-----+----------|
  |    3 |   2 |    37.00 |
  |    4 |  12 |   281.00 |
  |    5 |  14 |   458.00 |
  |    6 |  25 |   834.00 |
  |    7 |  10 |   406.00 |
  +------------------------+

chi-squared =     6.076 with 4 d.f.
probability =     0.1935

chi-squared with ties =     6.276 with 4 d.f.
probability =     0.1795


             Dunn's Pairwise Comparison of iparticipate by iage
                              (No adjustment)
Col Mean-|
Row Mean |              3              4              5              6
---------+--------------------------------------------
       4 |  -0.356920
         |     0.3606
         |
       5 |  -1.042565  -1.310385
         |     0.1486     0.0950
         |
       6 |  -1.121195  -1.569823  -0.107251
         |     0.1311     0.0582     0.4573
         |
       7 |  -1.581888  -2.225081  -1.055987  -1.072837
         |     0.0568     0.0130     0.1455     0.1417

alpha =   0.05
Reject Ho if p = P(Z <= |z|) <= alpha/2

.
. dunntest itotcost, by(iage)

Warning: by() values are unlabeled, option nolabel implicit


Kruskal-Wallis equality-of-populations rank test

  +------------------------+
  | iage | Obs | Rank Sum |
  |------+-----+----------|
  |    3 |   2 |    83.00 |
  |    4 |  12 |   402.50 |
  |    5 |  14 |   380.00 |
  |    6 |  25 |   742.50 |
  |    7 |   9 |   345.00 |
  +------------------------+
```

```
chi-squared =     3.125 with 4 d.f.
probability =     0.5372

chi-squared with ties =     4.632 with 4 d.f.
probability =     0.3272


               Dunn's Pairwise Comparison of itotcost by iage
                              (No adjustment)
Col Mean-|
Row Mean |            3            4            5            6
---------+--------------------------------------------
       4 |   0.703165
         |     0.2410
         |
       5 |   1.281683   1.097642
         |     0.1000     0.1362
         |
       6 |   1.083624   0.738198  -0.516952
         |     0.1393     0.2302     0.3026
         |
       7 |   0.273361  -0.733301  -1.767517  -1.498732
         |     0.3923     0.2317     0.0386     0.0670

alpha =   0.05
Reject Ho if p = P(Z <= |z|) <= alpha/2
===============================================================================================================
```

Question – For each of the factor variables (knowledge, participation, and total cost), are there differences in the average response by gender?

```
. dunntest iknowledge, by(igender)

Warning: by() values are unlabeled, option nolabel implicit


Kruskal-Wallis equality-of-populations rank test

  +-------------------------+
  | igender | Obs | Rank Sum |
  |---------+-----+----------|
  |       1 |  19 |   598.00 |
  |       2 |  44 |  1418.00 |
  +-------------------------+

chi-squared =     0.022 with 1 d.f.
probability =     0.8810

chi-squared with ties =     0.028 with 1 d.f.
probability =     0.8662


            Dunn's Pairwise Comparison of iknowledge by igender
                              (No adjustment)
Col Mean-|
Row Mean |            1
---------+-----------
       2 |  -0.168503
         |     0.4331

alpha =   0.05
Reject Ho if p = P(Z <= |z|) <= alpha/2

.
. dunntest iparticipate, by(igender)

Warning: by() values are unlabeled, option nolabel implicit


Kruskal-Wallis equality-of-populations rank test

  +-------------------------+
  | igender | Obs | Rank Sum |
  |---------+-----+----------|
  |       1 |  19 |   502.00 |
  |       2 |  44 |  1514.00 |
  +-------------------------+
```

```
chi-squared =     2.520 with 1 d.f.
probability =     0.1124

chi-squared with ties =     2.603 with 1 d.f.
probability =     0.1067


           Dunn's Pairwise Comparison of iparticipate by igender
                             (No adjustment)
Col Mean-|
Row Mean |             1
---------+-----------
       2 |  -1.613363
         |     0.0533

alpha =   0.05
Reject Ho if p = P(Z <= |z|) <= alpha/2

.
. dunntest itotcost, by(igender)

Warning: by() values are unlabeled, option nolabel implicit


Kruskal-Wallis equality-of-populations rank test

  +--------------------------+
  | igender | Obs | Rank Sum |
  |---------+-----+----------|
  |       1 |  19 |   587.50 |
  |       2 |  43 |  1365.50 |
  +--------------------------+

chi-squared =     0.028 with 1 d.f.
probability =     0.8666

chi-squared with ties =     0.042 with 1 d.f.
probability =     0.8380


             Dunn's Pairwise Comparison of itotcost by igender
                             (No adjustment)
Col Mean-|
Row Mean |             1
---------+-----------
       2 |  -0.204490
         |     0.4190

alpha =   0.05
Reject Ho if p = P(Z <= |z|) <= alpha/2
=================================================================================================================
```

- Question – For each of the factor variables (knowledge, participation, and total cost), are there differences in the average response by level of education?

```
. dunntest iknowledge, by(ied)

Warning: by() values are unlabeled, option nolabel implicit


Kruskal-Wallis equality-of-populations rank test

  +----------------------+
  | ied | Obs | Rank Sum |
  |-----+-----+----------|
  |   1 |   1 |    43.00 |
  |   2 |   3 |    96.50 |
  |   3 |  57 |  1751.50 |
  +----------------------+

chi-squared =     0.483 with 2 d.f.
probability =     0.7854

chi-squared with ties =     0.629 with 2 d.f.
probability =     0.7303
```

```
               Dunn's Pairwise Comparison of iknowledge by ied
                                (No adjustment)
Col Mean-|
Row Mean |             1             2
---------+----------------------
       2 |   0.602700
         |     0.2734
         |
       3 |   0.781528   0.156016
         |     0.2172     0.4380

alpha =   0.05
Reject Ho if p = P(Z <= |z|) <= alpha/2

.
. dunntest iparticipate, by(ied)

Warning: by() values are unlabeled, option nolabel implicit


Kruskal-Wallis equality-of-populations rank test

  +----------------------+
  | ied | Obs | Rank Sum |
  |-----+-----+----------|
  |   1 |   1 |    53.00 |
  |   2 |   3 |   137.00 |
  |   3 |  57 |  1701.00 |
  +----------------------+

chi-squared =     3.826 with 2 d.f.
probability =     0.1477

chi-squared with ties =     3.948 with 2 d.f.
probability =     0.1389


              Dunn's Pairwise Comparison of iparticipate by ied
                                (No adjustment)
Col Mean-|
Row Mean |             1             2
---------+----------------------
       2 |   0.363420
         |     0.3581
         |
       3 |   1.313711   1.528732
         |     0.0945     0.0632

alpha =   0.05
Reject Ho if p = P(Z <= |z|) <= alpha/2

.
. dunntest itotcost, by(ied)

Warning: by() values are unlabeled, option nolabel implicit


Kruskal-Wallis equality-of-populations rank test

  +----------------------+
  | ied | Obs | Rank Sum |
  |-----+-----+----------|
  |   1 |   1 |    40.50 |
  |   2 |   3 |    94.00 |
  |   3 |  56 |  1695.50 |
  +----------------------+

chi-squared =     0.344 with 2 d.f.
probability =     0.8420

chi-squared with ties =     0.500 with 2 d.f.
probability =     0.7788


               Dunn's Pairwise Comparison of itotcost by ied
                                (No adjustment)
Col Mean-|
Row Mean |             1             2
```

```
---------+----------------------
       2 |   0.548145
         |     0.2918
         |
       3 |   0.699677   0.123104
         |     0.2421     0.4510

alpha =   0.05
Reject Ho if p = P(Z <= |z|) <= alpha/2
```

===

- Question: For each of the factor variables (knowledge, participation, and total cost), are there differences in the average response based upon racer or ethnicity?

```
. dunntest iknowledge, by(ieth)

Warning: by() values are unlabeled, option nolabel implicit


Kruskal-Wallis equality-of-populations rank test

  +-----------------------+
  | ieth | Obs | Rank Sum |
  |------+-----+----------|
  |    1 |  53 |  1859.50 |
  |    2 |   2 |    22.50 |
  |    3 |   1 |     7.00 |
  |    4 |   4 |    93.00 |
  |    7 |   3 |    34.00 |
  +-----------------------+

chi-squared =    10.649 with 4 d.f.
probability =     0.0308

chi-squared with ties =    13.481 with 4 d.f.
probability =     0.0091


              Dunn's Pairwise Comparison of iknowledge by ieth
                              (No adjustment)
Col Mean-|
Row Mean |            1             2             3             4
---------+--------------------------------------------
       2 |   2.031072
         |     0.0211
         |
       3 |   1.707868   0.213002
         |     0.0438     0.4157
         |
       4 |   1.400992  -0.850533  -0.892152
         |     0.0806     0.1975     0.1862
         |
       7 |   2.456616  -0.005603  -0.230353   0.957716
         |     0.0070     0.4978     0.4089     0.1691

alpha =   0.05
Reject Ho if p = P(Z <= |z|) <= alpha/2

.
. dunntest iparticipate, by(ieth)

Warning: by() values are unlabeled, option nolabel implicit


Kruskal-Wallis equality-of-populations rank test

  +-----------------------+
  | ieth | Obs | Rank Sum |
  |------+-----+----------|
  |    1 |  53 |  1836.00 |
  |    2 |   2 |    24.00 |
  |    3 |   1 |    32.00 |
  |    4 |   4 |    84.50 |
  |    7 |   3 |    39.50 |
  +-----------------------+

chi-squared =     8.056 with 4 d.f.
probability =     0.0895
```

```
chi-squared with ties =     8.321 with 4 d.f.
probability =     0.0805


              Dunn's Pairwise Comparison of iparticipate by ieth
                                 (No adjustment)
Col Mean-|
Row Mean |             1              2              3              4
---------+--------------------------------------------
       2 |   1.742754
         |     0.0407
         |
       3 |   0.145095  -0.905406
         |     0.4423     0.1826
         |
       4 |   1.445287  -0.584200   0.539304
         |     0.0742     0.2795     0.2948
         |
       7 |   2.006289  -0.070859   0.904309   0.577727
         |     0.0224     0.4718     0.1829     0.2817

alpha =   0.05
Reject Ho if p = P(Z <= |z|) <= alpha/2

.
. dunntest itotcost, by(ieth)

Warning: by() values are unlabeled, option nolabel implicit


Kruskal-Wallis equality-of-populations rank test

  +-----------------------+
  | ieth | Obs | Rank Sum |
  |------+-----+----------|
  |    1 |  52 |  1672.00 |
  |    2 |   2 |    54.50 |
  |    3 |   1 |    41.50 |
  |    4 |   4 |   166.00 |
  |    7 |   3 |    19.00 |
  +-----------------------+

chi-squared =     7.553 with 4 d.f.
probability =     0.1094

chi-squared with ties =    11.196 with 4 d.f.
probability =     0.0245


                Dunn's Pairwise Comparison of itotcost by ieth
                               (No adjustment)
Col Mean-|
Row Mean |          1          2           3           4
---------+--------------------------------------------
       2 |   0.459251
         |     0.3230
         |
       3 |  -0.624727  -0.785168
         |     0.2661     0.2162
         |
       4 |  -1.215526  -1.110396   0.000000
         |     0.1121     0.1334     0.5000
         |
       7 |   2.934536   1.546239   2.055206   3.107180
         |     0.0017     0.0610     0.0199     0.0009

alpha =   0.05
Reject Ho if p = P(Z <= |z|) <= alpha/2
```

==

- Question: For each of the factor variables (knowledge, participation, and total cost), are there differences in the average response based experience working in a hospital?

```
. dunntest iknowledge, by(ihwork)

Warning: by() values are unlabeled, option nolabel implicit
```

```
Kruskal-Wallis equality-of-populations rank test

  +-------------------------+
  | ihwork | Obs | Rank Sum |
  |--------+-----+----------|
  |      0 |  38 |  1196.50 |
  |      1 |  16 |   439.00 |
  |      2 |   9 |   380.50 |
  +-------------------------+

chi-squared =     3.850 with 2 d.f.
probability =     0.1458

chi-squared with ties =     4.875 with 2 d.f.
probability =     0.0874


             Dunn's Pairwise Comparison of iknowledge by ihwork
                              (No adjustment)
Col Mean-|
Row Mean |             0            1
---------+----------------------
       1 |   0.834026
         |     0.2021
         |
       2 |  -1.786749  -2.186219
         |     0.0370     0.0144

alpha =   0.05
Reject Ho if p = P(Z <= |z|) <= alpha/2

.
. dunntest iparticipate, by(ihwork)

Warning: by() values are unlabeled, option nolabel implicit


Kruskal-Wallis equality-of-populations rank test

  +-------------------------+
  | ihwork | Obs | Rank Sum |
  |--------+-----+----------|
  |      0 |  38 |  1060.00 |
  |      1 |  16 |   540.00 |
  |      2 |   9 |   416.00 |
  +-------------------------+

chi-squared =     7.470 with 2 d.f.
probability =     0.0239

chi-squared with ties =     7.716 with 2 d.f.
probability =     0.0211


            Dunn's Pairwise Comparison of iparticipate by ihwork
                              (No adjustment)
Col Mean-|
Row Mean |             0            1
---------+----------------------
       1 |  -1.089332
         |     0.1380
         |
       2 |  -2.741107  -1.659641
         |     0.0031     0.0485

alpha =   0.05
Reject Ho if p = P(Z <= |z|) <= alpha/2

.
. dunntest itotcost, by(ihwork)

Warning: by() values are unlabeled, option nolabel implicit


Kruskal-Wallis equality-of-populations rank test

  +-------------------------+
```

```
  | ihwork | Obs | Rank Sum |
  |--------+-----+----------|
  |      0 |  38 |  1081.00 |
  |      1 |  16 |   540.00 |
  |      2 |   8 |   332.00 |
  +-------------------------+

chi-squared =     3.794 with 2 d.f.
probability =     0.1500

chi-squared with ties =     5.625 with 2 d.f.
probability =     0.0601


              Dunn's Pairwise Comparison of itotcost by ihwork
                              (No adjustment)
Col Mean-|
Row Mean |             0             1
---------+----------------------
       1 |  -1.200715
         |     0.1149
         |
       2 |  -2.264381  -1.207799
         |     0.0118     0.1136

alpha =   0.05
Reject Ho if p = P(Z <= |z|) <= alpha/2
```

HPESS Survey Statistics Report

- Question – For each of the questions, 1-10, is there a difference in the average response by age?

  Answer – YES, but for only two questions:
  Q1: age group 1 differed from all of the other groups.
  Q2: age groups 1 and 5 differed from groups 2,3,4, but did not differ from each other.

- Question – For each of the questions, 1-10, is there a difference in the average response by gender?

  Answer – NO – there are no significant differences in responses between genders for any of the 10 questions.

- Question – For each of the questions, 1-10, is there a difference in the average response by level of education

  Answer – YES, for questions 1, 2, 3, and 10

Q1:		1 v. 3	2 v. 3
Q2:		1 v. 3	2 v. 3
Q3:	1 v.2	1 v. 3	2 v. 3
Q10:		1 v. 3	2 v. 3

- Question: For each of the questions, is there a difference in the average response based upon racer or ethnicity

  Answer - NO – there are no significant difference in responses among races or ethnicities for any of the 10 questions.

- Question – For each of the questions, 1-10, is there a difference in the average response if respondent is or was a hospital worker?

  Answer – YES – for questions 1, 2, and 5. For all three questions, group 1 is significantly different from both group 0, and group 2.

==

- Question – For each of the questions, 1-10, is there a difference in the average response by age among those who identified their age group?

```
. dunntest iq1, by(iage) ma(bh) wrap

Kruskal-Wallis equality-of-populations rank test

  +-----------------------+
  | iage | Obs | Rank Sum |
  |------+-----+----------|
  |    1 |   1 |     3.50 |
  |    2 |  23 |   878.50 |
  |    3 |  35 |  1376.50 |
  |    4 |  11 |   456.50 |
  |    5 |   5 |   169.50 |
  |------+-----+----------|
  |    6 |   1 |    41.50 |
  +-----------------------+

chi-squared =      3.004 with 5 d.f.
probability =      0.6994
```

```
chi-squared with ties =    13.768 with 5 d.f.
probability =     0.0171


                 Dunn's Pairwise Comparison of iq1 by iage
                            (Benjamini-Hochberg)
Col Mean-|
Row Mean |          1            2            3            4            5
---------+-----------------------------------------------------------------
       2 |  -3.292779
         |     0.0025
         |
       3 |  -3.424849  -0.409178
         |     0.0023     0.4265
         |
       4 |  -3.527106  -0.873848  -0.609012
         |     0.0032     0.3583     0.3699
         |
       5 |  -2.690371   0.843972   1.100788   1.366042
         |     0.0134     0.3322     0.2903     0.2149
         |
       6 |  -2.604940  -0.313598  -0.207567   0.000000  -0.672593
         |     0.0138     0.4349     0.4476     0.5000     0.3759

False Discovery Rate =   0.05
Reject Ho if p = P(Z <= |z|) <= FDR/2 with stopping rule


. dunntest iq2, by(iage) ma(bh) wrap

Kruskal-Wallis equality-of-populations rank test

  +------------------------+
  | iage | Obs | Rank Sum |
  |------+-----+----------|
  |    1 |   1 |     4.50 |
  |    2 |  22 |   849.00 |
  |    3 |  35 |  1357.50 |
  |    4 |  11 |   462.00 |
  |    5 |   5 |   172.50 |
  |------+-----+----------|
  |    6 |   1 |     4.50 |
  +------------------------+

chi-squared =     5.286 with 5 d.f.
probability =     0.3819

chi-squared with ties =    18.489 with 5 d.f.
probability =     0.0024


                 Dunn's Pairwise Comparison of iq2 by iage
                            (Benjamini-Hochberg)
Col Mean-|
Row Mean |          1            2            3            4            5
---------+-----------------------------------------------------------------
       2 |  -2.861006
         |     0.0063
         |
       3 |  -2.900874  -0.061439
         |     0.0070     0.5095
         |
       4 |  -3.080845  -0.792177  -0.797937
         |     0.0155     0.2920     0.3187
         |
       5 |  -2.349976   0.708544   0.769210   1.193206
         |     0.0201     0.2761     0.2761     0.1940
         |
       6 |   0.000000   2.861006   2.900874   3.080845   2.349976
         |     0.5000     0.0053     0.0093     0.0077     0.0176

False Discovery Rate =   0.05
Reject Ho if p = P(Z <= |z|) <= FDR/2 with stopping rule


. dunntest iq3, by(iage) ma(bh) wrap

Kruskal-Wallis equality-of-populations rank test
```

```
  +-----------------------+
  | iage | Obs | Rank Sum |
  |------+-----+----------|
  |    1 |   1 |     7.00 |
  |    2 |  23 |   921.00 |
  |    3 |  35 |  1347.00 |
  |    4 |  11 |   419.00 |
  |    5 |   5 |   187.00 |
  |------+-----+----------|
  |    6 |   1 |    45.00 |
  +-----------------------+

chi-squared =     2.250 with 5 d.f.
probability =     0.8136

chi-squared with ties =     5.288 with 5 d.f.
probability =     0.3817


                 Dunn's Pairwise Comparison of iq3 by iage
                            (Benjamini-Hochberg)
Col Mean-|
Row Mean |             1              2              3              4              5
---------+-----------------------------------------------------------------
       2 |  -2.245722
         |     0.1854
         |
       3 |  -2.155302   0.402900
         |     0.1168     0.5725
         |
       4 |  -2.066574   0.369776   0.079295
         |     0.0969     0.4851     0.4684
         |
       5 |  -1.926615   0.371927   0.157658   0.088931
         |     0.1013     0.5325     0.5046     0.4978
         |
       6 |  -1.865437  -0.336858  -0.445925  -0.459239  -0.481654
         |     0.0932     0.4601     0.6147     0.6922     0.7876

False Discovery Rate =   0.05
Reject Ho if p = P(Z <= |z|) <= FDR/2 with stopping rule



. dunntest iq4, by(iage) ma(bh) wrap

Kruskal-Wallis equality-of-populations rank test

  +-----------------------+
  | iage | Obs | Rank Sum |
  |------+-----+----------|
  |    1 |   1 |    13.00 |
  |    2 |  23 |   934.00 |
  |    3 |  36 |  1433.50 |
  |    4 |  11 |   362.00 |
  |    5 |   5 |   211.00 |
  |------+-----+----------|
  |    6 |   1 |    49.50 |
  +-----------------------+

chi-squared =     2.656 with 5 d.f.
probability =     0.7529

chi-squared with ties =     4.393 with 5 d.f.
probability =     0.4944


                 Dunn's Pairwise Comparison of iq4 by iage
                            (Benjamini-Hochberg)
Col Mean-|
Row Mean |             1              2              3              4              5
---------+-----------------------------------------------------------------
       2 |  -1.553696
         |     0.9019
         |
       3 |  -1.520764   0.169968
         |     0.3208     0.4325
         |
```

```
       4 |  -1.095769   1.207400   1.153083
         |     0.2927     0.3409     0.3111
         |
       5 |  -1.532336  -0.185389  -0.286737  -0.990242
         |     0.4704     0.4569     0.4467     0.3019
         |
       6 |  -1.483678  -0.500363  -0.548924  -0.913141  -0.383084
         |     0.2586     0.4206     0.4373     0.3010     0.4385

False Discovery Rate =   0.05
Reject Ho if p = P(Z <= |z|) <= FDR/2 with stopping rule


. dunntest iq5, by(iage) ma(bh) wrap

Kruskal-Wallis equality-of-populations rank test

  +------------------------+
  | iage | Obs | Rank Sum |
  |------+-----+----------|
  |    1 |   1 |     7.00 |
  |    2 |  23 |   836.00 |
  |    3 |  35 |  1476.50 |
  |    4 |  11 |   377.00 |
  |    5 |   5 |   185.00 |
  |------+-----+----------|
  |    6 |   1 |    44.50 |
  +------------------------+

chi-squared =     3.728 with 5 d.f.
probability =     0.5892

chi-squared with ties =     9.323 with 5 d.f.
probability =     0.0968


                 Dunn's Pairwise Comparison of iq5 by iage
                            (Benjamini-Hochberg)
Col Mean-|
Row Mean |              1              2              3              4              5
---------+--------------------------------------------------------------
       2 |  -2.057391
         |     0.1487
         |
       3 |  -2.484459  -1.557480
         |     0.0973     0.1279
         |
       4 |  -1.869894   0.405361   1.639361
         |     0.0922     0.4283     0.1264
         |
       5 |  -1.961161  -0.094649   0.776748  -0.362103
         |     0.1247     0.4623     0.4100     0.4138
         |
       6 |  -1.898886  -0.571498  -0.163411  -0.701210  -0.490290
         |     0.1080     0.4257     0.4662     0.4026     0.4254

False Discovery Rate =   0.05
Reject Ho if p = P(Z <= |z|) <= FDR/2 with stopping rule


. dunntest iq6, by(iage) ma(bh) wrap

Kruskal-Wallis equality-of-populations rank test

  +------------------------+
  | iage | Obs | Rank Sum |
  |------+-----+----------|
  |    1 |   1 |    11.00 |
  |    2 |  23 |   841.50 |
  |    3 |  35 |  1397.00 |
  |    4 |  11 |   468.50 |
  |    5 |   5 |   161.50 |
  |------+-----+----------|
  |    6 |   1 |    46.50 |
  +------------------------+

chi-squared =     2.770 with 5 d.f.
probability =     0.7354
```

```
chi-squared with ties =     5.486 with 5 d.f.
probability =     0.3595


                 Dunn's Pairwise Comparison of iq6 by iage
                            (Benjamini-Hochberg)
Col Mean-|
Row Mean |          1            2            3            4            5
---------+-------------------------------------------------------
       2 |  -1.596368
         |     0.2070
         |
       3 |  -1.816984  -0.790016
         |     0.2596     0.3221
         |
       4 |  -1.927631  -1.043792  -0.493509
         |     0.4043     0.3178     0.3586
         |
       5 |  -1.239210   0.553701   1.015019   1.215993
         |     0.3229     0.3624     0.2907     0.2800
         |
       6 |  -1.599813  -0.618474  -0.413849  -0.238527  -0.826140
         |     0.2741     0.3656     0.3637     0.4057     0.3406

False Discovery Rate =   0.05
Reject Ho if p = P(Z <= |z|) <= FDR/2 with stopping rule


. dunntest iq7, by(iage) ma(bh) wrap

Kruskal-Wallis equality-of-populations rank test

  +------------------------+
  | iage | Obs | Rank Sum |
  |------+-----+----------|
  |    1 |   1 |    13.50 |
  |    2 |  22 |   819.00 |
  |    3 |  35 |  1270.50 |
  |    4 |  11 |   493.50 |
  |    5 |   5 |   205.50 |
  |------+-----+----------|
  |    6 |   1 |    48.00 |
  +------------------------+

chi-squared =     2.907 with 5 d.f.
probability =     0.7143

chi-squared with ties =     4.855 with 5 d.f.
probability =     0.4338


                 Dunn's Pairwise Comparison of iq7 by iage
                            (Benjamini-Hochberg)
Col Mean-|
Row Mean |          1            2            3            4            5
---------+-------------------------------------------------------
       2 |  -1.376058
         |     0.2532
         |
       3 |  -1.333089   0.202096
         |     0.2281     0.4499
         |
       4 |  -1.780629  -1.226249  -1.469099
         |     0.5623     0.2358     0.3545
         |
       5 |  -1.494032  -0.463525  -0.595349   0.413781
         |     0.5069     0.4384     0.4137     0.4244
         |
       6 |  -1.446590  -0.624762  -0.684085  -0.178063  -0.373508
         |     0.2775     0.4434     0.4631     0.4293     0.4089

False Discovery Rate =   0.05
Reject Ho if p = P(Z <= |z|) <= FDR/2 with stopping rule


. dunntest iq8, by(iage) ma(bh) wrap

Kruskal-Wallis equality-of-populations rank test
```

```
  +-----------------------+
  | iage | Obs | Rank Sum |
  |------+-----+----------|
  |    1 |   1 |    16.00 |
  |    2 |  23 |   896.00 |
  |    3 |  35 |  1360.00 |
  |    4 |  11 |   356.00 |
  |    5 |   5 |   239.50 |
  |------+-----+----------|
  |    6 |   1 |    58.50 |
  +-----------------------+

chi-squared =     3.633 with 5 d.f.
probability =     0.6034

chi-squared with ties =     4.157 with 5 d.f.
probability =     0.5270


                 Dunn's Pairwise Comparison of iq8 by iage
                            (Benjamini-Hochberg)
Col Mean-|
Row Mean |            1            2            3            4            5
---------+-------------------------------------------------------
       2 |  -1.088658
         |     0.3454
         |
       3 |  -1.091772   0.017935
         |     0.4124     0.4928
         |
       4 |  -0.758949   0.871211   0.910035
         |     0.2584     0.2398     0.2721
         |
       5 |  -1.410676  -0.878018  -0.916267  -1.395398
         |     0.5938     0.2590     0.2996     0.4072
         |
       6 |  -1.455798  -0.926803  -0.938242  -1.212211  -0.468751
         |     1.0000     0.3319     0.3730     0.4227     0.3425

False Discovery Rate =   0.05
Reject Ho if p = P(Z <= |z|) <= FDR/2 with stopping rule



. dunntest iq9, by(iage) ma(bh) wrap

Kruskal-Wallis equality-of-populations rank test

  +-----------------------+
  | iage | Obs | Rank Sum |
  |------+-----+----------|
  |    1 |   1 |    26.50 |
  |    2 |  23 |   844.00 |
  |    3 |  35 |  1377.00 |
  |    4 |  11 |   443.50 |
  |    5 |   5 |   208.50 |
  |------+-----+----------|
  |    6 |   1 |    26.50 |
  +-----------------------+

chi-squared =     0.975 with 5 d.f.
probability =     0.9646

chi-squared with ties =     1.158 with 5 d.f.
probability =     0.9488


                 Dunn's Pairwise Comparison of iq9 by iage
                            (Benjamini-Hochberg)
Col Mean-|
Row Mean |            1            2            3            4            5
---------+-------------------------------------------------------
       2 |  -0.492653
         |     0.5834
         |
       3 |  -0.625047  -0.486788
         |     0.7979     0.4271
         |
       4 |  -0.653017  -0.487754  -0.139274
```

```
         |     0.9633     0.4693     0.5130
         |
       5 |  -0.684890  -0.500594  -0.243357  -0.126456
         |     1.0000     0.6607     0.5048     0.4818
         |
       6 |   0.000000   0.492653   0.625047   0.653017   0.684890
         |     0.5000     0.5185     0.6649     1.0000     1.0000

False Discovery Rate =   0.05
Reject Ho if p = P(Z <= |z|) <= FDR/2 with stopping rule


. dunntest iq10, by(iage) ma(bh) wrap

Kruskal-Wallis equality-of-populations rank test

  +------------------------+
  | iage | Obs | Rank Sum |
  |------+-----+----------|
  |    1 |   1 |     6.50 |
  |    2 |  23 |   856.50 |
  |    3 |  35 |  1427.50 |
  |    4 |  11 |   409.00 |
  |    5 |   5 |   182.50 |
  |------+-----+----------|
  |    6 |   1 |    44.00 |
  +------------------------+

chi-squared =     2.692 with 5 d.f.
probability =     0.7473

chi-squared with ties =     7.233 with 5 d.f.
probability =     0.2039


                 Dunn's Pairwise Comparison of iq10 by iage
                            (Benjamini-Hochberg)
Col Mean-|
Row Mean |          1            2            3            4            5
---------+-------------------------------------------------------
       2 |  -2.233632
         |     0.0957
         |
       3 |  -2.509329  -0.980744
         |     0.0907     0.4084
         |
       4 |  -2.180462   0.011605   0.773901
         |     0.0731     0.4954     0.4703
         |
       5 |  -2.032789   0.111187   0.665386   0.093832
         |     0.0789     0.5258     0.4742     0.4957
         |
       6 |  -1.968240  -0.491273  -0.235250  -0.484547  -0.508197
         |     0.0736     0.4674     0.5088     0.4282     0.5094

False Discovery Rate =   0.05
Reject Ho if p = P(Z <= |z|) <= FDR/2 with stopping rule
```

- Question – For each of the questions, 1-10, is there a difference in the average response <u>by gender</u>?

```
. ranksum iq1, by(igender)

Two-sample Wilcoxon rank-sum (Mann-Whitney) test

     igender |      obs    rank sum    expected
-------------+---------------------------------
           1 |       17       629.5       654.5
           2 |       59      2296.5      2271.5
-------------+---------------------------------
    combined |       76        2926        2926

unadjusted variance     6435.92
adjustment for ties    -5031.72
                     ----------
adjusted variance       1404.20
```

```
Ho: iq1(igender==1) = iq1(igender==2)
             z =  -0.667
    Prob > |z| =   0.5047

.
. ranksum iq2, by(igender)

Two-sample Wilcoxon rank-sum (Mann-Whitney) test

     igender |      obs    rank sum    expected
-------------+---------------------------------
           1 |       17         564         646
           2 |       58        2286        2204
-------------+---------------------------------
    combined |       75        2850        2850

unadjusted variance     6244.67
adjustment for ties    -4459.21
                     ----------
adjusted variance       1785.46

Ho: iq2(igender==1) = iq2(igender==2)
             z =  -1.941
    Prob > |z| =   0.0523

.
. ranksum iq3, by(igender)

Two-sample Wilcoxon rank-sum (Mann-Whitney) test

     igender |      obs    rank sum    expected
-------------+---------------------------------
           1 |       17         613       654.5
           2 |       59        2313      2271.5
-------------+---------------------------------
    combined |       76        2926        2926

unadjusted variance     6435.92
adjustment for ties    -3697.73
                     ----------
adjusted variance       2738.19

Ho: iq3(igender==1) = iq3(igender==2)
             z =  -0.793
    Prob > |z| =   0.4277

.
. ranksum iq4, by(igender)

Two-sample Wilcoxon rank-sum (Mann-Whitney) test

     igender |      obs    rank sum    expected
-------------+---------------------------------
           1 |       17         659         663
           2 |       60        2344        2340
-------------+---------------------------------
    combined |       77        3003        3003

unadjusted variance     6630.00
adjustment for ties    -2621.46
                     ----------
adjusted variance       4008.54

Ho: iq4(igender==1) = iq4(igender==2)
             z =  -0.063
    Prob > |z| =   0.9496

.
. ranksum iq5, by(igender)

Two-sample Wilcoxon rank-sum (Mann-Whitney) test

     igender |      obs    rank sum    expected
-------------+---------------------------------
           1 |       17       600.5       654.5
           2 |       59      2325.5      2271.5
-------------+---------------------------------
    combined |       76        2926        2926
```

```
unadjusted variance     6435.92
adjustment for ties    -3862.43
                     ----------
adjusted variance       2573.49

Ho: iq5(igender==1) = iq5(igender==2)
             z =  -1.064
    Prob > |z| =   0.2871

.
. ranksum iq6, by(igender)

Two-sample Wilcoxon rank-sum (Mann-Whitney) test

     igender |      obs    rank sum    expected
-------------+---------------------------------
           1 |       17         684       654.5
           2 |       59        2242      2271.5
-------------+---------------------------------
    combined |       76        2926        2926

unadjusted variance     6435.92
adjustment for ties    -3186.72
                     ----------
adjusted variance       3249.19

Ho: iq6(igender==1) = iq6(igender==2)
             z =   0.518
    Prob > |z| =   0.6048

.
. ranksum iq7, by(igender)

Two-sample Wilcoxon rank-sum (Mann-Whitney) test

     igender |      obs    rank sum    expected
-------------+---------------------------------
           1 |       17         599         646
           2 |       58        2251        2204
-------------+---------------------------------
    combined |       75        2850        2850

unadjusted variance     6244.67
adjustment for ties    -2505.86
                     ----------
adjusted variance       3738.81

Ho: iq7(igender==1) = iq7(igender==2)
             z =  -0.769
    Prob > |z| =   0.4421

.
. ranksum iq8, by(igender)

Two-sample Wilcoxon rank-sum (Mann-Whitney) test

     igender |      obs    rank sum    expected
-------------+---------------------------------
           1 |       17       610.5       654.5
           2 |       59      2315.5      2271.5
-------------+---------------------------------
    combined |       76        2926        2926

unadjusted variance     6435.92
adjustment for ties     -812.08
                     ----------
adjusted variance       5623.84

Ho: iq8(igender==1) = iq8(igender==2)
             z =  -0.587
    Prob > |z| =   0.5574

.
. ranksum iq9, by(igender)

Two-sample Wilcoxon rank-sum (Mann-Whitney) test

     igender |      obs    rank sum    expected
```

```
-------------+---------------------------------
           1 |       17         597       654.5
           2 |       59        2329      2271.5
-------------+---------------------------------
    combined |       76        2926        2926

unadjusted variance     6435.92
adjustment for ties    -1019.01
                     ----------
adjusted variance       5416.90

Ho: iq9(igender==1) = iq9(igender==2)
             z =  -0.781
    Prob > |z| =   0.4347

.
. ranksum iq10, by(igender)

Two-sample Wilcoxon rank-sum (Mann-Whitney) test

     igender |      obs    rank sum    expected
-------------+---------------------------------
           1 |       17       635.5       654.5
           2 |       59      2290.5      2271.5
-------------+---------------------------------
    combined |       76        2926        2926

unadjusted variance     6435.92
adjustment for ties    -4040.59
                     ----------
adjusted variance       2395.32

Ho: iq10(igender==1) = iq10(igender==2)
             z =  -0.388
    Prob > |z| =   0.6979

-----------------------------------------------------------------------------------------------------------------------
```

- Question – For each of the questions, 1-10, is there a difference in the average response by level of education

```
. dunntest iq1, by(ied) ma(bh) wrap

Warning: by() values are unlabeled, option nolabel implicit


Kruskal-Wallis equality-of-populations rank test

  +----------------------+
  | ied | Obs | Rank Sum |
  |-----+-----+----------|
  |   1 |  26 |   965.00 |
  |   2 |  49 |  1957.50 |
  |   3 |   1 |     3.50 |
  +----------------------+

chi-squared =     2.825 with 2 d.f.
probability =     0.2435

chi-squared with ties =    12.949 with 2 d.f.
probability =     0.0015


                  Dunn's Pairwise Comparison of iq1 by ied
                            (Benjamini-Hochberg)
Col Mean-|
Row Mean |             1             2
---------+----------------------
       2 |  -1.132195
         |     0.1288
         |
       3 |   3.197953   3.498063
         |     0.0010     0.0007

False Discovery Rate =   0.05
Reject Ho if p = P(Z <= |z|) <= FDR/2 with stopping rule

.
. dunntest iq2, by(ied) ma(bh) wrap
```

```
Warning: by() values are unlabeled, option nolabel implicit


Kruskal-Wallis equality-of-populations rank test

  +-----------------------+
  | ied | Obs | Rank Sum |
  |-----+-----+----------|
  |   1 |  26 |   979.50 |
  |   2 |  48 |  1866.00 |
  |   3 |   1 |     4.50 |
  +-----------------------+

chi-squared =     2.446 with 2 d.f.
probability =     0.2944

chi-squared with ties =     8.554 with 2 d.f.
probability =     0.0139


                  Dunn's Pairwise Comparison of iq2 by ied
                            (Benjamini-Hochberg)
Col Mean-|
Row Mean |             1            2
---------+----------------------
       2 |  -0.423546
         |     0.3359
         |
       3 |   2.793337   2.919430
         |     0.0039     0.0053

False Discovery Rate =   0.05
Reject Ho if p = P(Z <= |z|) <= FDR/2 with stopping rule

.
. dunntest iq3, by(ied) ma(bh) wrap

Warning: by() values are unlabeled, option nolabel implicit


Kruskal-Wallis equality-of-populations rank test

  +-----------------------+
  | ied | Obs | Rank Sum |
  |-----+-----+----------|
  |   1 |  26 |   904.00 |
  |   2 |  49 |  2015.00 |
  |   3 |   1 |     7.00 |
  +-----------------------+

chi-squared =     3.468 with 2 d.f.
probability =     0.1766

chi-squared with ties =     8.151 with 2 d.f.
probability =     0.0170


                  Dunn's Pairwise Comparison of iq3 by ied
                            (Benjamini-Hochberg)
Col Mean-|
Row Mean |             1            2
---------+----------------------
       2 |  -1.817857
         |     0.0345
         |
       3 |   1.891823   2.345120
         |     0.0439     0.0285

False Discovery Rate =   0.05
Reject Ho if p = P(Z <= |z|) <= FDR/2 with stopping rule

.
. dunntest iq4, by(ied) ma(bh) wrap

Warning: by() values are unlabeled, option nolabel implicit


Kruskal-Wallis equality-of-populations rank test
```

```
  +----------------------+
  | ied | Obs | Rank Sum |
  |-----+-----+----------|
  |   1 |  26 |  1021.50 |
  |   2 |  50 |  1968.50 |
  |   3 |   1 |    13.00 |
  +----------------------+

chi-squared =     1.369 with 2 d.f.
probability =     0.5044

chi-squared with ties =     2.264 with 2 d.f.
probability =     0.3224


                  Dunn's Pairwise Comparison of iq4 by ied
                            (Benjamini-Hochberg)
Col Mean-|
Row Mean |            1            2
---------+----------------------
       2 |  -0.019386
         |     0.4923
         |
       3 |   1.482968   1.500969
         |     0.1036     0.2000

False Discovery Rate =   0.05
Reject Ho if p = P(Z <= |z|) <= FDR/2 with stopping rule

.
. dunntest iq5, by(ied) ma(bh) wrap

Warning: by() values are unlabeled, option nolabel implicit


Kruskal-Wallis equality-of-populations rank test

  +----------------------+
  | ied | Obs | Rank Sum |
  |-----+-----+----------|
  |   1 |  26 |  1044.50 |
  |   2 |  49 |  1874.50 |
  |   3 |   1 |     7.00 |
  +----------------------+

chi-squared =     2.190 with 2 d.f.
probability =     0.3345

chi-squared with ties =     5.477 with 2 d.f.
probability =     0.0647


                  Dunn's Pairwise Comparison of iq5 by ied
                            (Benjamini-Hochberg)
Col Mean-|
Row Mean |            1            2
---------+----------------------
       2 |   0.566082
         |     0.2857
         |
       3 |   2.331166   2.215729
         |     0.0296     0.0200

False Discovery Rate =   0.05
Reject Ho if p = P(Z <= |z|) <= FDR/2 with stopping rule

.
. dunntest iq6, by(ied) ma(bh) wrap

Warning: by() values are unlabeled, option nolabel implicit


Kruskal-Wallis equality-of-populations rank test

  +----------------------+
  | ied | Obs | Rank Sum |
  |-----+-----+----------|
  |   1 |  26 |  1024.00 |
```

```
  |   2 |  49 |  1891.00 |
  |   3 |   1 |    11.00 |
  +-----------------------+

chi-squared =     1.593 with 2 d.f.
probability =     0.4508

chi-squared with ties =     3.156 with 2 d.f.
probability =     0.2064


                  Dunn's Pairwise Comparison of iq6 by ied
                            (Benjamini-Hochberg)
Col Mean-|
Row Mean |             1             2
---------+----------------------
       2 |   0.208239
         |     0.4175
         |
       3 |   1.775186   1.740803
         |     0.1138     0.0613

False Discovery Rate =   0.05
Reject Ho if p = P(Z <= |z|) <= FDR/2 with stopping rule

.
. dunntest iq7, by(ied) ma(bh) wrap

Warning: by() values are unlabeled, option nolabel implicit


Kruskal-Wallis equality-of-populations rank test

  +-----------------------+
  | ied | Obs | Rank Sum |
  |-----+-----+----------|
  |   1 |  26 |  1065.50 |
  |   2 |  48 |  1771.00 |
  |   3 |   1 |    13.50 |
  +-----------------------+

chi-squared =     1.873 with 2 d.f.
probability =     0.3920

chi-squared with ties =     3.129 with 2 d.f.
probability =     0.2092


                  Dunn's Pairwise Comparison of iq7 by ied
                            (Benjamini-Hochberg)
Col Mean-|
Row Mean |             1             2
---------+----------------------
       2 |   0.994759
         |     0.1599
         |
       3 |   1.599098   1.373101
         |     0.1647     0.1273

False Discovery Rate =   0.05
Reject Ho if p = P(Z <= |z|) <= FDR/2 with stopping rule

.
. dunntest iq8, by(ied) ma(bh) wrap

Warning: by() values are unlabeled, option nolabel implicit


Kruskal-Wallis equality-of-populations rank test

  +-----------------------+
  | ied | Obs | Rank Sum |
  |-----+-----+----------|
  |   1 |  26 |  1025.50 |
  |   2 |  49 |  1868.50 |
  |   3 |   1 |    32.00 |
  +-----------------------+

chi-squared =     0.148 with 2 d.f.
```

```
probability =     0.9289

chi-squared with ties =     0.169 with 2 d.f.
probability =     0.9190


                  Dunn's Pairwise Comparison of iq8 by ied
                            (Benjamini-Hochberg)
Col Mean-|
Row Mean |            1             2
---------+----------------------
       2 |   0.261480
         |     0.3969
         |
       3 |   0.353785   0.294096
         |     1.0000     0.5765

False Discovery Rate =   0.05
Reject Ho if p = P(Z <= |z|) <= FDR/2 with stopping rule

.
. dunntest iq9, by(ied) ma(bh) wrap

Warning: by() values are unlabeled, option nolabel implicit


Kruskal-Wallis equality-of-populations rank test

  +----------------------+
  | ied | Obs | Rank Sum |
  |-----+-----+----------|
  |   1 |  26 |  1086.50 |
  |   2 |  49 |  1813.00 |
  |   3 |   1 |    26.50 |
  +----------------------+

chi-squared =     1.098 with 2 d.f.
probability =     0.5776

chi-squared with ties =     1.304 with 2 d.f.
probability =     0.5209


                  Dunn's Pairwise Comparison of iq9 by ied
                            (Benjamini-Hochberg)
Col Mean-|
Row Mean |            1             2
---------+----------------------
       2 |   0.974133
         |     0.4950
         |
       3 |   0.740520   0.513063
         |     0.3442     0.3040

False Discovery Rate =   0.05
Reject Ho if p = P(Z <= |z|) <= FDR/2 with stopping rule

.
. dunntest iq10, by(ied) ma(bh) wrap

Warning: by() values are unlabeled, option nolabel implicit


Kruskal-Wallis equality-of-populations rank test

  +----------------------+
  | ied | Obs | Rank Sum |
  |-----+-----+----------|
  |   1 |  26 |   956.50 |
  |   2 |  49 |  1963.00 |
  |   3 |   1 |     6.50 |
  +----------------------+

chi-squared =     2.501 with 2 d.f.
probability =     0.2864

chi-squared with ties =     6.720 with 2 d.f.
probability =     0.0347
```

```
                 Dunn's Pairwise Comparison of iq10 by ied
                            (Benjamini-Hochberg)
Col Mean-|
Row Mean |            1             2
---------+----------------------
       2 |  -1.001222
         |     0.1584
         |
       3 |   2.206194   2.466110
         |     0.0205     0.0205

False Discovery Rate =   0.05
Reject Ho if p = P(Z <= |z|) <= FDR/2 with stopping rule
```

- Question: For each of the questions, is there a difference in the average response based upon racer or ethnicity

```
. dunntest iq1, by(ieth) ma(bh) wrap

Warning: by() values are unlabeled, option nolabel implicit


Kruskal-Wallis equality-of-populations rank test

  +-----------------------+
  | ieth | Obs | Rank Sum |
  |------+-----+----------|
  |    1 |  39 |  1542.50 |
  |    2 |  12 |   460.00 |
  |    3 |  20 |   716.00 |
  |    4 |   3 |   124.50 |
  |    7 |   2 |    83.00 |
  +-----------------------+

chi-squared =     0.480 with 4 d.f.
probability =     0.9754

chi-squared with ties =     2.201 with 4 d.f.
probability =     0.6988


                 Dunn's Pairwise Comparison of iq1 by ieth
                            (Benjamini-Hochberg)
Col Mean-|
Row Mean |            1             2             3             4
---------+--------------------------------------------
       2 |   0.357681
         |     0.5147
         |
       3 |   1.322301   0.672593
         |     0.9303     0.6265
         |
       4 |  -0.315316  -0.475595  -0.892515
         |     0.4703     0.6344     0.9303
         |
       7 |  -0.260575  -0.401951  -0.745114   0.000000
         |     0.4413     0.5731     0.7603     0.5000

False Discovery Rate =   0.05
Reject Ho if p = P(Z <= |z|) <= FDR/2 with stopping rule

.
. dunntest iq2, by(ieth) ma(bh) wrap

Warning: by() values are unlabeled, option nolabel implicit


Kruskal-Wallis equality-of-populations rank test

  +-----------------------+
  | ieth | Obs | Rank Sum |
  |------+-----+----------|
  |    1 |  38 |  1483.50 |
  |    2 |  12 |   429.00 |
  |    3 |  20 |   727.50 |
```

```
  |    4 |   3 |   126.00 |
  |    7 |   2 |    84.00 |
  +-----------------------+

chi-squared =     0.494 with 4 d.f.
probability =     0.9741

chi-squared with ties =     1.728 with 4 d.f.
probability =     0.7857


                 Dunn's Pairwise Comparison of iq2 by ieth
                            (Benjamini-Hochberg)
Col Mean-|
Row Mean |            1            2            3            4
---------+--------------------------------------------
       2 |   0.852426
         |     1.0000
         |
       3 |   0.827632  -0.146874
         |     0.6798     0.4907
         |
       4 |  -0.423606  -0.830842  -0.779591
         |     0.4799     1.0000     0.5445
         |
       7 |  -0.350170  -0.702190  -0.650840   0.000000
         |     0.4539     0.4826     0.4293     0.5000

False Discovery Rate =   0.05
Reject Ho if p = P(Z <= |z|) <= FDR/2 with stopping rule

.
. dunntest iq3, by(ieth) ma(bh) wrap

Warning: by() values are unlabeled, option nolabel implicit


Kruskal-Wallis equality-of-populations rank test

  +-----------------------+
  | ieth | Obs | Rank Sum |
  |------+-----+----------|
  |    1 |  39 |  1641.00 |
  |    2 |  12 |   350.00 |
  |    3 |  20 |   710.00 |
  |    4 |   3 |   135.00 |
  |    7 |   2 |    90.00 |
  +-----------------------+

chi-squared =     3.969 with 4 d.f.
probability =     0.4102

chi-squared with ties =     9.329 with 4 d.f.
probability =     0.0534


                 Dunn's Pairwise Comparison of iq3 by ieth
                            (Benjamini-Hochberg)
Col Mean-|
Row Mean |            1            2            3            4
---------+--------------------------------------------
       2 |   2.715092
         |     0.0331
         |
       3 |   1.660183  -1.204134
         |     0.1615     0.2285
         |
       4 |  -0.338704  -1.702903  -1.065239
         |     0.4593     0.2215     0.2390
         |
       7 |  -0.279903  -1.439216  -0.889312   0.000000
         |     0.4331     0.1876     0.2670     0.5000

False Discovery Rate =   0.05
Reject Ho if p = P(Z <= |z|) <= FDR/2 with stopping rule

.
. dunntest iq4, by(ieth) ma(bh) wrap
```

```
Warning: by() values are unlabeled, option nolabel implicit


Kruskal-Wallis equality-of-populations rank test

  +-----------------------+
  | ieth | Obs | Rank Sum |
  |------+-----+----------|
  |    1 |  39 |  1584.50 |
  |    2 |  12 |   474.00 |
  |    3 |  20 |   733.00 |
  |    4 |   3 |    37.50 |
  |    7 |   2 |    97.00 |
  +-----------------------+

chi-squared =     5.096 with 4 d.f.
probability =     0.2776

chi-squared with ties =     8.628 with 4 d.f.
probability =     0.0711


                 Dunn's Pairwise Comparison of iq4 by ieth
                            (Benjamini-Hochberg)
Col Mean-|
Row Mean |             1             2             3             4
---------+--------------------------------------------
       2 |   0.201372
         |     0.4202
         |
       3 |   0.852280   0.459885
         |     0.3284     0.3587
         |
       4 |   2.766202   2.464580   2.298277
         |     0.0284     0.0343     0.0269
         |
       7 |  -0.639739  -0.694317  -0.941479  -2.323629
         |     0.3265     0.3482     0.3465     0.0336

False Discovery Rate =   0.05
Reject Ho if p = P(Z <= |z|) <= FDR/2 with stopping rule

.
. dunntest iq5, by(ieth) ma(bh) wrap

Warning: by() values are unlabeled, option nolabel implicit


Kruskal-Wallis equality-of-populations rank test

  +-----------------------+
  | ieth | Obs | Rank Sum |
  |------+-----+----------|
  |    1 |  39 |  1585.50 |
  |    2 |  12 |   384.00 |
  |    3 |  20 |   771.50 |
  |    4 |   3 |    96.00 |
  |    7 |   2 |    89.00 |
  +-----------------------+

chi-squared =     1.818 with 4 d.f.
probability =     0.7691

chi-squared with ties =     4.548 with 4 d.f.
probability =     0.3369


                 Dunn's Pairwise Comparison of iq5 by ieth
                            (Benjamini-Hochberg)
Col Mean-|
Row Mean |             1             2             3             4
---------+--------------------------------------------
       2 |   1.877283
         |     0.3024
         |
       3 |   0.541285  -1.289464
         |     0.3677     0.4931
         |
       4 |   1.034332   0.000000   0.760484
```

```
          |     0.3762     0.5000     0.3725
          |
        7 |  -0.379896  -1.172018  -0.572123  -0.980581
          |     0.3911     0.4020     0.4052     0.3268

False Discovery Rate =   0.05
Reject Ho if p = P(Z <= |z|) <= FDR/2 with stopping rule

.
. dunntest iq6, by(ieth) ma(bh) wrap

Warning: by() values are unlabeled, option nolabel implicit


Kruskal-Wallis equality-of-populations rank test

  +------------------------+
  | ieth | Obs | Rank Sum |
  |------+-----+----------|
  |    1 |  39 |  1547.50 |
  |    2 |  12 |   479.50 |
  |    3 |  20 |   666.50 |
  |    4 |   3 |   139.50 |
  |    7 |   2 |    93.00 |
  +------------------------+

chi-squared =     1.918 with 4 d.f.
probability =     0.7508

chi-squared with ties =     3.799 with 4 d.f.
probability =     0.4338


                 Dunn's Pairwise Comparison of iq6 by ieth
                            (Benjamini-Hochberg)
Col Mean-|
Row Mean |            1             2             3             4
---------+--------------------------------------------
        2 |  -0.053834
          |     0.5317
          |
        3 |   1.472508   1.157760
          |     0.7044     0.4116
          |
        4 |  -0.725506  -0.645877  -1.356183
          |     0.4681     0.4320     0.4376
          |
        7 |  -0.599554  -0.545866  -1.132205   0.000000
          |     0.3920     0.3657     0.3219     0.5000

False Discovery Rate =   0.05
Reject Ho if p = P(Z <= |z|) <= FDR/2 with stopping rule

.
. dunntest iq7, by(ieth) ma(bh) wrap

Warning: by() values are unlabeled, option nolabel implicit


Kruskal-Wallis equality-of-populations rank test

  +------------------------+
  | ieth | Obs | Rank Sum |
  |------+-----+----------|
  |    1 |  38 |  1459.00 |
  |    2 |  12 |   507.00 |
  |    3 |  20 |   644.00 |
  |    4 |   3 |   144.00 |
  |    7 |   2 |    96.00 |
  +------------------------+

chi-squared =     2.938 with 4 d.f.
probability =     0.5683

chi-squared with ties =     4.907 with 4 d.f.
probability =     0.2970


                 Dunn's Pairwise Comparison of iq7 by ieth
```

```
                            (Benjamini-Hochberg)
Col Mean-|
Row Mean |              1              2              3              4
---------+--------------------------------------------
       2 |  -0.690387
         |     0.3500
         |
       3 |   1.329710   1.632067
         |     0.3060     0.5133
         |
       4 |  -0.949754  -0.528220  -1.513248
         |     0.3422     0.3733     0.3255
         |
       7 |  -0.785104  -0.446427  -1.263331   0.000000
         |     0.3603     0.3640     0.2581     0.5000

False Discovery Rate =   0.05
Reject Ho if p = P(Z <= |z|) <= FDR/2 with stopping rule

.
. dunntest iq8, by(ieth) ma(bh) wrap

Warning: by() values are unlabeled, option nolabel implicit


Kruskal-Wallis equality-of-populations rank test

  +-----------------------+
  | ieth | Obs | Rank Sum |
  |------+-----+----------|
  |    1 |  39 |  1519.00 |
  |    2 |  12 |   510.00 |
  |    3 |  20 |   673.50 |
  |    4 |   3 |   106.50 |
  |    7 |   2 |   117.00 |
  +-----------------------+

chi-squared =     3.060 with 4 d.f.
probability =     0.5478

chi-squared with ties =     3.502 with 4 d.f.
probability =     0.4775


                 Dunn's Pairwise Comparison of iq8 by ieth
                            (Benjamini-Hochberg)
Col Mean-|
Row Mean |              1              2              3              4
---------+--------------------------------------------
       2 |  -0.521135
         |     0.3764
         |
       3 |   0.928892   1.170773
         |     0.2941     0.3021
         |
       4 |   0.278839   0.525328  -0.142791
         |     0.4335     0.4281     0.4432
         |
       7 |  -1.306345  -1.014820  -1.621568  -1.220522
         |     0.4786     0.3102     0.5245     0.3704

False Discovery Rate =   0.05
Reject Ho if p = P(Z <= |z|) <= FDR/2 with stopping rule

.
. dunntest iq9, by(ieth) ma(bh) wrap

Warning: by() values are unlabeled, option nolabel implicit


Kruskal-Wallis equality-of-populations rank test

  +-----------------------+
  | ieth | Obs | Rank Sum |
  |------+-----+----------|
  |    1 |  39 |  1358.00 |
  |    2 |  12 |   488.50 |
  |    3 |  20 |   821.00 |
  |    4 |   3 |   142.50 |
```

```
  |    7 |   2 |   116.00 |
  +-----------------------+

chi-squared =     3.527 with 4 d.f.
probability =     0.3808

chi-squared with ties =     4.191 with 4 d.f.
probability =     0.3808
```

```
                 Dunn's Pairwise Comparison of iq9 by ieth
                            (Benjamini-Hochberg)
Col Mean-|
Row Mean |             1             2             3             4
---------+--------------------------------------------
       2 |  -0.880360
         |     0.3156
         |
       3 |  -1.118000  -0.046185
         |     0.4393     0.4816
         |
       4 |  -1.044571  -0.519338  -0.514209
         |     0.2962     0.3772     0.3373
         |
       7 |  -1.578074  -1.117498  -1.128123  -0.567738
         |     0.5727     0.3297     0.6482     0.4073

False Discovery Rate =   0.05
Reject Ho if p = P(Z <= |z|) <= FDR/2 with stopping rule

.
. dunntest iq10, by(ieth) ma(bh) wrap

Warning: by() values are unlabeled, option nolabel implicit


Kruskal-Wallis equality-of-populations rank test

  +-----------------------+
  | ieth | Obs | Rank Sum |
  |------+-----+----------|
  |    1 |  39 |  1603.50 |
  |    2 |  12 |   415.50 |
  |    3 |  20 |   687.00 |
  |    4 |   3 |   132.00 |
  |    7 |   2 |    88.00 |
  +-----------------------+

chi-squared =     1.933 with 4 d.f.
probability =     0.7481

chi-squared with ties =     5.194 with 4 d.f.
probability =     0.2680


                 Dunn's Pairwise Comparison of iq10 by ieth
                            (Benjamini-Hochberg)
Col Mean-|
Row Mean |             1             2             3             4
---------+--------------------------------------------
       2 |   1.459385
         |     0.3611
         |
       3 |   1.825894   0.055902
         |     0.3393     0.5308
         |
       4 |  -0.357370  -1.078049  -1.156913
         |     0.5149     0.3513     0.4122
         |
       7 |  -0.295328  -0.911118  -0.965845   0.000000
         |     0.4798     0.3019     0.3341     0.5000

False Discovery Rate =   0.05
Reject Ho if p = P(Z <= |z|) <= FDR/2 with stopping rule

------------------------------------------------------------------------------------------------------------------

. dunntest iq1, by(ihwork) ma(bh) wrap
```

```
Warning: by() values are unlabeled, option nolabel implicit


Kruskal-Wallis equality-of-populations rank test

  +-------------------------+
  | ihwork | Obs | Rank Sum |
  |--------+-----+----------|
  |      0 |  16 |   664.00 |
  |      1 |  10 |   263.00 |
  |      2 |  50 |  1999.00 |
  +-------------------------+

chi-squared =     3.572 with 2 d.f.
probability =     0.1676

chi-squared with ties =    16.371 with 2 d.f.
probability =     0.0003


                Dunn's Pairwise Comparison of iq1 by ihwork
                            (Benjamini-Hochberg)
Col Mean-|
Row Mean |            0            1
---------+----------------------
       1 |   3.655494
         |     0.0002
         |
       2 |   0.513034  -3.828465
         |     0.3040     0.0002

False Discovery Rate =   0.05
Reject Ho if p = P(Z <= |z|) <= FDR/2 with stopping rule

.
. dunntest iq2, by(ihwork) ma(bh) wrap

Warning: by() values are unlabeled, option nolabel implicit


Kruskal-Wallis equality-of-populations rank test

  +-------------------------+
  | ihwork | Obs | Rank Sum |
  |--------+-----+----------|
  |      0 |  16 |   634.50 |
  |      1 |   9 |   228.00 |
  |      2 |  50 |  1987.50 |
  +-------------------------+

chi-squared =     3.455 with 2 d.f.
probability =     0.1777

chi-squared with ties =    12.083 with 2 d.f.
probability =     0.0024


                Dunn's Pairwise Comparison of iq2 by ihwork
                            (Benjamini-Hochberg)
Col Mean-|
Row Mean |            0            1
---------+----------------------
       1 |   2.949684
         |     0.0024
         |
       2 |  -0.028008  -3.416473
         |     0.4888     0.0010

False Discovery Rate =   0.05
Reject Ho if p = P(Z <= |z|) <= FDR/2 with stopping rule

.
. dunntest iq3, by(ihwork) ma(bh) wrap

Warning: by() values are unlabeled, option nolabel implicit


Kruskal-Wallis equality-of-populations rank test
```

```
  +-------------------------+
  | ihwork | Obs | Rank Sum |
  |--------+-----+----------|
  |      0 |  16 |   644.00 |
  |      1 |  10 |   298.00 |
  |      2 |  50 |  1984.00 |
  +-------------------------+

chi-squared =     1.795 with 2 d.f.
probability =     0.4075

chi-squared with ties =     4.220 with 2 d.f.
probability =     0.1213


                Dunn's Pairwise Comparison of iq3 by ihwork
                            (Benjamini-Hochberg)
Col Mean-|
Row Mean |            0            1
---------+----------------------
       1 |   1.799706
         |     0.0539
         |
       2 |   0.137772  -1.980059
         |     0.4452     0.0715

False Discovery Rate =   0.05
Reject Ho if p = P(Z <= |z|) <= FDR/2 with stopping rule

.
. dunntest iq4, by(ihwork) ma(bh) wrap

Warning: by() values are unlabeled, option nolabel implicit


Kruskal-Wallis equality-of-populations rank test

  +-------------------------+
  | ihwork | Obs | Rank Sum |
  |--------+-----+----------|
  |      0 |  17 |   685.50 |
  |      1 |  10 |   300.50 |
  |      2 |  50 |  2017.00 |
  +-------------------------+

chi-squared =     1.839 with 2 d.f.
probability =     0.3987

chi-squared with ties =     3.042 with 2 d.f.
probability =     0.2185


                Dunn's Pairwise Comparison of iq4 by ihwork
                            (Benjamini-Hochberg)
Col Mean-|
Row Mean |            0            1
---------+----------------------
       1 |   1.481917
         |     0.1038
         |
       2 |  -0.003372  -1.707601
         |     0.4987     0.1316

False Discovery Rate =   0.05
Reject Ho if p = P(Z <= |z|) <= FDR/2 with stopping rule

.
. dunntest iq5, by(ihwork) ma(bh) wrap

Warning: by() values are unlabeled, option nolabel implicit


Kruskal-Wallis equality-of-populations rank test

  +-------------------------+
  | ihwork | Obs | Rank Sum |
  |--------+-----+----------|
  |      0 |  16 |   712.00 |
  |      1 |  10 |   220.00 |
```

```
  |      2 |  50 |  1994.00 |
  +-------------------------+

chi-squared =     6.959 with 2 d.f.
probability =     0.0308

chi-squared with ties =    17.404 with 2 d.f.
probability =     0.0002


                Dunn's Pairwise Comparison of iq5 by ihwork
                            (Benjamini-Hochberg)
Col Mean-|
Row Mean |             0            1
---------+----------------------
       1 |   3.997040
         |     0.0001
         |
       2 |   1.151855  -3.696235
         |     0.1247     0.0002

False Discovery Rate =   0.05
Reject Ho if p = P(Z <= |z|) <= FDR/2 with stopping rule

.
. dunntest iq6, by(ihwork) ma(bh) wrap

Warning: by() values are unlabeled, option nolabel implicit


Kruskal-Wallis equality-of-populations rank test

  +-------------------------+
  | ihwork | Obs | Rank Sum |
  |--------+-----+----------|
  |      0 |  16 |   559.00 |
  |      1 |  10 |   308.00 |
  |      2 |  50 |  2059.00 |
  +-------------------------+

chi-squared =     2.369 with 2 d.f.
probability =     0.3060

chi-squared with ties =     4.692 with 2 d.f.
probability =     0.0958


                Dunn's Pairwise Comparison of iq6 by ihwork
                            (Benjamini-Hochberg)
Col Mean-|
Row Mean |             0            1
---------+----------------------
       1 |   0.654135
         |     0.2565
         |
       2 |  -1.385120  -1.909689
         |     0.1245     0.0843

False Discovery Rate =   0.05
Reject Ho if p = P(Z <= |z|) <= FDR/2 with stopping rule

.
. dunntest iq7, by(ihwork) ma(bh) wrap

Warning: by() values are unlabeled, option nolabel implicit


Kruskal-Wallis equality-of-populations rank test

  +-------------------------+
  | ihwork | Obs | Rank Sum |
  |--------+-----+----------|
  |      0 |  16 |   644.50 |
  |      1 |   9 |   353.00 |
  |      2 |  50 |  1852.50 |
  +-------------------------+

chi-squared =     0.299 with 2 d.f.
probability =     0.8613
```

```
chi-squared with ties =     0.499 with 2 d.f.
probability =     0.7793


                Dunn's Pairwise Comparison of iq7 by ihwork
                            (Benjamini-Hochberg)
Col Mean-|
Row Mean |             0            1
---------+----------------------
       1 |   0.150716
         |     0.4401
         |
       2 |   0.667091   0.355734
         |     0.7571     0.5415

False Discovery Rate =   0.05
Reject Ho if p = P(Z <= |z|) <= FDR/2 with stopping rule

.
. dunntest iq8, by(ihwork) ma(bh) wrap

Warning: by() values are unlabeled, option nolabel implicit


Kruskal-Wallis equality-of-populations rank test

  +-------------------------+
  | ihwork | Obs | Rank Sum |
  |--------+-----+----------|
  |      0 |  16 |   521.00 |
  |      1 |  10 |   393.00 |
  |      2 |  50 |  2012.00 |
  +-------------------------+

chi-squared =     1.480 with 2 d.f.
probability =     0.4771

chi-squared with ties =     1.694 with 2 d.f.
probability =     0.4287


                Dunn's Pairwise Comparison of iq8 by ihwork
                            (Benjamini-Hochberg)
Col Mean-|
Row Mean |             0            1
---------+----------------------
       1 |  -0.809654
         |     0.3136
         |
       2 |  -1.294852  -0.131451
         |     0.2931     0.4477

False Discovery Rate =   0.05
Reject Ho if p = P(Z <= |z|) <= FDR/2 with stopping rule

.
. dunntest iq9, by(ihwork) ma(bh) wrap

Warning: by() values are unlabeled, option nolabel implicit


Kruskal-Wallis equality-of-populations rank test

  +-------------------------+
  | ihwork | Obs | Rank Sum |
  |--------+-----+----------|
  |      0 |  16 |   639.00 |
  |      1 |  10 |   379.00 |
  |      2 |  50 |  1908.00 |
  +-------------------------+

chi-squared =     0.087 with 2 d.f.
probability =     0.9574

chi-squared with ties =     0.103 with 2 d.f.
probability =     0.9496
```

```
                Dunn's Pairwise Comparison of iq9 by ihwork
                            (Benjamini-Hochberg)
Col Mean-|
Row Mean |              0              1
---------+----------------------
       1 |   0.249482
         |     0.6022
         |
       2 |   0.305457  -0.037047
         |     1.0000     0.4852

False Discovery Rate =   0.05
Reject Ho if p = P(Z <= |z|) <= FDR/2 with stopping rule

.
. dunntest iq10, by(ihwork) ma(bh) wrap

Warning: by() values are unlabeled, option nolabel implicit


Kruskal-Wallis equality-of-populations rank test

  +--------------------------+
  | ihwork | Obs | Rank Sum |
  |--------+-----+----------|
  |      0 |  16 |   666.50 |
  |      1 |  10 |   322.00 |
  |      2 |  50 |  1937.50 |
  +--------------------------+

chi-squared =     1.147 with 2 d.f.
probability =     0.5635

chi-squared with ties =     3.082 with 2 d.f.
probability =     0.2141


                Dunn's Pairwise Comparison of iq10 by ihwork
                            (Benjamini-Hochberg)
Col Mean-|
Row Mean |              0              1
---------+----------------------
       1 |   1.741221
         |     0.1225
         |
       2 |   0.751048  -1.403500
         |     0.2263     0.1204

False Discovery Rate =   0.05
Reject Ho if p = P(Z <= |z|) <= FDR/2 with stopping rule

.
```

HPESS Survey Statistics on Factor Analysis Produced Variables

- Question – For each of the factor variables (knowledge, participation), is there a difference in the average response by age?

  Answer – NO, not for either variable

- Question – For each of the factor variables (knowledge, participation), is there a difference in the average response by gender?

  Answer – NO, not for either variable

- Question – For each of the factor variables (knowledge, participation), is there a difference in the average response by level of education

  Answer – NO, not for either variable

- Question: For each of the factor variables (knowledge, participation), is there a difference in the average response based upon racer or ethnicity

  Answer – K-Wallis (nonparametric ANOVA reports a significant p value for "knowledge" but the Dunn test finds no significant difference among the pairs tested. No significant difference was found for "participate"

- Question – For each of the factor variables (knowledge, participation), is there a difference in the average response by age?

```
. dunntest iknowledge, by(iage) ma(bh) wrap

Kruskal-Wallis equality-of-populations rank test

  +-----------------------+
  | iage | Obs | Rank Sum |
  |------+-----+----------|
  |    1 |   1 |     3.50 |
  |    2 |  22 |   876.00 |
  |    3 |  35 |  1415.50 |
  |    4 |  11 |   324.50 |
  |    5 |   5 |   209.50 |
  |------+-----+----------|
  |    6 |   1 |    21.00 |
  +-----------------------+

chi-squared =     5.540 with 5 d.f.
probability =     0.3535

chi-squared with ties =     7.568 with 5 d.f.
probability =     0.1817


              Dunn's Pairwise Comparison of iknowledge by iage
                          (Benjamini-Hochberg)
Col Mean-|
Row Mean |            1             2             3             4             5
---------+--------------------------------------------------------
       2 |  -1.904824
         |     0.2130
         |
       3 |  -1.953424  -0.123125
         |     0.3808     0.4510
         |
       4 |  -1.334942   1.498433   1.697718
```

```
         |     0.2274     0.2010     0.1679
         |
       5 |  -1.879853  -0.225341  -0.163446  -1.232896
         |     0.1503     0.4741     0.4662     0.2332
         |
       6 |  -0.663600   0.986980   1.028078   0.436423   1.023149
         |     0.3456     0.2427     0.2849     0.4141     0.2552

False Discovery Rate =   0.05
Reject Ho if p = P(Z <= |z|) <= FDR/2 with stopping rule

.
. dunntest iparticipate, by(iage) ma(bh) wrap

Kruskal-Wallis equality-of-populations rank test

  +-----------------------+
  | iage | Obs | Rank Sum |
  |------+-----+----------|
  |    1 |   1 |    10.00 |
  |    2 |  22 |   810.00 |
  |    3 |  35 |  1355.00 |
  |    4 |  11 |   407.50 |
  |    5 |   5 |   221.50 |
  |------+-----+----------|
  |    6 |   1 |    46.00 |
  +-----------------------+

chi-squared =     2.326 with 5 d.f.
probability =     0.8024

chi-squared with ties =     2.448 with 5 d.f.
probability =     0.7843


             Dunn's Pairwise Comparison of iparticipate by iage
                           (Benjamini-Hochberg)
Col Mean-|
Row Mean |            1             2             3             4             5
---------+-----------------------------------------------------
       2 |  -1.234590
         |     0.5425
         |
       3 |  -1.332682  -0.328032
         |     0.6849     0.4643
         |
       4 |  -1.218838  -0.028970   0.227253
         |     0.4179     0.4884     0.4732
         |
       5 |  -1.473837  -0.710833  -0.549938  -0.633107
         |     1.0000     0.5965     0.5460     0.5643
         |
       6 |  -1.198211  -0.422690  -0.338143  -0.403548  -0.073047
         |     0.3463     0.5604     0.5013     0.5149     0.5045

False Discovery Rate =   0.05
Reject Ho if p = P(Z <= |z|) <= FDR/2 with stopping rule
```

Question – For each of the factor variables (knowledge, participation), is there a difference in the average response <u>by gender</u>?

```
. ranksum iknowledge, by(igender)

Two-sample Wilcoxon rank-sum (Mann-Whitney) test

     igender |      obs    rank sum    expected
-------------+---------------------------------
           1 |       17         579         646
           2 |       58        2271        2204
-------------+---------------------------------
    combined |       75        2850        2850

unadjusted variance     6244.67
adjustment for ties    -1673.27
                     ----------
adjusted variance       4571.40
```

```
Ho: iknowl~e(igender==1) = iknowl~e(igender==2)
             z =  -0.991
    Prob > |z| =   0.3217

.
. ranksum iparticipate, by(igender)

Two-sample Wilcoxon rank-sum (Mann-Whitney) test

     igender |      obs    rank sum    expected
-------------+---------------------------------
           1 |       17       599.5         646
           2 |       58      2250.5        2204
-------------+---------------------------------
    combined |       75        2850        2850

unadjusted variance     6244.67
adjustment for ties     -310.99
                     ----------
adjusted variance       5933.68

Ho: iparti~e(igender==1) = iparti~e(igender==2)
             z =  -0.604
    Prob > |z| =   0.5461
```

- Question – For each of the factor variables (knowledge, participation), is there a difference in the average response by level of education

```
. dunntest iknowledge, by(ied) ma(bh) wrap

Kruskal-Wallis equality-of-populations rank test

  +-----------------------+
  | ied | Obs | Rank Sum |
  |-----+-----+----------|
  |   1 |  26 |   952.00 |
  |   2 |  48 |  1894.50 |
  |   3 |   1 |     3.50 |
  +-----------------------+

chi-squared =     2.829 with 2 d.f.
probability =     0.2431

chi-squared with ties =     3.864 with 2 d.f.
probability =     0.1449


              Dunn's Pairwise Comparison of iknowledge by ied
                            (Benjamini-Hochberg)
Col Mean-|
Row Mean |             1            2
---------+----------------------
       2 |  -0.628394
         |     0.2649
         |
       3 |   1.742681   1.909111
         |     0.0610     0.0844

False Discovery Rate =   0.05
Reject Ho if p = P(Z <= |z|) <= FDR/2 with stopping rule

.
. dunntest iparticipate, by(ied) ma(bh) wrap

Kruskal-Wallis equality-of-populations rank test

  +-----------------------+
  | ied | Obs | Rank Sum |
  |-----+-----+----------|
  |   1 |  26 |  1051.50 |
  |   2 |  48 |  1784.00 |
  |   3 |   1 |    14.50 |
  +-----------------------+
```

```
chi-squared =     1.559 with 2 d.f.
probability =     0.4586

chi-squared with ties =     1.641 with 2 d.f.
probability =     0.4402


              Dunn's Pairwise Comparison of iparticipate by ied
                              (Benjamini-Hochberg)
Col Mean-|
Row Mean |            1            2
---------+----------------------
       2 |   0.633189
         |     0.2633
         |
       3 |   1.198283   1.055981
         |     0.3462     0.2182

False Discovery Rate =   0.05
Reject Ho if p = P(Z <= |z|) <= FDR/2 with stopping rule
```

- Question: For each of the factor variables (knowledge, participation), is there a difference in the average response based upon racer or ethnicity

```
. dunntest iknowledge, by(ieth) ma(bh) wrap

Warning: by() values are unlabeled, option nolabel implicit


Kruskal-Wallis equality-of-populations rank test

  +-----------------------+
  | ieth | Obs | Rank Sum |
  |------+-----+----------|
  |    1 |  38 |  1601.50 |
  |    2 |  12 |   333.00 |
  |    3 |  20 |   759.00 |
  |    4 |   3 |    53.50 |
  |    7 |   2 |   103.00 |
  +-----------------------+

chi-squared =     7.365 with 4 d.f.
probability =     0.1178

chi-squared with ties =    10.060 with 4 d.f.
probability =     0.0394


               Dunn's Pairwise Comparison of iknowledge by ieth
                              (Benjamini-Hochberg)
Col Mean-|
Row Mean |            1            2            3            4
---------+--------------------------------------------
       2 |   2.331226
         |     0.0987
         |
       3 |   0.814293  -1.498008
         |     0.2308     0.1118
         |
       4 |   2.173971   0.823862   1.742413
         |     0.0743     0.2563     0.1018
         |
       7 |  -0.691538  -1.667587  -0.979809  -1.977762
         |     0.2446     0.0954     0.2337     0.0799

False Discovery Rate =   0.05
Reject Ho if p = P(Z <= |z|) <= FDR/2 with stopping rule

.
. dunntest iparticipate, by(ieth) ma(bh) wrap

Warning: by() values are unlabeled, option nolabel implicit


Kruskal-Wallis equality-of-populations rank test
```

```
  +-----------------------+
  | ieth | Obs | Rank Sum |
  |------+-----+----------|
  |    1 |  38 |  1430.50 |
  |    2 |  12 |   507.00 |
  |    3 |  20 |   659.50 |
  |    4 |   3 |   128.00 |
  |    7 |   2 |   125.00 |
  +-----------------------+

chi-squared =     4.195 with 4 d.f.
probability =     0.3803

chi-squared with ties =     4.414 with 4 d.f.
probability =     0.3528


             Dunn's Pairwise Comparison of iparticipate by ieth
                            (Benjamini-Hochberg)
Col Mean-|
Row Mean |            1             2             3             4
---------+--------------------------------------------
       2 |  -0.654633
         |     0.3204
         |
       3 |   0.795667   1.195612
         |     0.3552     0.2898
         |
       4 |  -0.394164  -0.030384  -0.736811
         |     0.3853     0.4879     0.3295
         |
       7 |  -1.612653  -1.247994  -1.873935  -1.022662
         |     0.2670     0.3534     0.3047     0.3065

False Discovery Rate =   0.05
Reject Ho if p = P(Z <= |z|) <= FDR/2 with stopping rule
```

National Survey Statistics Report

Summary

- Question – For each of the questions, 1-10, are there differences in the average response by age?

  Answer – YES, for ALL questions there are significant differences among the responses of the various age groups

- Question – For each of the questions, 1-10, are there differences in the average response by gender?

  Answer – YES, for ALL questions there are significant differences between the responses of the genders.

- Question – For each of the questions, 1-10, are there differences in the average response by income level?

  Answer – YES, for questions 1, 2, 3, 4, and 6 there are differences in responses among income levels.

- Question: For each of the questions, are there differences in the average responses among regions?

  Answer – YES, but only for question 9.

- Question – For each of the questions, 1-10, are there differences in the average responses among the devices used?
  Answer – Yes, for all questions, except 2, 8 and 9, there are differences in the average responses among the devices used.

Statistics

- Question – For each of the questions, 1-10, are there differences in the average response by age among those who identified their age group?

```
. dunntest iq1, by(iage) ma(bh) wrap

Warning: by() values are unlabeled, option nolabel implicit


Kruskal-Wallis equality-of-populations rank test

  +------------------------+
  | iage | Obs |  Rank Sum |
  |------+-----+-----------|
  |    2 | 297 | 136808.00 |
  |    3 | 230 | 120095.00 |
  |    4 | 343 | 193579.00 |
  |    5 | 197 | 119296.00 |
  +------------------------+

chi-squared =    31.130 with 3 d.f.
probability =     0.0001

chi-squared with ties =    53.379 with 3 d.f.
probability =     0.0001


                 Dunn's Pairwise Comparison of iq1 by iage
                            (Benjamini-Hochberg)
Col Mean-|
Row Mean |            2             3             4
```

```
---------+--------------------------------
       3 |  -2.976209
         |     0.0022
         |
       4 |  -5.561425  -2.104981
         |     0.0000     0.0212
         |
       5 |  -6.702295  -3.651101  -1.958054
         |     0.0000     0.0003     0.0251

False Discovery Rate =   0.05
Reject Ho if p = P(Z <= |z|) <= FDR/2 with stopping rule

.
. dunntest iq2, by(iage) ma(bh) wrap

Warning: by() values are unlabeled, option nolabel implicit


Kruskal-Wallis equality-of-populations rank test

  +------------------------+
  | iage | Obs |  Rank Sum |
  |------+-----+-----------|
  |    2 | 297 | 137489.50 |
  |    3 | 230 | 117935.00 |
  |    4 | 343 | 193709.50 |
  |    5 | 197 | 120644.00 |
  +------------------------+

chi-squared =    33.059 with 3 d.f.
probability =     0.0001

chi-squared with ties =    47.662 with 3 d.f.
probability =     0.0001


                 Dunn's Pairwise Comparison of iq2 by iage
                            (Benjamini-Hochberg)
Col Mean-|
Row Mean |             2              3              4
---------+--------------------------------
       3 |  -2.210640
         |     0.0162
         |
       4 |  -5.005456  -2.376918
         |     0.0000     0.0131
         |
       5 |  -6.338529  -3.999461  -2.077098
         |     0.0000     0.0001     0.0189

False Discovery Rate =   0.05
Reject Ho if p = P(Z <= |z|) <= FDR/2 with stopping rule

.
. dunntest iq3, by(iage) ma(bh) wrap

Warning: by() values are unlabeled, option nolabel implicit


Kruskal-Wallis equality-of-populations rank test

  +------------------------+
  | iage | Obs |  Rank Sum |
  |------+-----+-----------|
  |    2 | 297 | 139770.50 |
  |    3 | 230 | 117843.00 |
  |    4 | 343 | 191441.00 |
  |    5 | 197 | 120723.50 |
  +------------------------+

chi-squared =    28.691 with 3 d.f.
probability =     0.0001

chi-squared with ties =    53.833 with 3 d.f.
probability =     0.0001


                 Dunn's Pairwise Comparison of iq3 by iage
```

```
                            (Benjamini-Hochberg)
Col Mean-|
Row Mean |              2              3              4
---------+---------------------------------
       3 |  -2.113003
         |     0.0173
         |
       4 |  -4.908660  -2.387522
         |     0.0000     0.0102
         |
       5 |  -6.879036  -4.599409  -2.718488
         |     0.0000     0.0000     0.0049

False Discovery Rate =   0.05
Reject Ho if p = P(Z <= |z|) <= FDR/2 with stopping rule

.
. dunntest iq4, by(iage) ma(bh) wrap

Warning: by() values are unlabeled, option nolabel implicit


Kruskal-Wallis equality-of-populations rank test

  +------------------------+
  | iage | Obs |  Rank Sum |
  |------+-----+-----------|
  |    2 | 297 | 131759.50 |
  |    3 | 230 | 116810.50 |
  |    4 | 343 | 196304.50 |
  |    5 | 197 | 124903.50 |
  +------------------------+

chi-squared =    53.252 with 3 d.f.
probability =     0.0001

chi-squared with ties =    70.467 with 3 d.f.
probability =     0.0001


                 Dunn's Pairwise Comparison of iq4 by iage
                            (Benjamini-Hochberg)
Col Mean-|
Row Mean |              2              3              4
---------+---------------------------------
       3 |  -2.730052
         |     0.0038
         |
       4 |  -6.060387  -2.822725
         |     0.0000     0.0036
         |
       5 |  -7.734777  -4.851098  -2.576905
         |     0.0000     0.0000     0.0050

False Discovery Rate =   0.05
Reject Ho if p = P(Z <= |z|) <= FDR/2 with stopping rule

.
. dunntest iq5, by(iage) ma(bh) wrap

Warning: by() values are unlabeled, option nolabel implicit


Kruskal-Wallis equality-of-populations rank test

  +------------------------+
  | iage | Obs |  Rank Sum |
  |------+-----+-----------|
  |    2 | 297 | 130735.50 |
  |    3 | 230 | 118988.50 |
  |    4 | 343 | 197372.50 |
  |    5 | 197 | 122681.50 |
  +------------------------+

chi-squared =    50.736 with 3 d.f.
probability =     0.0001

chi-squared with ties =    74.894 with 3 d.f.
probability =     0.0001
```

```
                 Dunn's Pairwise Comparison of iq5 by iage
                            (Benjamini-Hochberg)
Col Mean-|
Row Mean |              2              3              4
---------+---------------------------------
       3 |  -3.463252
         |     0.0004
         |
       4 |  -6.727241  -2.687273
         |     0.0000     0.0043
         |
       5 |  -7.833291  -4.280955  -2.086904
         |     0.0000     0.0000     0.0184

False Discovery Rate =   0.05
Reject Ho if p = P(Z <= |z|) <= FDR/2 with stopping rule

.
. dunntest iq6, by(iage) ma(bh) wrap

Warning: by() values are unlabeled, option nolabel implicit


Kruskal-Wallis equality-of-populations rank test

  +------------------------+
  | iage | Obs |  Rank Sum |
  |------+-----+-----------|
  |    2 | 297 | 139523.00 |
  |    3 | 230 | 121315.50 |
  |    4 | 343 | 196979.50 |
  |    5 | 197 | 111960.00 |
  +------------------------+

chi-squared =    21.310 with 3 d.f.
probability =     0.0001

chi-squared with ties =    31.684 with 3 d.f.
probability =     0.0001


                 Dunn's Pairwise Comparison of iq6 by iage
                            (Benjamini-Hochberg)
Col Mean-|
Row Mean |              2              3              4
---------+---------------------------------
       3 |  -2.598612
         |     0.0094
         |
       4 |  -5.217225  -2.174021
         |     0.0000     0.0223
         |
       5 |  -4.243787  -1.665690   0.263774
         |     0.0000     0.0575     0.3960

False Discovery Rate =   0.05
Reject Ho if p = P(Z <= |z|) <= FDR/2 with stopping rule

.
. dunntest iq7, by(iage) ma(bh) wrap

Warning: by() values are unlabeled, option nolabel implicit


Kruskal-Wallis equality-of-populations rank test

  +------------------------+
  | iage | Obs |  Rank Sum |
  |------+-----+-----------|
  |    2 | 297 | 134994.00 |
  |    3 | 230 | 118404.00 |
  |    4 | 343 | 195415.00 |
  |    5 | 197 | 120965.00 |
  +------------------------+

chi-squared =    38.545 with 3 d.f.
probability =     0.0001
```

```
chi-squared with ties =    47.396 with 3 d.f.
probability =     0.0001


                 Dunn's Pairwise Comparison of iq7 by iage
                            (Benjamini-Hochberg)
Col Mean-|
Row Mean |             2             3             4
---------+---------------------------------
       3 |  -2.469339
         |     0.0102
         |
       4 |  -5.229834  -2.318978
         |     0.0000     0.0122
         |
       5 |  -6.246620  -3.678399  -1.783685
         |     0.0000     0.0002     0.0372

False Discovery Rate =   0.05
Reject Ho if p = P(Z <= |z|) <= FDR/2 with stopping rule

.
. dunntest iq8, by(iage) ma(bh) wrap

Warning: by() values are unlabeled, option nolabel implicit


Kruskal-Wallis equality-of-populations rank test

  +------------------------+
  | iage | Obs |  Rank Sum |
  |------+-----+-----------|
  |    2 | 297 | 144264.00 |
  |    3 | 230 | 123659.00 |
  |    4 | 343 | 195323.50 |
  |    5 | 197 | 106531.50 |
  +------------------------+

chi-squared =    11.953 with 3 d.f.
probability =     0.0075

chi-squared with ties =    13.243 with 3 d.f.
probability =     0.0041


                 Dunn's Pairwise Comparison of iq8 by iage
                            (Benjamini-Hochberg)
Col Mean-|
Row Mean |             2             3             4
---------+---------------------------------
       3 |  -2.018706
         |     0.0435
         |
       4 |  -3.607781  -1.274845
         |     0.0009     0.1518
         |
       5 |  -2.045700  -0.109821   1.096108
         |     0.0612     0.4563     0.1638

False Discovery Rate =   0.05
Reject Ho if p = P(Z <= |z|) <= FDR/2 with stopping rule

.
. dunntest iq9, by(iage) ma(bh) wrap

Warning: by() values are unlabeled, option nolabel implicit


Kruskal-Wallis equality-of-populations rank test

  +------------------------+
  | iage | Obs |  Rank Sum |
  |------+-----+-----------|
  |    2 | 297 | 145982.00 |
  |    3 | 230 | 123673.00 |
  |    4 | 343 | 185055.00 |
  |    5 | 197 | 115068.00 |
  +------------------------+
```

```
chi-squared =    10.994 with 3 d.f.
probability =     0.0118

chi-squared with ties =    12.738 with 3 d.f.
probability =     0.0052


                 Dunn's Pairwise Comparison of iq9 by iage
                            (Benjamini-Hochberg)
Col Mean-|
Row Mean |             2             3             4
---------+---------------------------------
       3 |  -1.836776
         |     0.0662
         |
       4 |  -2.115200  -0.074195
         |     0.0516     0.4704
         |
       5 |  -3.519369  -1.669304  -1.742007
         |     0.0013     0.0570     0.0611

False Discovery Rate =   0.05
Reject Ho if p = P(Z <= |z|) <= FDR/2 with stopping rule

.
. dunntest iq10, by(iage) ma(bh) wrap

Warning: by() values are unlabeled, option nolabel implicit


Kruskal-Wallis equality-of-populations rank test

  +------------------------+
  | iage | Obs |  Rank Sum |
  |------+-----+-----------|
  |    2 | 297 | 134627.00 |
  |    3 | 230 | 122540.00 |
  |    4 | 343 | 194647.50 |
  |    5 | 197 | 117963.50 |
  +------------------------+

chi-squared =    33.137 with 3 d.f.
probability =     0.0001

chi-squared with ties =    60.194 with 3 d.f.
probability =     0.0001


                 Dunn's Pairwise Comparison of iq10 by iage
                            (Benjamini-Hochberg)
Col Mean-|
Row Mean |             2             3             4
---------+---------------------------------
       3 |  -3.958265
         |     0.0001
         |
       4 |  -6.301218  -1.780890
         |     0.0000     0.0450
         |
       5 |  -6.925950  -2.974246  -1.532010
         |     0.0000     0.0022     0.0628

False Discovery Rate =   0.05
Reject Ho if p = P(Z <= |z|) <= FDR/2 with stopping rule
```

- Question – For each of the questions, 1-10, are there differences in the average response by gender?

```
. dunntest iq1, by(igender)

Warning: by() values are unlabeled, option nolabel implicit


Kruskal-Wallis equality-of-populations rank test

  +---------------------------+
```

```
  | igender | Obs |  Rank Sum |
  |---------+-----+-----------|
  |       1 | 497 | 248163.00 |
  |       2 | 570 | 321615.00 |
  +---------------------------+

chi-squared =    11.781 with 1 d.f.
probability =     0.0006

chi-squared with ties =    20.202 with 1 d.f.
probability =     0.0001


                Dunn's Pairwise Comparison of iq1 by igender
                              (No adjustment)
Col Mean-|
Row Mean |              1
---------+-----------
       2 |  -4.494629
         |     0.0000

alpha =   0.05
Reject Ho if p = P(Z <= |z|) <= alpha/2

.
. dunntest iq2, by(igender)

Warning: by() values are unlabeled, option nolabel implicit


Kruskal-Wallis equality-of-populations rank test

  +---------------------------+
  | igender | Obs |  Rank Sum |
  |---------+-----+-----------|
  |       1 | 497 | 245930.00 |
  |       2 | 570 | 323848.00 |
  +---------------------------+

chi-squared =    15.032 with 1 d.f.
probability =     0.0001

chi-squared with ties =    21.672 with 1 d.f.
probability =     0.0001


                Dunn's Pairwise Comparison of iq2 by igender
                              (No adjustment)
Col Mean-|
Row Mean |              1
---------+-----------
       2 |  -4.655324
         |     0.0000

alpha =   0.05
Reject Ho if p = P(Z <= |z|) <= alpha/2

.
. dunntest iq3, by(igender)

Warning: by() values are unlabeled, option nolabel implicit


Kruskal-Wallis equality-of-populations rank test

  +---------------------------+
  | igender | Obs |  Rank Sum |
  |---------+-----+-----------|
  |       1 | 497 | 254937.00 |
  |       2 | 570 | 314841.00 |
  +---------------------------+

chi-squared =     4.340 with 1 d.f.
probability =     0.0372

chi-squared with ties =     8.144 with 1 d.f.
probability =     0.0043
```

```
                Dunn's Pairwise Comparison of iq3 by igender
                              (No adjustment)
Col Mean-|
Row Mean |             1
---------+-----------
       2 |  -2.853738
         |     0.0022

alpha =   0.05
Reject Ho if p = P(Z <= |z|) <= alpha/2

.
. dunntest iq4, by(igender)

Warning: by() values are unlabeled, option nolabel implicit


Kruskal-Wallis equality-of-populations rank test

  +---------------------------+
  | igender | Obs |  Rank Sum |
  |---------+-----+-----------|
  |       1 | 497 | 245219.00 |
  |       2 | 570 | 324559.00 |
  +---------------------------+

chi-squared =    16.150 with 1 d.f.
probability =     0.0001

chi-squared with ties =    21.371 with 1 d.f.
probability =     0.0001


                Dunn's Pairwise Comparison of iq4 by igender
                              (No adjustment)
Col Mean-|
Row Mean |             1
---------+-----------
       2 |  -4.622902
         |     0.0000

alpha =   0.05
Reject Ho if p = P(Z <= |z|) <= alpha/2

.
. dunntest iq5, by(igender)

Warning: by() values are unlabeled, option nolabel implicit


Kruskal-Wallis equality-of-populations rank test

  +---------------------------+
  | igender | Obs |  Rank Sum |
  |---------+-----+-----------|
  |       1 | 497 | 250255.00 |
  |       2 | 570 | 319523.00 |
  +---------------------------+

chi-squared =     9.095 with 1 d.f.
probability =     0.0026

chi-squared with ties =    13.426 with 1 d.f.
probability =     0.0002


                Dunn's Pairwise Comparison of iq5 by igender
                              (No adjustment)
Col Mean-|
Row Mean |             1
---------+-----------
       2 |  -3.664079
         |     0.0001

alpha =   0.05
Reject Ho if p = P(Z <= |z|) <= alpha/2

.
. dunntest iq6, by(igender)
```

```
Warning: by() values are unlabeled, option nolabel implicit


Kruskal-Wallis equality-of-populations rank test

  +---------------------------+
  | igender | Obs |  Rank Sum |
  |---------+-----+-----------|
  |       1 | 497 | 253170.50 |
  |       2 | 570 | 316607.50 |
  +---------------------------+

chi-squared =     5.930 with 1 d.f.
probability =     0.0149

chi-squared with ties =     8.817 with 1 d.f.
probability =     0.0030


                Dunn's Pairwise Comparison of iq6 by igender
                              (No adjustment)
Col Mean-|
Row Mean |             1
---------+-----------
       2 |  -2.969281
         |     0.0015

alpha =   0.05
Reject Ho if p = P(Z <= |z|) <= alpha/2

.
. dunntest iq7, by(igender)

Warning: by() values are unlabeled, option nolabel implicit


Kruskal-Wallis equality-of-populations rank test

  +---------------------------+
  | igender | Obs |  Rank Sum |
  |---------+-----+-----------|
  |       1 | 497 | 242886.00 |
  |       2 | 570 | 326892.00 |
  +---------------------------+

chi-squared =    20.100 with 1 d.f.
probability =     0.0001

chi-squared with ties =    24.716 with 1 d.f.
probability =     0.0001


                Dunn's Pairwise Comparison of iq7 by igender
                              (No adjustment)
Col Mean-|
Row Mean |             1
---------+-----------
       2 |  -4.971520
         |     0.0000

alpha =   0.05
Reject Ho if p = P(Z <= |z|) <= alpha/2

.
. dunntest iq8, by(igender)

Warning: by() values are unlabeled, option nolabel implicit


Kruskal-Wallis equality-of-populations rank test

  +---------------------------+
  | igender | Obs |  Rank Sum |
  |---------+-----+-----------|
  |       1 | 497 | 243180.50 |
  |       2 | 570 | 326597.50 |
  +---------------------------+
```

```
chi-squared =    19.578 with 1 d.f.
probability =     0.0001

chi-squared with ties =    21.691 with 1 d.f.
probability =     0.0001


                Dunn's Pairwise Comparison of iq8 by igender
                              (No adjustment)
Col Mean-|
Row Mean |             1
---------+-----------
       2 |  -4.657396
         |     0.0000

alpha =   0.05
Reject Ho if p = P(Z <= |z|) <= alpha/2

.
. dunntest iq9, by(igender)

Warning: by() values are unlabeled, option nolabel implicit


Kruskal-Wallis equality-of-populations rank test

  +---------------------------+
  | igender | Obs |  Rank Sum |
  |---------+-----+-----------|
  |       1 | 497 | 250477.00 |
  |       2 | 570 | 319301.00 |
  +---------------------------+

chi-squared =     8.830 with 1 d.f.
probability =     0.0030

chi-squared with ties =    10.231 with 1 d.f.
probability =     0.0014


                Dunn's Pairwise Comparison of iq9 by igender
                              (No adjustment)
Col Mean-|
Row Mean |             1
---------+-----------
       2 |  -3.198645
         |     0.0007

alpha =   0.05
Reject Ho if p = P(Z <= |z|) <= alpha/2

.
. dunntest iq10, by(igender)

Warning: by() values are unlabeled, option nolabel implicit


Kruskal-Wallis equality-of-populations rank test

  +---------------------------+
  | igender | Obs |  Rank Sum |
  |---------+-----+-----------|
  |       1 | 497 | 246943.50 |
  |       2 | 570 | 322834.50 |
  +---------------------------+

chi-squared =    13.508 with 1 d.f.
probability =     0.0002

chi-squared with ties =    24.537 with 1 d.f.
probability =     0.0001


               Dunn's Pairwise Comparison of iq10 by igender
                              (No adjustment)
Col Mean-|
Row Mean |             1
---------+-----------
       2 |  -4.953449
```

```
         |     0.0000

alpha =   0.05
Reject Ho if p = P(Z <= |z|) <= alpha/2

-----------------------------------------------------------------------------------------------------------------
```

- Question – For each of the questions, 1-10, are there differences in the average response by income level?

```
. dunntest iq1, by(iincome)

Warning: by() values are unlabeled, option nolabel implicit


Kruskal-Wallis equality-of-populations rank test

  +----------------------------+
  | iincome | Obs |  Rank Sum |
  |---------+-----+-----------|
  |       1 |  85 |  39647.00 |
  |       2 | 124 |  60999.00 |
  |       3 | 220 | 109906.00 |
  |       4 | 194 | 109253.00 |
  |       5 | 138 |  73959.00 |
  |---------+-----+-----------|
  |       6 |  81 |  47674.00 |
  |       7 |  45 |  26205.00 |
  |       8 |  29 |  18958.00 |
  |       9 |  13 |   7766.00 |
  |      10 |  22 |  13681.00 |
  |---------+-----+-----------|
  |      11 | 116 |  61730.00 |
  +----------------------------+

chi-squared =    21.252 with 10 d.f.
probability =     0.0194

chi-squared with ties =    36.441 with 10 d.f.
probability =     0.0001


                Dunn's Pairwise Comparison of iq1 by iincome
                              (No adjustment)
Col Mean-|
Row Mean |      1          2          3          4          5          6
---------+------------------------------------------------------------------
       2 |  -0.769253
         |     0.2209
         |
       3 |  -1.102569  -0.289304
         |     0.1351     0.3862
         |
       4 |  -3.159808  -2.632641  -2.743449
         |     0.0008     0.0042     0.0030
         |
       5 |  -2.141875  -1.511267  -1.422898   1.038856
         |     0.0161     0.0654     0.0774     0.1494
         |
       6 |  -3.342301  -2.874429  -2.909733  -0.816141  -1.597847
         |     0.0004     0.0020     0.0018     0.2072     0.0550
         |
       7 |  -2.671383  -2.207428  -2.149485  -0.492410  -1.148526   0.142490
         |     0.0038     0.0136     0.0158     0.3112     0.1254     0.4433
         |
       8 |  -3.700701  -3.333112  -3.315692  -1.932950  -2.450205  -1.279432
         |     0.0001     0.0004     0.0005     0.0266     0.0071     0.1004
         |
       9 |  -1.868475  -1.537144  -1.456172  -0.507627  -0.900035  -0.125393
         |     0.0308     0.0621     0.0727     0.3059     0.1841     0.4501
         |
      10 |  -2.761056  -2.386668  -2.323942  -1.108837  -1.590545  -0.588491
         |     0.0029     0.0085     0.0101     0.1338     0.0559     0.2781
         |
      11 |  -1.955930  -1.323354  -1.206620   1.122513   0.127501   1.655509
         |     0.0252     0.0929     0.1138     0.1308     0.4493     0.0489
Col Mean-|
Row Mean |      7          8          9         10
```

```
---------+--------------------------------------------
       8 |  -1.273936
         |     0.1013
         |
       9 |  -0.203120   0.717258
         |     0.4195     0.2366
         |
      10 |  -0.645693   0.478844  -0.297344
         |     0.2592     0.3160     0.3831
         |
      11 |   1.214096   2.488185   0.947688   1.639269
         |     0.1124     0.0064     0.1716     0.0506

alpha =   0.05
Reject Ho if p = P(Z <= |z|) <= alpha/2

.
. dunntest iq2, by(iincome)

Warning: by() values are unlabeled, option nolabel implicit


Kruskal-Wallis equality-of-populations rank test

  +---------------------------+
  | iincome | Obs |  Rank Sum |
  |---------+-----+-----------|
  |       1 |  85 |  39413.00 |
  |       2 | 124 |  62680.50 |
  |       3 | 220 | 113218.00 |
  |       4 | 194 | 104957.50 |
  |       5 | 138 |  77734.00 |
  |---------+-----+-----------|
  |       6 |  81 |  46268.50 |
  |       7 |  45 |  27142.00 |
  |       8 |  29 |  14295.00 |
  |       9 |  13 |   8091.00 |
  |      10 |  22 |  12619.00 |
  |---------+-----+-----------|
  |      11 | 116 |  63359.50 |
  +---------------------------+

chi-squared =    13.281 with 10 d.f.
probability =     0.2084

chi-squared with ties =    19.148 with 10 d.f.
probability =     0.0384


                Dunn's Pairwise Comparison of iq2 by iincome
                              (No adjustment)
Col Mean-|
Row Mean |          1          2          3          4          5          6
---------+------------------------------------------------------------------
       2 |  -1.156759
         |     0.1237
         |
       3 |  -1.554296  -0.317118
         |     0.0601     0.3756
         |
       4 |  -2.316595  -1.204085  -1.044061
         |     0.0103     0.1143     0.1482
         |
       5 |  -2.814820  -1.820137  -1.746089  -0.779272
         |     0.0024     0.0344     0.0404     0.2179
         |
       6 |  -2.698388  -1.792626  -1.696535  -0.889441  -0.220641
         |     0.0035     0.0365     0.0449     0.1869     0.4127
         |
       7 |  -2.947791  -2.186686  -2.108330  -1.463268  -0.904860  -0.669351
         |     0.0016     0.0144     0.0175     0.0717     0.1828     0.2516
         |
       8 |  -0.529937   0.237196   0.427915   0.941103   1.342026   1.409567
         |     0.2981     0.4063     0.3344     0.1733     0.0898     0.0793
         |
       9 |  -2.076410  -1.562379  -1.471004  -1.106612  -0.793658  -0.667291
         |     0.0189     0.0591     0.0706     0.1342     0.2137     0.2523
         |
      10 |  -1.790286  -1.147028  -1.027451  -0.564161  -0.174837  -0.038489
```

```
         |     0.0367     0.1257     0.1521     0.2863     0.4306     0.4846
         |
      11 |  -2.251971  -1.228138  -1.072211  -0.172116   0.528550   0.673092
         |     0.0122     0.1097     0.1418     0.4317     0.2986     0.2504
Col Mean-|
Row Mean |          7          8          9         10
---------+--------------------------------------------
       8 |   1.803556
         |     0.0357
         |
       9 |  -0.237949  -1.511200
         |     0.4060     0.0654
         |
      10 |   0.442807  -1.111590   0.543469
         |     0.3290     0.1332     0.2934
         |
      11 |   1.263574  -0.999773   1.014893   0.458911
         |     0.1032     0.1587     0.1551     0.3231

alpha =   0.05
Reject Ho if p = P(Z <= |z|) <= alpha/2

.
. dunntest iq3, by(iincome)

Warning: by() values are unlabeled, option nolabel implicit


Kruskal-Wallis equality-of-populations rank test

  +---------------------------+
  | iincome | Obs |  Rank Sum |
  |---------+-----+-----------|
  |       1 |  85 |  38988.50 |
  |       2 | 124 |  65318.50 |
  |       3 | 220 | 111481.50 |
  |       4 | 194 | 108216.50 |
  |       5 | 138 |  75233.00 |
  |---------+-----+-----------|
  |       6 |  81 |  46445.50 |
  |       7 |  45 |  26126.00 |
  |       8 |  29 |  16689.00 |
  |       9 |  13 |   8034.00 |
  |      10 |  22 |  13280.50 |
  |---------+-----+-----------|
  |      11 | 116 |  59965.00 |
  +---------------------------+

chi-squared =    13.531 with 10 d.f.
probability =     0.1955

chi-squared with ties =    25.388 with 10 d.f.
probability =     0.0047


                Dunn's Pairwise Comparison of iq3 by iincome
                              (No adjustment)
Col Mean-|
Row Mean |          1          2          3          4          5          6
---------+------------------------------------------------------------------
       2 |  -2.148829
         |     0.0158
         |
       3 |  -1.672250   0.792784
         |     0.0472     0.2140
         |
       4 |  -3.387523  -1.200612  -2.305484
         |     0.0004     0.1150     0.0106
         |
       5 |  -2.787910  -0.661150  -1.573197   0.504950
         |     0.0027     0.2543     0.0578     0.3068
         |
       6 |  -3.283862  -1.451113  -2.280115  -0.523645  -0.896635
         |     0.0005     0.0734     0.0113     0.3003     0.1850
         |
       7 |  -2.938900  -1.374539  -2.006238  -0.611462  -0.916926  -0.171575
         |     0.0016     0.0846     0.0224     0.2704     0.1796     0.4319
         |
       8 |  -2.414087  -1.049909  -1.546854  -0.394415  -0.659672  -0.042756
```

```
         |     0.0079     0.1469     0.0609     0.3466     0.2547     0.4829
         |
       9 |  -2.377882  -1.391143  -1.732772  -0.933760  -1.115905  -0.663510
         |     0.0087     0.0821     0.0416     0.1752     0.1322     0.2535
         |
      10 |  -2.693915  -1.477507  -1.926749  -0.905783  -1.132569  -0.559433
         |     0.0035     0.0698     0.0270     0.1825     0.1287     0.2879
         |
      11 |  -1.813516   0.338009  -0.395350   1.548125   0.996072   1.733268
         |     0.0349     0.3677     0.3463     0.0608     0.1596     0.0415
Col Mean-|
Row Mean |          7          8          9         10
---------+--------------------------------------------
       8 |   0.095106
         |     0.4621
         |
       9 |  -0.528284  -0.566220
         |     0.2987     0.2856
         |
      10 |  -0.394380  -0.442980   0.182222
         |     0.3467     0.3289     0.4277
         |
      11 |   1.610698   1.253413   1.535893   1.657645
         |     0.0536     0.1050     0.0623     0.0487

alpha =   0.05
Reject Ho if p = P(Z <= |z|) <= alpha/2

.
. dunntest iq4, by(iincome)

Warning: by() values are unlabeled, option nolabel implicit


Kruskal-Wallis equality-of-populations rank test

  +---------------------------+
  | iincome | Obs |  Rank Sum |
  |---------+-----+-----------|
  |       1 |  85 |  37107.00 |
  |       2 | 124 |  65210.00 |
  |       3 | 220 | 110440.00 |
  |       4 | 194 | 111545.50 |
  |       5 | 138 |  75994.50 |
  |---------+-----+-----------|
  |       6 |  81 |  42547.50 |
  |       7 |  45 |  27401.50 |
  |       8 |  29 |  15829.50 |
  |       9 |  13 |   7802.00 |
  |      10 |  22 |  13522.00 |
  |---------+-----+-----------|
  |      11 | 116 |  62378.50 |
  +---------------------------+

chi-squared =    19.683 with 10 d.f.
probability =     0.0324

chi-squared with ties =    26.046 with 10 d.f.
probability =     0.0037


                Dunn's Pairwise Comparison of iq4 by iincome
                              (No adjustment)
Col Mean-|
Row Mean |          1          2          3          4          5          6
---------+------------------------------------------------------------------
       2 |  -2.368171
         |     0.0089
         |
       3 |  -1.912976   0.794063
         |     0.0279     0.2136
         |
       4 |  -3.972534  -1.593812  -2.765956
         |     0.0000     0.0555     0.0028
         |
       5 |  -3.089953  -0.748099  -1.673598   0.814298
         |     0.0010     0.2272     0.0471     0.2077
         |
       6 |  -2.133003   0.015921  -0.668591   1.402405   0.677582
```

```
         |     0.0165      0.4936      0.2519      0.0804      0.2490
         |
       7 |  -3.490216   -1.781082   -2.439558   -0.765840   -1.266400   -1.679380
         |     0.0002      0.0374      0.0074      0.2219      0.1027      0.0465
         |
       8 |  -1.897109   -0.361180   -0.828471    0.546218    0.088444   -0.354785
         |     0.0289      0.3590      0.2037      0.2925      0.4648      0.3614
         |
       9 |  -2.050700   -0.950966   -1.283692   -0.328050   -0.636509   -0.935496
         |     0.0201      0.1708      0.0996      0.3714      0.2622      0.1748
         |
      10 |  -2.779079   -1.432053   -1.880365   -0.658084   -1.039898   -1.387458
         |     0.0027      0.0761      0.0300      0.2552      0.1492      0.0827
         |
      11 |  -2.645686   -0.342701   -1.162901    1.184141    0.383446   -0.321426
         |     0.0041      0.3659      0.1224      0.1182      0.3507      0.3739
Col Mean-|
Row Mean |          7           8          9          10
---------+--------------------------------------------
       8 |   0.988807
         |     0.1614
         |
       9 |   0.103952   -0.607388
         |     0.4586      0.2718
         |
      10 |  -0.081994   -0.908257   -0.154540
         |     0.4673      0.1819      0.4386
         |
      11 |   1.512891    0.145623    0.796518    1.234306
         |     0.0652      0.4421      0.2129      0.1085

alpha =   0.05
Reject Ho if p = P(Z <= |z|) <= alpha/2

.
. dunntest iq5, by(iincome)

Warning: by() values are unlabeled, option nolabel implicit


Kruskal-Wallis equality-of-populations rank test

  +---------------------------+
  | iincome | Obs |  Rank Sum |
  |---------+-----+-----------|
  |       1 |  85 |  43091.50 |
  |       2 | 124 |  66453.50 |
  |       3 | 220 | 109374.50 |
  |       4 | 194 | 106261.50 |
  |       5 | 138 |  75463.00 |
  |---------+-----+-----------|
  |       6 |  81 |  44934.00 |
  |       7 |  45 |  24609.50 |
  |       8 |  29 |  17201.00 |
  |       9 |  13 |   8082.00 |
  |      10 |  22 |  13958.00 |
  |---------+-----+-----------|
  |      11 | 116 |  60349.50 |
  +---------------------------+

chi-squared =     9.564 with 10 d.f.
probability =     0.4796

chi-squared with ties =    14.118 with 10 d.f.
probability =     0.1677


                Dunn's Pairwise Comparison of iq5 by iincome
                              (No adjustment)
Col Mean-|
Row Mean |              1              2              3              4              5              6
---------+------------------------------------------------------------------
       2 |  -0.810736
         |     0.2088
         |
       3 |   0.302602    1.360806
         |     0.3811      0.0868
         |
       4 |  -1.236093   -0.405473   -2.024892
```

```
         |     0.1082     0.3426     0.0214
         |
       5 |  -1.140193  -0.347880  -1.803628   0.032089
         |     0.1271     0.3640     0.0356     0.4872
         |
       6 |  -1.213243  -0.519526  -1.746860  -0.208654  -0.222731
         |     0.1125     0.3017     0.0403     0.4174     0.4119
         |
       7 |  -0.853708  -0.248352  -1.198176   0.020538  -0.001021   0.166739
         |     0.1966     0.4019     0.1154     0.4918     0.4996     0.4338
         |
       8 |  -1.579954  -1.093750  -1.915503  -0.899027  -0.893698  -0.699570
         |     0.0571     0.1370     0.0277     0.1843     0.1857     0.2421
         |
       9 |  -1.518954  -1.160057  -1.720222  -1.017718  -1.017309  -0.883481
         |     0.0644     0.1230     0.0427     0.1544     0.1545     0.1885
         |
      10 |  -2.101410  -1.679350  -2.420832  -1.519726  -1.504827  -1.307239
         |     0.0178     0.0465     0.0077     0.0643     0.0662     0.0956
         |
      11 |  -0.367139   0.478014  -0.793637   0.923288   0.831911   0.939016
         |     0.3568     0.3163     0.2137     0.1779     0.2027     0.1739
Col Mean-|
Row Mean |          7          8          9         10
---------+--------------------------------------------
       8 |  -0.765919
         |     0.2219
         |
       9 |  -0.936777  -0.337291
         |     0.1744     0.3679
         |
      10 |  -1.327258  -0.576151  -0.143834
         |     0.0922     0.2823     0.4428
         |
      11 |   0.597686   1.384077   1.367391   1.936218
         |     0.2750     0.0832     0.0858     0.0264

alpha =   0.05
Reject Ho if p = P(Z <= |z|) <= alpha/2

.
. dunntest iq6, by(iincome)

Warning: by() values are unlabeled, option nolabel implicit


Kruskal-Wallis equality-of-populations rank test

  +---------------------------+
  | iincome | Obs |  Rank Sum |
  |---------+-----+-----------|
  |       1 |  85 |  39943.00 |
  |       2 | 124 |  65934.00 |
  |       3 | 220 | 112644.00 |
  |       4 | 194 | 111196.50 |
  |       5 | 138 |  76173.50 |
  |---------+-----+-----------|
  |       6 |  81 |  42432.00 |
  |       7 |  45 |  27899.50 |
  |       8 |  29 |  16523.00 |
  |       9 |  13 |   7017.00 |
  |      10 |  22 |  12425.00 |
  |---------+-----+-----------|
  |      11 | 116 |  57590.50 |
  +---------------------------+

chi-squared =    14.334 with 10 d.f.
probability =     0.1583

chi-squared with ties =    21.312 with 10 d.f.
probability =     0.0190


                Dunn's Pairwise Comparison of iq6 by iincome
                              (No adjustment)
Col Mean-|
Row Mean |          1          2          3          4          5          6
---------+------------------------------------------------------------------
       2 |  -1.736761
```

```
         |     0.0412
         |
       3 |  -1.304384   0.694423
         |     0.0961     0.2437
         |
       4 |  -3.141146  -1.426563  -2.457107
         |     0.0008     0.0769     0.0070
         |
       5 |  -2.355036  -0.647742  -1.456204   0.753132
         |     0.0093     0.2586     0.0727     0.2257
         |
       6 |  -1.374388   0.218080  -0.360277   1.475366   0.795202
         |     0.0847     0.4137     0.3593     0.0701     0.2132
         |
       7 |  -3.220984  -2.006780  -2.611245  -1.119447  -1.567548  -2.045979
         |     0.0006     0.0224     0.0045     0.1315     0.0585     0.0204
         |
       8 |  -1.837011  -0.729574  -1.156479   0.067955  -0.344334  -0.839400
         |     0.0331     0.2328     0.1237     0.4729     0.3653     0.2006
         |
       9 |  -0.928093  -0.109172  -0.384708   0.461416   0.166563  -0.210799
         |     0.1767     0.4565     0.3502     0.3223     0.4339     0.4165
         |
      10 |  -1.569049  -0.565228  -0.933516   0.147834  -0.220464  -0.673484
         |     0.0583     0.2860     0.1753     0.4412     0.4128     0.2503
         |
      11 |  -0.735847   1.079976   0.536170   2.586049   1.743757   0.748257
         |     0.2309     0.1401     0.2959     0.0049     0.0406     0.2272
Col Mean-|
Row Mean |          7          8          9         10
---------+--------------------------------------------
       8 |   0.834645
         |     0.2020
         |
       9 |   1.008073   0.355517
         |     0.1567     0.3611
         |
      10 |   0.839834   0.069777  -0.282811
         |     0.2005     0.4722     0.3887
         |
      11 |   2.782937   1.396782   0.585780   1.162216
         |     0.0027     0.0812     0.2790     0.1226

alpha =   0.05
Reject Ho if p = P(Z <= |z|) <= alpha/2

.
. dunntest iq7, by(iincome)

Warning: by() values are unlabeled, option nolabel implicit


Kruskal-Wallis equality-of-populations rank test

  +---------------------------+
  | iincome | Obs |  Rank Sum |
  |---------+-----+-----------|
  |       1 |  85 |  40655.00 |
  |       2 | 124 |  63730.00 |
  |       3 | 220 | 112270.00 |
  |       4 | 194 | 105789.00 |
  |       5 | 138 |  76798.00 |
  |---------+-----+-----------|
  |       6 |  81 |  41235.00 |
  |       7 |  45 |  24842.00 |
  |       8 |  29 |  18999.00 |
  |       9 |  13 |   8325.00 |
  |      10 |  22 |  13773.00 |
  |---------+-----+-----------|
  |      11 | 116 |  63362.00 |
  +---------------------------+

chi-squared =    14.459 with 10 d.f.
probability =     0.1531

chi-squared with ties =    17.779 with 10 d.f.
probability =     0.0588
```

```
                  Dunn's Pairwise Comparison of iq7 by iincome
                                (No adjustment)
Col Mean-|
Row Mean |          1          2          3          4          5          6
---------+------------------------------------------------------------------
       2 |  -0.911185
         |     0.1811
         |
       3 |  -0.902310   0.116431
         |     0.1834     0.4537
         |
       4 |  -1.853772  -0.981248  -1.278245
         |     0.0319     0.1632     0.1006
         |
       5 |  -2.041196  -1.237557  -1.530584  -0.362009
         |     0.0206     0.1079     0.0629     0.3587
         |
       6 |  -0.713304   0.122853   0.034446   0.985495   1.219413
         |     0.2378     0.4511     0.4863     0.1622     0.1113
         |
       7 |  -1.439516  -0.787636  -0.917725  -0.146588   0.093548  -0.831651
         |     0.0750     0.2155     0.1794     0.4417     0.4627     0.2028
         |
       8 |  -2.959064  -2.463005  -2.637831  -1.985144  -1.737404  -2.428826
         |     0.0015     0.0069     0.0042     0.0236     0.0412     0.0076
         |
       9 |  -1.958548  -1.560599  -1.639754  -1.194228  -1.040342  -1.581461
         |     0.0251     0.0593     0.0505     0.1162     0.1491     0.0569
         |
      10 |  -2.222639  -1.743556  -1.862341  -1.291486  -1.089991  -1.750747
         |     0.0131     0.0406     0.0313     0.0983     0.1379     0.0400
         |
      11 |  -1.712027  -0.899033  -1.126019  -0.028207   0.293755  -0.923223
         |     0.0434     0.1843     0.1301     0.4887     0.3845     0.1779
Col Mean-|
Row Mean |          7          8          9         10
---------+--------------------------------------------
       8 |  -1.557863
         |     0.0596
         |
       9 |  -1.009557   0.159054
         |     0.1564     0.4368
         |
      10 |  -1.023591   0.370267   0.147496
         |     0.1530     0.3556     0.4414
         |
      11 |   0.119255   1.887710   1.158465   1.235174
         |     0.4525     0.0295     0.1233     0.1084

alpha =   0.05
Reject Ho if p = P(Z <= |z|) <= alpha/2

.
. dunntest iq8, by(iincome)

Warning: by() values are unlabeled, option nolabel implicit


Kruskal-Wallis equality-of-populations rank test

  +---------------------------+
  | iincome | Obs |  Rank Sum |
  |---------+-----+-----------|
  |       1 |  85 |  44398.00 |
  |       2 | 124 |  67446.50 |
  |       3 | 220 | 114674.50 |
  |       4 | 194 | 109552.50 |
  |       5 | 138 |  77545.00 |
  |---------+-----+-----------|
  |       6 |  81 |  39286.00 |
  |       7 |  45 |  27072.00 |
  |       8 |  29 |  11459.50 |
  |       9 |  13 |   7777.00 |
  |      10 |  22 |  11179.00 |
  |---------+-----+-----------|
  |      11 | 116 |  59388.00 |
  +---------------------------+

chi-squared =    15.098 with 10 d.f.
```

```
probability =     0.1285

chi-squared with ties =    16.728 with 10 d.f.
probability =     0.0806


                Dunn's Pairwise Comparison of iq8 by iincome
                              (No adjustment)
Col Mean-|
Row Mean |          1             2            3            4            5            6
---------+-------------------------------------------------------------------
       2 |  -0.523795
         |     0.3002
         |
       3 |   0.028930   0.689738
         |     0.4885     0.2452
         |
       4 |  -1.112733  -0.617347  -1.507100
         |     0.1329     0.2685     0.0659
         |
       5 |  -0.980783  -0.496797  -1.279359   0.085372
         |     0.1633     0.3097     0.1004     0.4660
         |
       6 |   0.820893   1.408492   0.952324   2.057639   1.876777
         |     0.2059     0.0795     0.1705     0.0198     0.0303
         |
       7 |  -1.468715  -1.132022  -1.677545  -0.761682  -0.789533  -2.141891
         |     0.0710     0.1288     0.0467     0.2231     0.2149     0.0161
         |
       8 |   2.019931   2.463517   2.180125   2.908858   2.788476   1.418337
         |     0.0217     0.0069     0.0146     0.0018     0.0026     0.0780
         |
       9 |  -0.870561  -0.636301  -0.921258  -0.399729  -0.427500  -1.294341
         |     0.1920     0.2623     0.1785     0.3447     0.3345     0.0978
         |
      10 |   0.202668   0.528388   0.200283   0.858878   0.800248  -0.328534
         |     0.4197     0.2986     0.4206     0.1952     0.2118     0.3713
         |
      11 |   0.247939   0.845071   0.276314   1.534811   1.354597  -0.635813
         |     0.4021     0.1990     0.3912     0.0624     0.0878     0.2624
Col Mean-|
Row Mean |          7             8            9           10
---------+--------------------------------------------
       8 |   2.961248
         |     0.0015
         |
       9 |   0.036549  -2.078189
         |     0.4854     0.0188
         |
      10 |   1.227169  -1.364937   0.879687
         |     0.1099     0.0861     0.1895
         |
      11 |   1.743327  -1.921793   1.007449  -0.056245
         |     0.0406     0.0273     0.1569     0.4776

alpha =   0.05
Reject Ho if p = P(Z <= |z|) <= alpha/2

.
. dunntest iq9, by(iincome)

Warning: by() values are unlabeled, option nolabel implicit


Kruskal-Wallis equality-of-populations rank test

  +---------------------------+
  | iincome | Obs |  Rank Sum |
  |---------+-----+-----------|
  |       1 |  85 |  42614.00 |
  |       2 | 124 |  71402.00 |
  |       3 | 220 | 115021.00 |
  |       4 | 194 | 107204.00 |
  |       5 | 138 |  73164.00 |
  |---------+-----+-----------|
  |       6 |  81 |  36234.00 |
  |       7 |  45 |  25791.00 |
  |       8 |  29 |  18002.00 |
  |       9 |  13 |   6129.00 |
```

```
  |      10 |  22 |  12144.00 |
  |---------+-----+-----------|
  |      11 | 116 |  62073.00 |
  +---------------------------+

chi-squared =    14.299 with 10 d.f.
probability =     0.1598

chi-squared with ties =    16.568 with 10 d.f.
probability =     0.0845


                Dunn's Pairwise Comparison of iq9 by iincome
                              (No adjustment)
Col Mean-|
Row Mean |            1            2            3            4            5            6
---------+------------------------------------------------------------------------------
       2 |  -1.847551
         |     0.0323
         |
       3 |  -0.587541     1.648615
         |     0.2784       0.0496
         |
       4 |  -1.376451     0.705584    -1.056011
         |     0.0843       0.2402       0.1455
         |
       5 |  -0.730439     1.288633    -0.236466     0.703374
         |     0.2326       0.0988       0.4065       0.2409
         |
       6 |   1.214944     3.141555     2.028888     2.779463     2.067305
         |     0.1122       0.0008       0.0212       0.0027       0.0194
         |
       7 |  -1.360262     0.053977    -1.074127    -0.433524    -0.874138    -2.363446
         |     0.0869       0.4785       0.1414       0.3323       0.1910       0.0091
         |
       8 |  -1.939659    -0.760958    -1.731626    -1.195867    -1.548947    -2.799362
         |     0.0262       0.2233       0.0417       0.1159       0.0607       0.0026
         |
       9 |   0.350465     1.250438     0.628553     0.989247     0.706893    -0.282083
         |     0.3630       0.1056       0.2648       0.1613       0.2398       0.3889
         |
      10 |  -0.739751     0.359696    -0.455786     0.009284    -0.332100    -1.520705
         |     0.2297       0.3595       0.3243       0.4963       0.3699       0.0642
         |
      11 |  -0.826199     1.100886    -0.374111     0.520401    -0.136936    -2.117528
         |     0.2043       0.1355       0.3542       0.3014       0.4455       0.0171
Col Mean-|
Row Mean |            7            8            9           10
---------+----------------------------------------------------
       8 |  -0.698600
         |     0.2424
         |
       9 |   1.127888     1.562424
         |     0.1297       0.0591
         |
      10 |   0.283759     0.849481    -0.804181
         |     0.3883       0.1978       0.2106
         |
      11 |   0.756224     1.440971    -0.760168     0.253676
         |     0.2248       0.0748       0.2236       0.3999

alpha =   0.05
Reject Ho if p = P(Z <= |z|) <= alpha/2

.
. dunntest iq10, by(iincome)

Warning: by() values are unlabeled, option nolabel implicit


Kruskal-Wallis equality-of-populations rank test

  +---------------------------+
  | iincome | Obs |  Rank Sum |
  |---------+-----+-----------|
  |       1 |  85 |  40198.50 |
  |       2 | 124 |  64675.00 |
  |       3 | 220 | 115226.00 |
  |       4 | 194 | 105304.00 |
```

```
  |        5 | 138 |  75828.00 |
  |---------+-----+-----------|
  |        6 |  81 |  43222.00 |
  |        7 |  45 |  27158.00 |
  |        8 |  29 |  17443.00 |
  |        9 |  13 |   7630.50 |
  |       10 |  22 |  12461.00 |
  |---------+-----+-----------|
  |       11 | 116 |  60632.00 |
  +---------------------------+

chi-squared =     8.754 with 10 d.f.
probability =     0.5556

chi-squared with ties =    15.902 with 10 d.f.
probability =     0.1025


               Dunn's Pairwise Comparison of iq10 by iincome
                              (No adjustment)
Col Mean-|
Row Mean |          1           2           3           4           5           6
---------+------------------------------------------------------------------
       2 |  -1.510986
         |     0.0654
         |
       3 |  -1.740758   -0.084983
         |     0.0409      0.4661
         |
       4 |  -2.349653   -0.807641   -0.845934
         |     0.0094      0.2096      0.1988
         |
       5 |  -2.428329   -0.986350   -1.036053   -0.262123
         |     0.0076      0.1620      0.1501      0.3966
         |
       6 |  -1.709198   -0.368355   -0.331484    0.304134    0.495983
         |     0.0437      0.3563      0.3701      0.3805      0.3100
         |
       7 |  -3.098024   -2.059211   -2.132063   -1.604670   -1.376629   -1.644439
         |     0.0010      0.0197      0.0165      0.0543      0.0843      0.0500
         |
       8 |  -2.614557   -1.694358   -1.720791   -1.289040   -1.113423   -1.371867
         |     0.0045      0.0451      0.0426      0.0987      0.1328      0.0851
         |
       9 |  -1.674775   -0.980992   -0.968521   -0.674109   -0.565066   -0.781047
         |     0.0470      0.1633      0.1664      0.2501      0.2860      0.2174
         |
      10 |  -1.709276   -0.847650   -0.834294   -0.458910   -0.322558   -0.596764
         |     0.0437      0.1983      0.2021      0.3231      0.3735      0.2753
         |
      11 |  -1.524450   -0.037823    0.040590    0.749543    0.930124    0.329695
         |     0.0637      0.4849      0.4838      0.2268      0.1762      0.3708
Col Mean-|
Row Mean |          7           8           9          10
---------+--------------------------------------------
       8 |   0.037254
         |     0.4851
         |
       9 |   0.229874    0.190278
         |     0.4091      0.4245
         |
      10 |   0.623759    0.542557    0.256952
         |     0.2664      0.2937      0.3986
         |
      11 |   2.012741    1.659858    0.961094    0.822269
         |     0.0221      0.0485      0.1683      0.2055

alpha =   0.05
Reject Ho if p = P(Z <= |z|) <= alpha/2
```

- Question: For each of the questions, are there differences in the average response among regions?

```
. dunntest iq1, by(iregion)

Warning: by() values are unlabeled, option nolabel implicit
```

```
Kruskal-Wallis equality-of-populations rank test

  +---------------------------+
  | iregion | Obs |  Rank Sum |
  |---------+-----+-----------|
  |       1 |  47 |  25801.50 |
  |       2 | 123 |  67314.50 |
  |       3 | 190 | 102363.00 |
  |       4 |  60 |  30521.00 |
  |       5 | 196 |  99988.50 |
  |---------+-----+-----------|
  |       6 |  74 |  39154.50 |
  |       7 | 102 |  53159.00 |
  |       8 |  77 |  40078.50 |
  |       9 | 189 | 101830.50 |
  +---------------------------+

chi-squared =     2.163 with 8 d.f.
probability =     0.9756

chi-squared with ties =     3.726 with 8 d.f.
probability =     0.8809


                Dunn's Pairwise Comparison of iq1 by iregion
                              (No adjustment)
Col Mean-|
Row Mean |         1          2          3          4          5          6
---------+------------------------------------------------------------------
       2 |   0.042474
         |     0.4831
         |
       3 |   0.269342   0.316211
         |     0.3938     0.3759
         |
       4 |   0.888316   1.052593   0.872168
         |     0.1872     0.1463     0.1916
         |
       5 |   1.026723   1.386337   1.206927  -0.042564
         |     0.1523     0.0828     0.1137     0.4830
         |
       6 |   0.457191   0.530134   0.302107  -0.505166  -0.597188
         |     0.3238     0.2980     0.3813     0.3067     0.2752
         |
       7 |   0.677356   0.837319   0.615384  -0.329566  -0.387744   0.223575
         |     0.2491     0.2012     0.2692     0.3709     0.3491     0.4115
         |
       8 |   0.660596   0.791341   0.580345  -0.294747  -0.330689   0.227308
         |     0.2544     0.2144     0.2808     0.3841     0.3704     0.4101
         |
       9 |   0.268329   0.314656  -0.001383  -0.872573  -1.206703  -0.302920
         |     0.3942     0.3765     0.4994     0.1914     0.1138     0.3810
Col Mean-|
Row Mean |         7          8
---------+----------------------
       8 |   0.018968
         |     0.4924
         |
       9 |  -0.615972  -0.580954
         |     0.2690     0.2806

alpha =   0.05
Reject Ho if p = P(Z <= |z|) <= alpha/2

.
. dunntest iq2, by(iregion)

Warning: by() values are unlabeled, option nolabel implicit


Kruskal-Wallis equality-of-populations rank test

  +---------------------------+
  | iregion | Obs |  Rank Sum |
  |---------+-----+-----------|
  |       1 |  47 |  23519.00 |
  |       2 | 123 |  69050.00 |
```

```
  |       3 | 190 | 100366.50 |
  |       4 |  60 |  31012.00 |
  |       5 | 196 | 100609.50 |
  |---------+-----+-----------|
  |       6 |  74 |  36875.00 |
  |       7 | 102 |  54881.50 |
  |       8 |  77 |  44283.00 |
  |       9 | 189 |  99614.50 |
  +---------------------------+

chi-squared =     4.999 with 8 d.f.
probability =     0.7577

chi-squared with ties =     7.247 with 8 d.f.
probability =     0.5102


                Dunn's Pairwise Comparison of iq2 by iregion
                              (No adjustment)
Col Mean-|
Row Mean |        1           2           3           4           5           6
---------+------------------------------------------------------------------
       2 |  -1.401196
         |     0.0806
         |
       3 |  -0.673408   1.128301
         |     0.2503     0.1296
         |
       4 |  -0.333024   1.113944    0.302762
         |     0.3696     0.1327      0.3810
         |
       5 |  -0.313209   1.646623    0.577895    0.094889
         |     0.3771     0.0498      0.2817      0.4622
         |
       6 |   0.044227   1.689339    0.860804    0.420891    0.433300
         |     0.4824     0.0456      0.1947      0.3369      0.3324
         |
       7 |  -0.841525   0.686424   -0.314897   -0.513148   -0.798495   -1.025584
         |     0.2000     0.2462      0.3764      0.3039      0.2123      0.1525
         |
       8 |  -1.590200  -0.372086   -1.366818   -1.332635   -1.810343   -1.858851
         |     0.0559     0.3549      0.0858      0.0913      0.0351      0.0315
         |
       9 |  -0.644434   1.167399    0.045410   -0.271087   -0.531360   -0.826147
         |     0.2596     0.1215      0.4819      0.3932      0.2976      0.2044
Col Mean-|
Row Mean |        7           8
---------+----------------------
       8 |  -0.967067
         |     0.1668
         |
       9 |   0.352577   1.400283
         |     0.3622     0.0807

alpha =   0.05
Reject Ho if p = P(Z <= |z|) <= alpha/2

.
. dunntest iq3, by(iregion)

Warning: by() values are unlabeled, option nolabel implicit


Kruskal-Wallis equality-of-populations rank test

  +---------------------------+
  | iregion | Obs |  Rank Sum |
  |---------+-----+-----------|
  |       1 |  47 |  24663.50 |
  |       2 | 123 |  68571.50 |
  |       3 | 190 | 103626.00 |
  |       4 |  60 |  29282.00 |
  |       5 | 196 | 101056.00 |
  |---------+-----+-----------|
  |       6 |  74 |  36988.00 |
  |       7 | 102 |  51807.00 |
  |       8 |  77 |  42563.50 |
  |       9 | 189 | 101653.50 |
  +---------------------------+
```

```
chi-squared =     4.863 with 8 d.f.
probability =     0.7721

chi-squared with ties =     9.241 with 8 d.f.
probability =     0.3224


                Dunn's Pairwise Comparison of iq3 by iregion
                              (No adjustment)
Col Mean-|
Row Mean |       1           2           3           4           5           6
---------+------------------------------------------------------------------------
       2 |  -0.861221
         |     0.1946
         |
       3 |  -0.571695    0.471363
         |     0.2838      0.3187
         |
       4 |   0.850479    1.989908    1.747619
         |     0.1975      0.0233      0.0403
         |
       5 |   0.254530    1.643252    1.320843   -0.842644
         |     0.3995      0.0502      0.0933      0.1997
         |
       6 |   0.602672    1.767949    1.500029   -0.306543    0.520904
         |     0.2734      0.0385      0.0668      0.3796      0.3012
         |
       7 |   0.431017    1.670219    1.377797   -0.551195    0.283785   -0.238533
         |     0.3332      0.0474      0.0841      0.2908      0.3883      0.4057
         |
       8 |  -0.682835    0.146504   -0.246206   -1.696032   -1.247144   -1.466964
         |     0.2474      0.4418      0.4028      0.0449      0.1062      0.0712
         |
       9 |  -0.362407    0.764912    0.331578   -1.516629   -0.984934   -1.250510
         |     0.3585      0.2222      0.3701      0.0647      0.1623      0.1056
Col Mean-|
Row Mean |       7           8
---------+------------------------
       8 |  -1.340578
         |     0.0900
         |
       9 |  -1.099269    0.497979
         |     0.1358      0.3092

alpha =   0.05
Reject Ho if p = P(Z <= |z|) <= alpha/2

.
. dunntest iq4, by(iregion)

Warning: by() values are unlabeled, option nolabel implicit


Kruskal-Wallis equality-of-populations rank test

  +---------------------------+
  | iregion | Obs | Rank Sum |
  |---------+-----+----------|
  |       1 |  47 | 23898.00 |
  |       2 | 123 | 70371.00 |
  |       3 | 190 | 99803.00 |
  |       4 |  60 | 29574.00 |
  |       5 | 196 | 99327.50 |
  |---------+-----+----------|
  |       6 |  74 | 39668.00 |
  |       7 | 102 | 56000.00 |
  |       8 |  77 | 43087.50 |
  |       9 | 189 | 98482.00 |
  +---------------------------+

chi-squared =     5.937 with 8 d.f.
probability =     0.6543

chi-squared with ties =     7.884 with 8 d.f.
probability =     0.4449


                Dunn's Pairwise Comparison of iq4 by iregion
```

```
                                 (No adjustment)
Col Mean-|
Row Mean |          1          2          3          4          5          6
---------+------------------------------------------------------------------
       2 |  -1.399868
         |     0.0808
         |
       3 |  -0.389159   1.526466
         |     0.3486     0.0634
         |
       4 |   0.301407   1.897289   0.824575
         |     0.3816     0.0289     0.2048
         |
       5 |   0.039361   2.142444   0.685502  -0.354599
         |     0.4843     0.0161     0.2465     0.3614
         |
       6 |  -0.557758   0.924573  -0.296550  -0.936798  -0.809347
         |     0.2885     0.1776     0.3834     0.1744     0.2092
         |
       7 |  -0.867458   0.650583  -0.729396  -1.300823  -1.304961  -0.320211
         |     0.1928     0.2577     0.2329     0.0967     0.0960     0.3744
         |
       8 |  -1.041294   0.325541  -0.957487  -1.460253  -1.480649  -0.544963
         |     0.1489     0.3724     0.1692     0.0721     0.0694     0.2929
         |
       9 |  -0.291544   1.661935   0.154551  -0.716903  -0.528838   0.412115
         |     0.3853     0.0483     0.4386     0.2367     0.2985     0.3401
Col Mean-|
Row Mean |          7          8
---------+----------------------
       8 |  -0.263754
         |     0.3960
         |
       9 |   0.857955   1.074198
         |     0.1955     0.1414

alpha =   0.05
Reject Ho if p = P(Z <= |z|) <= alpha/2

.
. dunntest iq5, by(iregion)

Warning: by() values are unlabeled, option nolabel implicit


Kruskal-Wallis equality-of-populations rank test

  +-------------------------+
  | iregion | Obs | Rank Sum |
  |---------+-----+----------|
  |       1 |  47 | 25000.00 |
  |       2 | 123 | 70157.00 |
  |       3 | 190 | 97806.00 |
  |       4 |  60 | 31315.00 |
  |       5 | 196 | 99921.50 |
  |---------+-----+----------|
  |       6 |  74 | 41475.00 |
  |       7 | 102 | 54597.00 |
  |       8 |  77 | 40836.00 |
  |       9 | 189 | 99103.50 |
  +-------------------------+

chi-squared =     4.348 with 8 d.f.
probability =     0.8244

chi-squared with ties =     6.456 with 8 d.f.
probability =     0.5962


                Dunn's Pairwise Comparison of iq5 by iregion
                              (No adjustment)
Col Mean-|
Row Mean |          1          2          3          4          5          6
---------+------------------------------------------------------------------
       2 |  -0.894537
         |     0.1855
         |
       3 |   0.419717   1.916327
         |     0.3373     0.0277
```

```
         |
       4 |   0.204685   1.227342  -0.192492
         |     0.4189     0.1098     0.4237
         |
       5 |   0.542899   2.100075   0.194468   0.327393
         |     0.2936     0.0179     0.4229     0.3717
         |
       6 |  -0.610565   0.268597  -1.330089  -0.885045  -1.480943
         |     0.2707     0.3941     0.0917     0.1881     0.0693
         |
       7 |  -0.075772   1.045718  -0.665873  -0.327165  -0.831627   0.658314
         |     0.4698     0.1478     0.2527     0.3718     0.2028     0.2552
         |
       8 |   0.033979   1.098894  -0.459584  -0.195009  -0.608833   0.738209
         |     0.4864     0.1359     0.3229     0.4227     0.2713     0.2302
         |
       9 |   0.184904   1.584274  -0.372203  -0.065677  -0.569284   1.050261
         |     0.4267     0.0566     0.3549     0.4738     0.2846     0.1468
Col Mean-|
Row Mean |          7          8
---------+----------------------
       8 |   0.130148
         |     0.4482
         |
       9 |   0.354032   0.176403
         |     0.3617     0.4300

alpha =   0.05
Reject Ho if p = P(Z <= |z|) <= alpha/2

.
. dunntest iq6, by(iregion)

Warning: by() values are unlabeled, option nolabel implicit


Kruskal-Wallis equality-of-populations rank test

  +---------------------------+
  | iregion | Obs |  Rank Sum |
  |---------+-----+-----------|
  |       1 |  47 |  24290.50 |
  |       2 | 123 |  67846.50 |
  |       3 | 190 | 101167.00 |
  |       4 |  60 |  31261.00 |
  |       5 | 196 | 103413.00 |
  |---------+-----+-----------|
  |       6 |  74 |  36430.00 |
  |       7 | 102 |  52408.00 |
  |       8 |  77 |  40753.50 |
  |       9 | 189 | 102641.50 |
  +---------------------------+

chi-squared =     2.535 with 8 d.f.
probability =     0.9601

chi-squared with ties =     3.778 with 8 d.f.
probability =     0.8766


                Dunn's Pairwise Comparison of iq6 by iregion
                              (No adjustment)
Col Mean-|
Row Mean |          1          2          3          4          5          6
---------+------------------------------------------------------------------
       2 |  -0.810245
         |     0.2089
         |
       3 |  -0.383515   0.660725
         |     0.3507     0.2544
         |
       4 |  -0.086090   0.775858   0.308663
         |     0.4657     0.2189     0.3788
         |
       5 |  -0.265616   0.832852   0.189948  -0.178732
         |     0.3953     0.2025     0.4247     0.4291
         |
       6 |   0.525236   1.610354   1.170901   0.660455   1.034219
         |     0.2997     0.0537     0.1208     0.2545     0.1505
```

```
         |
       7 |   0.068329   1.127482   0.607136   0.177112   0.452013  -0.562680
         |     0.4728     0.1298     0.2719     0.4297     0.3256     0.2868
         |
       8 |  -0.268646   0.613941   0.094387  -0.191391  -0.048979  -0.907275
         |     0.3941     0.2696     0.4624     0.4241     0.4805     0.1821
         |
       9 |  -0.643588   0.293845  -0.412947  -0.594761  -0.605829  -1.479401
         |     0.2599     0.3844     0.3398     0.2760     0.2723     0.0695
Col Mean-|
Row Mean |          7          8
---------+----------------------
       8 |  -0.409188
         |     0.3412
         |
       9 |  -0.951871  -0.408107
         |     0.1706     0.3416

alpha =   0.05
Reject Ho if p = P(Z <= |z|) <= alpha/2

.
. dunntest iq7, by(iregion)

Warning: by() values are unlabeled, option nolabel implicit


Kruskal-Wallis equality-of-populations rank test

  +----------------------------+
  | iregion | Obs |  Rank Sum |
  |---------+-----+-----------|
  |       1 |  47 |  25775.50 |
  |       2 | 123 |  69441.50 |
  |       3 | 190 |  96261.50 |
  |       4 |  60 |  29885.00 |
  |       5 | 196 | 104560.50 |
  |---------+-----+-----------|
  |       6 |  74 |  36689.50 |
  |       7 | 102 |  55909.00 |
  |       8 |  77 |  41935.00 |
  |       9 | 189 |  99753.50 |
  +----------------------------+

chi-squared =     5.004 with 8 d.f.
probability =     0.7572

chi-squared with ties =     6.168 with 8 d.f.
probability =     0.6284


                Dunn's Pairwise Comparison of iq7 by iregion
                              (No adjustment)
Col Mean-|
Row Mean |          1          2          3          4          5          6
---------+------------------------------------------------------------------
       2 |  -0.342213
         |     0.3661
         |
       3 |   0.931783   1.818737
         |     0.1757     0.0345
         |
       4 |   0.938892   1.534078   0.209944
         |     0.1739     0.0625     0.4169
         |
       5 |   0.334313   0.982182  -0.957666  -0.871545
         |     0.3691     0.1630     0.1691     0.1917
         |
       6 |   1.024920   1.698322   0.287329   0.047674   1.003173
         |     0.1527     0.0447     0.3869     0.4810     0.1579
         |
       7 |   0.005924   0.446007  -1.228147  -1.117670  -0.436178  -1.245082
         |     0.4976     0.3278     0.1097     0.1319     0.3314     0.1066
         |
       8 |   0.074683   0.498964  -1.021316  -0.981768  -0.300926  -1.089410
         |     0.4702     0.3089     0.1536     0.1631     0.3817     0.1380
         |
       9 |   0.459648   1.153261  -0.748309  -0.728610   0.202295  -0.847727
         |     0.3229     0.1244     0.2271     0.2331     0.4198     0.1983
```

```
Col Mean-|
Row Mean |         7          8
---------+----------------------
       8 |   0.084653
         |     0.4663
         |
       9 |   0.601297   0.451909
         |     0.2738     0.3257

alpha =   0.05
Reject Ho if p = P(Z <= |z|) <= alpha/2

.
. dunntest iq8, by(iregion)

Warning: by() values are unlabeled, option nolabel implicit


Kruskal-Wallis equality-of-populations rank test

  +----------------------------+
  | iregion | Obs |  Rank Sum |
  |---------+-----+-----------|
  |       1 |  47 |  24173.50 |
  |       2 | 123 |  63543.50 |
  |       3 | 190 |  99851.00 |
  |       4 |  60 |  30860.50 |
  |       5 | 196 | 106283.50 |
  |---------+-----+-----------|
  |       6 |  74 |  37277.50 |
  |       7 | 102 |  58555.00 |
  |       8 |  77 |  38886.50 |
  |       9 | 189 | 100780.00 |
  +----------------------------+

chi-squared =     4.074 with 8 d.f.
probability =     0.8504

chi-squared with ties =     4.516 with 8 d.f.
probability =     0.8078


                Dunn's Pairwise Comparison of iq8 by iregion
                              (No adjustment)
Col Mean-|
Row Mean |          1          2          3          4          5          6
---------+------------------------------------------------------------------
       2 |  -0.045892
         |     0.4817
         |
       3 |  -0.236920  -0.265506
         |     0.4064     0.3953
         |
       4 |  -0.000210   0.049717   0.260358
         |     0.4999     0.4802     0.3973
         |
       5 |  -0.592588  -0.768275  -0.566239  -0.652046
         |     0.2767     0.2212     0.2856     0.2572
         |
       6 |   0.195439   0.301278   0.547699   0.210071   0.972587
         |     0.4225     0.3816     0.2919     0.4168     0.1654
         |
       7 |  -1.167548  -1.478256  -1.362451  -1.264884  -0.897613  -1.586690
         |     0.1215     0.0697     0.0865     0.1030     0.1847     0.0563
         |
       8 |   0.173304   0.274910   0.523165   0.186526   0.954118  -0.026870
         |     0.4312     0.3917     0.3004     0.4260     0.1700     0.4893
         |
       9 |  -0.399480  -0.494122  -0.258114  -0.439142   0.305373  -0.740665
         |     0.3448     0.3106     0.3982     0.3303     0.3800     0.2294
Col Mean-|
Row Mean |          7          8
---------+----------------------
       8 |   1.575938
         |     0.0575
         |
       9 |   1.145365  -0.718903
         |     0.1260     0.2361
```

```
alpha =   0.05
Reject Ho if p = P(Z <= |z|) <= alpha/2

.
. dunntest iq9, by(iregion)

Warning: by() values are unlabeled, option nolabel implicit


Kruskal-Wallis equality-of-populations rank test

  +----------------------------+
  | iregion | Obs |  Rank Sum |
  |---------+-----+-----------|
  |       1 |  47 |  20677.00 |
  |       2 | 123 |  72186.50 |
  |       3 | 190 | 102587.00 |
  |       4 |  60 |  28965.00 |
  |       5 | 196 |  99733.50 |
  |---------+-----+-----------|
  |       6 |  74 |  42108.50 |
  |       7 | 102 |  55248.00 |
  |       8 |  77 |  42429.00 |
  |       9 | 189 |  96276.50 |
  +----------------------------+

chi-squared =    13.497 with 8 d.f.
probability =     0.0958

chi-squared with ties =    15.670 with 8 d.f.
probability =     0.0473


                Dunn's Pairwise Comparison of iq9 by iregion
                              (No adjustment)
Col Mean-|
Row Mean |          1          2          3          4          5          6
---------+------------------------------------------------------------------
       2 |  -3.021716
         |     0.0013
         |
       3 |  -2.164465   1.430595
         |     0.0152     0.0763
         |
       4 |  -0.775061   2.331881   1.361625
         |     0.2192     0.0099     0.0867
         |
       5 |  -1.496111   2.392263   1.076742  -0.623663
         |     0.0673     0.0084     0.1408     0.2664
         |
       6 |  -2.440672   0.427811  -0.748920  -1.751408  -1.555611
         |     0.0073     0.3344     0.2270     0.0399     0.0599
         |
       7 |  -2.034428   1.191120  -0.049282  -1.276529  -0.947432   0.632439
         |     0.0210     0.1168     0.4803     0.1009     0.1717     0.2635
         |
       8 |  -2.116297   0.870093  -0.289594  -1.398130  -1.105946   0.390079
         |     0.0172     0.1921     0.3861     0.0810     0.1344     0.3482
         |
       9 |  -1.502790   2.358466   1.048006  -0.634183  -0.019200   1.533501
         |     0.0664     0.0092     0.1473     0.2630     0.4923     0.0626
Col Mean-|
Row Mean |          7          8
---------+----------------------
       8 |  -0.219074
         |     0.4133
         |
       9 |   0.925552   1.085736
         |     0.1773     0.1388

alpha =   0.05
Reject Ho if p = P(Z <= |z|) <= alpha/2

.
. dunntest iq10, by(iregion)

Warning: by() values are unlabeled, option nolabel implicit
```

```
Kruskal-Wallis equality-of-populations rank test

  +---------------------------+
  | iregion | Obs |  Rank Sum |
  |---------+-----+-----------|
  |       1 |  47 |  24342.50 |
  |       2 | 123 |  68159.50 |
  |       3 | 190 | 103335.00 |
  |       4 |  60 |  29614.00 |
  |       5 | 196 | 100986.00 |
  |---------+-----+-----------|
  |       6 |  74 |  36223.00 |
  |       7 | 102 |  54254.00 |
  |       8 |  77 |  40915.50 |
  |       9 | 189 | 102381.50 |
  +---------------------------+

chi-squared =     4.123 with 8 d.f.
probability =     0.8458

chi-squared with ties =     7.555 with 8 d.f.
probability =     0.4781


               Dunn's Pairwise Comparison of iq10 by iregion
                              (No adjustment)
Col Mean-|
Row Mean |          1           2           3           4           5           6
---------+------------------------------------------------------------------
       2 |  -0.935595
         |     0.1747
         |
       3 |  -0.705458    0.393271
         |     0.2403      0.3471
         |
       4 |   0.553976    1.704126    1.504759
         |     0.2898      0.0442      0.0662
         |
       5 |   0.073394    1.498376    1.245921   -0.650586
         |     0.4707      0.0670      0.1064      0.2577
         |
       6 |   0.675122    1.946495    1.757676    0.103700    0.835569
         |     0.2498      0.0258      0.0394      0.4587      0.2017
         |
       7 |  -0.351199    0.735705    0.431870   -1.043803   -0.604764   -1.230118
         |     0.3627      0.2310      0.3329      0.1483      0.2727      0.1093
         |
       8 |  -0.321760    0.694206    0.409844   -0.972509   -0.531464   -1.139406
         |     0.3738      0.2438      0.3410      0.1654      0.2975      0.1273
         |
       9 |  -0.646183    0.475741    0.093459   -1.439010   -1.150070   -1.686357
         |     0.2591      0.3171      0.4628      0.0751      0.1251      0.0459
Col Mean-|
Row Mean |          7           8
---------+----------------------
       8 |   0.015606
         |     0.4938
         |
       9 |  -0.353323   -0.338514
         |     0.3619      0.3675

alpha =   0.05
Reject Ho if p = P(Z <= |z|) <= alpha/2
```

- Question – For each of the questions, 1-10, are there differences in the average response among the <u>devices</u> used?

```
. dunntest iq1, by(idevice) ma(bh) wrap

Warning: by() values are unlabeled, option nolabel implicit


Kruskal-Wallis equality-of-populations rank test

  +---------------------------+
```

```
  | idevice | Obs |  Rank Sum |
  |---------+-----+-----------|
  |       1 | 455 | 235385.00 |
  |       2 | 464 | 243130.00 |
  |       4 | 117 |  72496.00 |
  |       5 |  22 |  13796.00 |
  |       6 |   9 |   4971.00 |
  +---------------------------+

chi-squared =    12.894 with 4 d.f.
probability =     0.0118

chi-squared with ties =    22.109 with 4 d.f.
probability =     0.0002


                Dunn's Pairwise Comparison of iq1 by idevice
                            (Benjamini-Hochberg)
Col Mean-|
Row Mean |          1          2          4          5
---------+--------------------------------------------
       2 |  -0.428773
         |     0.4176
         |
       4 |  -4.193416  -3.928305
         |     0.0001     0.0002
         |
       5 |  -2.136598  -2.007905  -0.136539
         |     0.0544     0.0558     0.4457
         |
       6 |  -0.441873  -0.357900   0.826607   0.802829
         |     0.4704     0.4002     0.4085     0.3517

False Discovery Rate =   0.05
Reject Ho if p = P(Z <= |z|) <= FDR/2 with stopping rule

.
. dunntest iq2, by(idevice) ma(bh) wrap

Warning: by() values are unlabeled, option nolabel implicit


Kruskal-Wallis equality-of-populations rank test

  +---------------------------+
  | idevice | Obs |  Rank Sum |
  |---------+-----+-----------|
  |       1 | 455 | 238731.50 |
  |       2 | 464 | 243803.00 |
  |       4 | 117 |  69497.50 |
  |       5 |  22 |  13042.00 |
  |       6 |   9 |   4704.00 |
  +---------------------------+

chi-squared =     6.023 with 4 d.f.
probability =     0.1975

chi-squared with ties =     8.683 with 4 d.f.
probability =     0.0695


                Dunn's Pairwise Comparison of iq2 by idevice
                            (Benjamini-Hochberg)
Col Mean-|
Row Mean |          1          2          4          5
---------+--------------------------------------------
       2 |  -0.044463
         |     0.6890
         |
       4 |  -2.605346  -2.582173
         |     0.0459     0.0245
         |
       5 |  -1.216133  -1.203232   0.019744
         |     0.3732     0.2861     0.4921
         |
       6 |   0.023358   0.032079   0.803447   0.690797
         |     0.5452     0.6090     0.4217     0.4081

False Discovery Rate =   0.05
```

```
Reject Ho if p = P(Z <= |z|) <= FDR/2 with stopping rule

.
. dunntest iq3, by(idevice) ma(bh) wrap

Warning: by() values are unlabeled, option nolabel implicit


Kruskal-Wallis equality-of-populations rank test

  +---------------------------+
  | idevice | Obs |  Rank Sum |
  |---------+-----+-----------|
  |       1 | 455 | 231099.50 |
  |       2 | 464 | 249881.00 |
  |       4 | 117 |  70070.00 |
  |       5 |  22 |  13920.00 |
  |       6 |   9 |   4807.50 |
  +---------------------------+

chi-squared =    10.808 with 4 d.f.
probability =     0.0288

chi-squared with ties =    20.278 with 4 d.f.
probability =     0.0004


                Dunn's Pairwise Comparison of iq3 by idevice
                            (Benjamini-Hochberg)
Col Mean-|
Row Mean |         1          2          4          5
---------+--------------------------------------------
       2 |  -2.063320
         |     0.0489
         |
       4 |  -3.901314  -2.593174
         |     0.0005     0.0238
         |
       5 |  -2.541578  -1.918820  -0.647263
         |     0.0184     0.0550     0.3234
         |
       6 |  -0.346709   0.057717   0.831681   1.107209
         |     0.4049     0.4770     0.2897     0.2235

False Discovery Rate =   0.05
Reject Ho if p = P(Z <= |z|) <= FDR/2 with stopping rule

.
. dunntest iq4, by(idevice) ma(bh) wrap

Warning: by() values are unlabeled, option nolabel implicit


Kruskal-Wallis equality-of-populations rank test

  +---------------------------+
  | idevice | Obs |  Rank Sum |
  |---------+-----+-----------|
  |       1 | 455 | 233917.50 |
  |       2 | 464 | 245190.00 |
  |       4 | 117 |  71356.50 |
  |       5 |  22 |  13558.00 |
  |       6 |   9 |   5756.00 |
  +---------------------------+

chi-squared =    11.767 with 4 d.f.
probability =     0.0192

chi-squared with ties =    15.571 with 4 d.f.
probability =     0.0037


                Dunn's Pairwise Comparison of iq4 by idevice
                            (Benjamini-Hochberg)
Col Mean-|
Row Mean |        1          2          4          5
---------+--------------------------------------------
       2 |  -0.810343
         |     0.2984
```

```
         |
       4 |  -3.449252  -2.939310
         |     0.0028     0.0082
         |
       5 |  -1.747119  -1.502874  -0.102617
         |     0.1344     0.1661     0.4591
         |
       6 |  -1.391205  -1.232608  -0.320191  -0.219652
         |     0.1642     0.1814     0.4680     0.4590

False Discovery Rate =   0.05
Reject Ho if p = P(Z <= |z|) <= FDR/2 with stopping rule

.
. dunntest iq5, by(idevice) ma(bh) wrap

Warning: by() values are unlabeled, option nolabel implicit


Kruskal-Wallis equality-of-populations rank test

  +---------------------------+
  | idevice | Obs |  Rank Sum |
  |---------+-----+-----------|
  |       1 | 455 | 233689.00 |
  |       2 | 464 | 246682.00 |
  |       4 | 117 |  72399.00 |
  |       5 |  22 |  13029.00 |
  |       6 |   9 |   3979.00 |
  +---------------------------+

chi-squared =    12.465 with 4 d.f.
probability =     0.0142

chi-squared with ties =    18.400 with 4 d.f.
probability =     0.0010


                Dunn's Pairwise Comparison of iq5 by idevice
                            (Benjamini-Hochberg)
Col Mean-|
Row Mean |       1          2          4          5
---------+--------------------------------------------
       2 |  -1.078030
         |     0.2007
         |
       4 |  -4.001036  -3.321473
         |     0.0003     0.0022
         |
       5 |  -1.420055  -1.094722   0.450750
         |     0.1556     0.2280     0.3261
         |
       6 |   0.837348   1.048842   2.013779   1.495773
         |     0.2236     0.1839     0.0734     0.1684

False Discovery Rate =   0.05
Reject Ho if p = P(Z <= |z|) <= FDR/2 with stopping rule

.
. dunntest iq6, by(idevice) ma(bh) wrap

Warning: by() values are unlabeled, option nolabel implicit


Kruskal-Wallis equality-of-populations rank test

  +---------------------------+
  | idevice | Obs |  Rank Sum |
  |---------+-----+-----------|
  |       1 | 455 | 232150.00 |
  |       2 | 464 | 249498.50 |
  |       4 | 117 |  70802.00 |
  |       5 |  22 |  12735.50 |
  |       6 |   9 |   4592.00 |
  +---------------------------+

chi-squared =     9.534 with 4 d.f.
probability =     0.0491
```

```
chi-squared with ties =    14.174 with 4 d.f.
probability =     0.0068


                Dunn's Pairwise Comparison of iq6 by idevice
                            (Benjamini-Hochberg)
Col Mean-|
Row Mean |        1          2          4          5
---------+--------------------------------------------
       2 |  -1.648801
         |     0.1653
         |
       4 |  -3.623520  -2.579191
         |     0.0015     0.0248
         |
       5 |  -1.244659  -0.746660   0.447117
         |     0.2666     0.3794     0.4092
         |
       6 |  -0.000029   0.323201   1.085795   0.686639
         |     0.5000     0.4147     0.2776     0.3516

False Discovery Rate =   0.05
Reject Ho if p = P(Z <= |z|) <= FDR/2 with stopping rule

.
. dunntest iq7, by(idevice) ma(bh) wrap

Warning: by() values are unlabeled, option nolabel implicit


Kruskal-Wallis equality-of-populations rank test

  +---------------------------+
  | idevice | Obs |  Rank Sum |
  |---------+-----+-----------|
  |       1 | 455 | 241171.00 |
  |       2 | 464 | 241784.00 |
  |       4 | 117 |  70870.00 |
  |       5 |  22 |  12133.00 |
  |       6 |   9 |   3820.00 |
  +---------------------------+

chi-squared =     8.437 with 4 d.f.
probability =     0.0768

chi-squared with ties =    10.374 with 4 d.f.
probability =     0.0346


                Dunn's Pairwise Comparison of iq7 by idevice
                            (Benjamini-Hochberg)
Col Mean-|
Row Mean |        1          2          4          5
---------+--------------------------------------------
       2 |   0.488676
         |     0.3473
         |
       4 |  -2.627194  -2.944079
         |     0.0215     0.0162
         |
       5 |  -0.353648  -0.501570   0.839686
         |     0.3618     0.3850     0.2865
         |
       6 |   1.128879   1.033292   1.885785   1.155457
         |     0.2589     0.2512     0.0989     0.3099

False Discovery Rate =   0.05
Reject Ho if p = P(Z <= |z|) <= FDR/2 with stopping rule

.
. dunntest iq8, by(idevice) ma(bh) wrap

Warning: by() values are unlabeled, option nolabel implicit


Kruskal-Wallis equality-of-populations rank test

  +---------------------------+
  | idevice | Obs |  Rank Sum |
```

```
  |---------+-----+-----------|
  |       1 | 455 | 236191.50 |
  |       2 | 464 | 255170.50 |
  |       4 | 117 |  60562.50 |
  |       5 |  22 |  13139.50 |
  |       6 |   9 |   4714.00 |
  +---------------------------+

chi-squared =     3.571 with 4 d.f.
probability =     0.4671

chi-squared with ties =     3.957 with 4 d.f.
probability =     0.4119


                Dunn's Pairwise Comparison of iq8 by idevice
                            (Benjamini-Hochberg)
Col Mean-|
Row Mean |          1          2          4          5
---------+--------------------------------------------
       2 |  -1.596325
         |     0.5521
         |
       4 |   0.048571   1.066739
         |     0.5340     0.3576
         |
       5 |  -1.222802  -0.740661  -1.170335
         |     0.5535     0.4589     0.4031
         |
       6 |  -0.047444   0.265489  -0.060723   0.634244
         |     0.4811     0.5647     0.5947     0.4383

False Discovery Rate =   0.05
Reject Ho if p = P(Z <= |z|) <= FDR/2 with stopping rule

.
. dunntest iq9, by(idevice) ma(bh) wrap

Warning: by() values are unlabeled, option nolabel implicit


Kruskal-Wallis equality-of-populations rank test

  +---------------------------+
  | idevice | Obs |  Rank Sum |
  |---------+-----+-----------|
  |       1 | 455 | 233402.00 |
  |       2 | 464 | 251754.00 |
  |       4 | 117 |  69053.00 |
  |       5 |  22 |  11048.00 |
  |       6 |   9 |   4521.00 |
  +---------------------------+

chi-squared =     6.698 with 4 d.f.
probability =     0.1527

chi-squared with ties =     7.761 with 4 d.f.
probability =     0.1007


                Dunn's Pairwise Comparison of iq9 by idevice
                            (Benjamini-Hochberg)
Col Mean-|
Row Mean |          1          2          4          5
---------+--------------------------------------------
       2 |  -1.567210
         |     0.1951
         |
       4 |  -2.602321  -1.607996
         |     0.0463     0.2696
         |
       5 |   0.172649   0.646611   1.322982
         |     0.5393     0.4316     0.2323
         |
       6 |   0.110391   0.417646   0.887233  -0.001338
         |     0.5067     0.4830     0.3750     0.4995

False Discovery Rate =   0.05
Reject Ho if p = P(Z <= |z|) <= FDR/2 with stopping rule
```

```
.
. dunntest iq10, by(idevice) ma(bh) wrap

Warning: by() values are unlabeled, option nolabel implicit


Kruskal-Wallis equality-of-populations rank test

  +---------------------------+
  | idevice | Obs |  Rank Sum |
  |---------+-----+-----------|
  |       1 | 455 | 230212.00 |
  |       2 | 464 | 251454.50 |
  |       4 | 117 |  70292.50 |
  |       5 |  22 |  13460.00 |
  |       6 |   9 |   4359.00 |
  +---------------------------+

chi-squared =    11.207 with 4 d.f.
probability =     0.0243

chi-squared with ties =    20.357 with 4 d.f.
probability =     0.0004


               Dunn's Pairwise Comparison of iq10 by idevice
                            (Benjamini-Hochberg)
Col Mean-|
Row Mean |       1          2          4          5
---------+--------------------------------------------
       2 |  -2.384264
         |     0.0285
         |
       4 |  -4.001160  -2.488534
         |     0.0003     0.0321
         |
       5 |  -2.120896  -1.400904  -0.207547
         |     0.0424     0.1152     0.4178
         |
       6 |   0.280999   0.748461   1.472429   1.409124
         |     0.4326     0.2839     0.1409     0.1323

False Discovery Rate =   0.05
Reject Ho if p = P(Z <= |z|) <= FDR/2 with stopping rule
```

National Survey Statistics on Factor Analysis Produced Variables

- Question – For each of the factor variables (knowledge and other), are there differences in the average response by age?

  Answer – YES, there are significant differences among the age categories for both factor variables, and with the exception of group 4 vs group 5 for the factor variable "other" all groups differed significantly from each other. Difference

```
. dunntest iknowledge, by(iage)
Kruskal-Wallis probability =      0.0001

Dunn's Pairwise Comparison of iknowledge by iage
                              (No adjustment)
Col Mean-|
Row Mean |       2          3          4
---------+---------------------------------
       3 |  -3.047089
         |     0.0012
         |
       4 |  -6.647864  -3.042354
         |     0.0000     0.0012
         |
       5 |  -8.540506  -5.326895  -2.884203
         |     0.0000     0.0000     0.0020

alpha =   0.05
Reject Ho if p = P(Z <= |z|) <= alpha/2
```

```
. dunntest iother, by(iage)
Kruskal-Wallis probability =      0.0001

                Dunn's Pairwise Comparison of iother by iage
                              (No adjustment)
Col Mean-|
Row Mean |       2          3          4
---------+---------------------------------
       3 |  -3.687658
         |     0.0001
         |
       4 |  -6.409482  -2.160471
         |     0.0000     0.0154
         |
       5 |  -5.995882  -2.338749  -0.480036
         |     0.0000     0.0097     0.3156
```

- Question – For each of the factor variables (knowledge and other), are there differences in the average response by gender?

  Answer – YES, for both factor variables (knowledge and other) the differences in responses of the genders are very highly significantly different (p <0.0001)

- Question – For each of the factor variables (knowledge and other), are there differences in the average response by income?

  Answer – YES, but only for the factor variable knowledge. Most of the differences among pairs are between group 1 and other groups and between group 3 and other groups.

```
. dunntest iknowledge, by(iincome)
Kruskal-Wallis probability =      0.0005
```

```
Dunn's Pairwise Comparison of iknowledge by iincome
                              (No adjustment)
Col Mean-|
Row Mean |        1           2           3          4           5           6
---------+------------------------------------------------------------------------
       2 |  -2.497470
         |     0.0063
         |
       3 |  -1.980782   0.879087
         |     0.0238     0.1897
         |
       4 |  -3.815271  -1.257535  -2.470334
         |     0.0001     0.1043     0.0067
         |
       5 |  -3.893000  -1.495793  -2.613509  -0.363691
         |     0.0000     0.0674     0.0045     0.3580
         |
       6 |  -3.353408  -1.183058  -2.060025  -0.184688   0.114798
         |     0.0004     0.1184     0.0197     0.4267     0.4543
         |
       7 |  -3.552889  -1.742852  -2.457248  -0.959300  -0.688698  -0.722300
         |     0.0002     0.0407     0.0070     0.1687     0.2455     0.2351
         |
       8 |  -1.760408  -0.130388  -0.635829   0.591132   0.774389   0.656758
         |     0.0392     0.4481     0.2624     0.2772     0.2194     0.2557
         |
       9 |  -2.347848  -1.192059  -1.563387  -0.708333  -0.559877  -0.597431
         |     0.0094     0.1166     0.0590     0.2394     0.2878     0.2751
         |
      10 |  -3.169354  -1.756891  -2.259138  -1.163994  -0.964239  -0.987559
         |     0.0008     0.0395     0.0119     0.1222     0.1675     0.1617
         |
      11 |  -3.282179  -0.905285  -1.879430   0.235565   0.541013   0.359674
         |     0.0005     0.1827     0.0301     0.4069     0.2942     0.3595
Col Mean-|
Row Mean |        7           8           9         10
---------+--------------------------------------------
       8 |   1.160782
         |     0.1229
         |
       9 |  -0.140395  -0.960591
         |     0.4442     0.1684
         |
      10 |  -0.396438  -1.342428  -0.168444
         |     0.3459     0.0897     0.4331
         |
      11 |   1.061221  -0.433697   0.788364   1.244967
         |     0.1443     0.3323     0.2152     0.1066

alpha =   0.05
Reject Ho if p = P(Z <= |z|) <= alpha/2
```

- Question: For each of the factor variables (knowledge and other), are there differences in the average response among regions?

  Answer – NO, for both factor variables, there are no significant differences in responses among regions.

- Question: For each of the factor variables (knowledge and other), are there differences in the average response based upon type of device used?

  Answer – YES, for both factor variables there are significant differences in response provided on various devices.

```
. dunntest iknowledge, by(idevice)
Kruskal-Wallis probability =      0.0002

Dunn's Pairwise Comparison of iknowledge by idevice
                              (No adjustment)
Col Mean-|
Row Mean |        1           2           4           5
---------+--------------------------------------------
       2 |  -0.842399
```

```
          |     0.1998
          |
        4 |  -4.104772  -3.575691
          |     0.0000     0.0002
          |
        5 |  -2.253612  -1.999900  -0.286000
          |     0.0121     0.0228     0.3874
          |
        6 |  -1.116132  -0.951199   0.143918   0.293782
          |     0.1322     0.1708     0.4428     0.3845

alpha =   0.05
Reject Ho if p = P(Z <= |z|) <= alpha/2


. dunntest iother, by(idevice)
Kruskal-Wallis probability =     0.0423

Dunn's Pairwise Comparison of iother by idevice
                              (No adjustment)
Col Mean-|
Row Mean |       1          2          4         5
---------+------------------------------------------------
        2 |  -1.392887
          |     0.0818
          |
        4 |  -3.084003  -2.201813
          |     0.0010     0.0138
          |
        5 |  -0.728643  -0.307796   0.691191
          |     0.2331     0.3791     0.2447
          |
        6 |   0.005101   0.278162   0.929115   0.406324
          |     0.4980     0.3904     0.1764     0.3423

alpha =   0.05
Reject Ho if p = P(Z <= |z|) <= alpha/2
```

STATISTICS

- Question – For each of the factor variables (knowledge and other), are there differences in the average response by age?

```
. dunntest iknowledge, by(iage)

Warning: by() values are unlabeled, option nolabel implicit


Kruskal-Wallis equality-of-populations rank test

  +------------------------+
  | iage | Obs |  Rank Sum |
  |------+-----+-----------|
  |    2 | 297 | 126497.00 |
  |    3 | 230 | 115847.50 |
  |    4 | 343 | 198606.00 |
  |    5 | 197 | 128827.50 |
  +------------------------+

chi-squared =    75.931 with 3 d.f.
probability =     0.0001

chi-squared with ties =    85.400 with 3 d.f.
probability =     0.0001


              Dunn's Pairwise Comparison of iknowledge by iage
                              (No adjustment)
Col Mean-|
Row Mean |       2          3          4
---------+---------------------------------
        3 |  -3.047089
          |     0.0012
          |
        4 |  -6.647864  -3.042354
          |     0.0000     0.0012
```

```
         |
       5 |  -8.540506  -5.326895  -2.884203
         |     0.0000     0.0000     0.0020

alpha =   0.05
Reject Ho if p = P(Z <= |z|) <= alpha/2

.
. dunntest iother, by(iage)

Warning: by() values are unlabeled, option nolabel implicit


Kruskal-Wallis equality-of-populations rank test

  +------------------------+
  | iage | Obs |  Rank Sum |
  |------+-----+-----------|
  |    2 | 297 | 128210.00 |
  |    3 | 230 | 122050.50 |
  |    4 | 343 | 201312.00 |
  |    5 | 197 | 118205.50 |
  +------------------------+

chi-squared =    51.926 with 3 d.f.
probability =     0.0001

chi-squared with ties =    52.814 with 3 d.f.
probability =     0.0001


                Dunn's Pairwise Comparison of iother by iage
                              (No adjustment)
Col Mean-|
Row Mean |       2          3          4
---------+---------------------------------
       3 |  -3.687658
         |     0.0001
         |
       4 |  -6.409482  -2.160471
         |     0.0000     0.0154
         |
       5 |  -5.995882  -2.338749  -0.480036
         |     0.0000     0.0097     0.3156

alpha =   0.05
Reject Ho if p = P(Z <= |z|) <= alpha/2


==============================================================================================================
```

- Question – For each of the factor variables (knowledge and other), are there differences in the average response by gender?

```
. dunntest iknowledge, by(igender)

Warning: by() values are unlabeled, option nolabel implicit


Kruskal-Wallis equality-of-populations rank test

  +---------------------------+
  | igender | Obs |  Rank Sum |
  |---------+-----+-----------|
  |       1 | 497 | 240985.50 |
  |       2 | 570 | 328792.50 |
  +---------------------------+

chi-squared =    23.638 with 1 d.f.
probability =     0.0001

chi-squared with ties =    26.585 with 1 d.f.
probability =     0.0001


            Dunn's Pairwise Comparison of iknowledge by igender
                              (No adjustment)
Col Mean-|
```

```
Row Mean |             1
---------+-----------
       2 |  -5.156095
         |     0.0000

alpha =   0.05
Reject Ho if p = P(Z <= |z|) <= alpha/2

.
. dunntest iother, by(igender)

Warning: by() values are unlabeled, option nolabel implicit


Kruskal-Wallis equality-of-populations rank test

  +---------------------------+
  | igender | Obs |  Rank Sum |
  |---------+-----+-----------|
  |       1 | 497 | 238686.50 |
  |       2 | 570 | 331091.50 |
  +---------------------------+

chi-squared =    28.299 with 1 d.f.
probability =     0.0001

chi-squared with ties =    28.783 with 1 d.f.
probability =     0.0001


              Dunn's Pairwise Comparison of iother by igender
                              (No adjustment)
Col Mean-|
Row Mean |             1
---------+-----------
       2 |  -5.365020
         |     0.0000

alpha =   0.05
Reject Ho if p = P(Z <= |z|) <= alpha/2
================================================================================================================
```

- Question – For each of the factor variables (knowledge and other), are there differences in the average response by income?

```
. dunntest iknowledge, by(iincome)

Warning: by() values are unlabeled, option nolabel implicit


Kruskal-Wallis equality-of-populations rank test

  +---------------------------+
  | iincome | Obs |  Rank Sum |
  |---------+-----+-----------|
  |       1 |  85 |  35381.50 |
  |       2 | 124 |  64287.00 |
  |       3 | 220 | 107747.00 |
  |       4 | 194 | 108728.50 |
  |       5 | 138 |  78967.00 |
  |---------+-----+-----------|
  |       6 |  81 |  45972.00 |
  |       7 |  45 |  27296.00 |
  |       8 |  29 |  15261.50 |
  |       9 |  13 |   8052.50 |
  |      10 |  22 |  14004.00 |
  |---------+-----+-----------|
  |      11 | 116 |  64081.00 |
  +---------------------------+

chi-squared =    28.138 with 10 d.f.
probability =     0.0017

chi-squared with ties =    31.647 with 10 d.f.
probability =     0.0005
```

```
            Dunn's Pairwise Comparison of iknowledge by iincome
                              (No adjustment)
Col Mean-|
Row Mean |              1              2              3              4              5              6
---------+------------------------------------------------------------------
       2 |  -2.497470
         |     0.0063
         |
       3 |  -1.980782   0.879087
         |     0.0238     0.1897
         |
       4 |  -3.815271  -1.257535  -2.470334
         |     0.0001     0.1043     0.0067
         |
       5 |  -3.893000  -1.495793  -2.613509  -0.363691
         |     0.0000     0.0674     0.0045     0.3580
         |
       6 |  -3.353408  -1.183058  -2.060025  -0.184688   0.114798
         |     0.0004     0.1184     0.0197     0.4267     0.4543
         |
       7 |  -3.552889  -1.742852  -2.457248  -0.959300  -0.688698  -0.722300
         |     0.0002     0.0407     0.0070     0.1687     0.2455     0.2351
         |
       8 |  -1.760408  -0.130388  -0.635829   0.591132   0.774389   0.656758
         |     0.0392     0.4481     0.2624     0.2772     0.2194     0.2557
         |
       9 |  -2.347848  -1.192059  -1.563387  -0.708333  -0.559877  -0.597431
         |     0.0094     0.1166     0.0590     0.2394     0.2878     0.2751
         |
      10 |  -3.169354  -1.756891  -2.259138  -1.163994  -0.964239  -0.987559
         |     0.0008     0.0395     0.0119     0.1222     0.1675     0.1617
         |
      11 |  -3.282179  -0.905285  -1.879430   0.235565   0.541013   0.359674
         |     0.0005     0.1827     0.0301     0.4069     0.2942     0.3595
Col Mean-|
Row Mean |              7              8              9             10
---------+--------------------------------------------
       8 |   1.160782
         |     0.1229
         |
       9 |  -0.140395  -0.960591
         |     0.4442     0.1684
         |
      10 |  -0.396438  -1.342428  -0.168444
         |     0.3459     0.0897     0.4331
         |
      11 |   1.061221  -0.433697   0.788364   1.244967
         |     0.1443     0.3323     0.2152     0.1066

alpha =   0.05
Reject Ho if p = P(Z <= |z|) <= alpha/2

.
. dunntest iother, by(iincome)

Warning: by() values are unlabeled, option nolabel implicit


Kruskal-Wallis equality-of-populations rank test

  +---------------------------+
  | iincome | Obs |  Rank Sum |
  |---------+-----+-----------|
  |       1 |  85 |  40557.50 |
  |       2 | 124 |  68881.50 |
  |       3 | 220 | 111152.50 |
  |       4 | 194 | 109253.00 |
  |       5 | 138 |  76566.00 |
  |---------+-----+-----------|
  |       6 |  81 |  38956.50 |
  |       7 |  45 |  26963.00 |
  |       8 |  29 |  15964.00 |
  |       9 |  13 |   7397.50 |
  |      10 |  22 |  12425.50 |
  |---------+-----+-----------|
  |      11 | 116 |  61661.00 |
  +---------------------------+

chi-squared =    12.672 with 10 d.f.
```

```
probability =     0.2426

chi-squared with ties =    12.889 with 10 d.f.
probability =     0.2299


              Dunn's Pairwise Comparison of iother by iincome
                               (No adjustment)
Col Mean-|
Row Mean |          1          2          3          4          5          6
---------+------------------------------------------------------------------
       2 |  -1.820902
         |     0.0343
         |
       3 |  -0.719869   1.464701
         |     0.2358     0.0715
         |
       4 |  -2.164101  -0.218148  -1.924668
         |     0.0152     0.4137     0.0271
         |
       5 |  -1.843770   0.017718  -1.494472   0.244915
         |     0.0326     0.4929     0.0675     0.4033
         |
       6 |  -0.080037   1.707810   0.611758   2.033932   1.727440
         |     0.4681     0.0438     0.2703     0.0210     0.0420
         |
       7 |  -2.166306  -0.821450  -1.879091  -0.712417  -0.845545  -2.081181
         |     0.0151     0.2057     0.0301     0.2381     0.1989     0.0187
         |
       8 |  -1.116035   0.079540  -0.749513   0.208387   0.069584  -1.051661
         |     0.1322     0.4683     0.2268     0.4175     0.4723     0.1465
         |
       9 |  -1.009833  -0.152029  -0.731528  -0.067154  -0.160323  -0.964946
         |     0.1563     0.4396     0.2322     0.4732     0.4363     0.1673
         |
      10 |  -1.199166  -0.131556  -0.871672  -0.023795  -0.142123  -1.141432
         |     0.1152     0.4477     0.1917     0.4905     0.4435     0.1268
         |
      11 |  -1.247245   0.606437  -0.750743   0.881120   0.604470  -1.144015
         |     0.1062     0.2721     0.2264     0.1891     0.2728     0.1263
Col Mean-|
Row Mean |          7          8          9         10
---------+--------------------------------------------
       8 |   0.669238
         |     0.2517
         |
       9 |   0.313259  -0.181941
         |     0.3770     0.4278
         |
      10 |   0.432536  -0.165674   0.039694
         |     0.3327     0.4342     0.4842
         |
      11 |   1.260049   0.298282   0.419363   0.467740
         |     0.1038     0.3827     0.3375     0.3200

alpha =   0.05
Reject Ho if p = P(Z <= |z|) <= alpha/2

==================================================================================================================
```

- Question: For each of the factor variables (knowledge and other), are there differences in the average response among regions?

```
. dunntest iknowledge, by(iregion)

Warning: by() values are unlabeled, option nolabel implicit


Kruskal-Wallis equality-of-populations rank test

  +----------------------------+
  | iregion | Obs |  Rank Sum |
  |---------+-----+-----------|
  |       1 |  47 |  24583.50 |
  |       2 | 123 |  70842.50 |
  |       3 | 190 | 100915.00 |
  |       4 |  60 |  30070.50 |
  |       5 | 196 |  98718.00 |
```

```
  |---------+-----+-----------|
  |       6 |  74 |  38057.50 |
  |       7 | 102 |  54316.00 |
  |       8 |  77 |  42647.50 |
  |       9 | 189 | 100060.50 |
  +---------------------------+

chi-squared =     5.469 with 8 d.f.
probability =     0.7065

chi-squared with ties =     6.162 with 8 d.f.
probability =     0.6291


            Dunn's Pairwise Comparison of iknowledge by iregion
                              (No adjustment)
Col Mean-|
Row Mean |            1            2            3            4            5            6
---------+------------------------------------------------------------------
       2 |  -1.071609
         |     0.1419
         |
       3 |  -0.172251     1.345399
         |     0.4316       0.0892
         |
       4 |   0.390149     1.649590     0.702685
         |     0.3482       0.0495       0.2411
         |
       5 |   0.414702     2.183041     0.937194    -0.058582
         |     0.3392       0.0145       0.1743       0.4766
         |
       6 |   0.163190     1.455991     0.426919    -0.262248    -0.270564
         |     0.4352       0.0727       0.3347       0.3966       0.3934
         |
       7 |  -0.186328     1.126918    -0.039002    -0.669008    -0.820729    -0.414454
         |     0.4261       0.1299       0.4844       0.2517       0.2059       0.3393
         |
       8 |  -0.578186     0.528077    -0.584510    -1.062830    -1.296538    -0.844421
         |     0.2816       0.2987       0.2794       0.1439       0.0974       0.1992
         |
       9 |  -0.135699     1.395304     0.057851    -0.662132    -0.877640    -0.383263
         |     0.4460       0.0815       0.4769       0.2539       0.1901       0.3508
Col Mean-|
Row Mean |            7            8
---------+----------------------
       8 |  -0.491339
         |     0.3116
         |
       9 |   0.087340     0.628024
         |     0.4652       0.2650

alpha =   0.05
Reject Ho if p = P(Z <= |z|) <= alpha/2

.
. dunntest iother, by(iregion)

Warning: by() values are unlabeled, option nolabel implicit


Kruskal-Wallis equality-of-populations rank test

  +---------------------------+
  | iregion | Obs |  Rank Sum |
  |---------+-----+-----------|
  |       1 |  47 |  22561.50 |
  |       2 | 123 |  69595.50 |
  |       3 | 190 |  98283.50 |
  |       4 |  60 |  29825.50 |
  |       5 | 196 | 103603.00 |
  |---------+-----+-----------|
  |       6 |  74 |  38500.50 |
  |       7 | 102 |  56208.00 |
  |       8 |  77 |  40265.50 |
  |       9 | 189 | 101368.00 |
  +---------------------------+

chi-squared =     4.655 with 8 d.f.
probability =     0.7937
```

```
chi-squared with ties =     4.736 with 8 d.f.
probability =     0.7854


              Dunn's Pairwise Comparison of iother by iregion
                              (No adjustment)
Col Mean-|
Row Mean |          1          2          3          4          5          6
---------+------------------------------------------------------------------
       2 |  -1.651264
         |     0.0493
         |
       3 |  -0.754747   1.384344
         |     0.2252     0.0831
         |
       4 |  -0.289090   1.440613   0.450033
         |     0.3863     0.0748     0.3263
         |
       5 |  -0.986810   1.068340  -0.366535  -0.704618
         |     0.1619     0.1427     0.3570     0.2405
         |
       6 |  -0.712218   1.021777  -0.072157  -0.440535   0.201037
         |     0.2382     0.1534     0.4712     0.3298     0.4203
         |
       7 |  -1.329861   0.363767  -0.908316  -1.094902  -0.607562  -0.665397
         |     0.0918     0.3580     0.1819     0.1368     0.2717     0.2529
         |
       8 |  -0.764952   0.974207  -0.137978  -0.495255   0.138866  -0.053765
         |     0.2221     0.1650     0.4451     0.3102     0.4448     0.4786
         |
       9 |  -1.140280   0.839921  -0.612310  -0.874259  -0.250994  -0.386621
         |     0.1271     0.2005     0.2702     0.1910     0.4009     0.3495
Col Mean-|
Row Mean |          7          8
---------+----------------------
       8 |   0.615064
         |     0.2693
         |
       9 |   0.395481  -0.327411
         |     0.3462     0.3717

alpha =   0.05
Reject Ho if p = P(Z <= |z|) <= alpha/2
```

==

- Question: For each of the factor variables (knowledge and other), are there differences in the average response based upon type of device used?

```
. dunntest iknowledge, by(idevice)

Warning: by() values are unlabeled, option nolabel implicit


Kruskal-Wallis equality-of-populations rank test

  +---------------------------+
  | idevice | Obs |  Rank Sum |
  |---------+-----+-----------|
  |       1 | 455 | 231846.00 |
  |       2 | 464 | 243925.50 |
  |       4 | 117 |  74083.00 |
  |       5 |  22 |  14355.00 |
  |       6 |   9 |   5568.50 |
  +---------------------------+

chi-squared =    19.255 with 4 d.f.
probability =     0.0007

chi-squared with ties =    21.656 with 4 d.f.
probability =     0.0002


            Dunn's Pairwise Comparison of iknowledge by idevice
```

```
                              (No adjustment)
Col Mean-|
Row Mean |       1           2           4          5
---------+--------------------------------------------
       2 |  -0.842399
         |     0.1998
         |
       4 |  -4.104772  -3.575691
         |     0.0000     0.0002
         |
       5 |  -2.253612  -1.999900  -0.286000
         |     0.0121     0.0228     0.3874
         |
       6 |  -1.116132  -0.951199   0.143918   0.293782
         |     0.1322     0.1708     0.4428     0.3845

alpha =   0.05
Reject Ho if p = P(Z <= |z|) <= alpha/2

.
. dunntest iother, by(idevice)

Warning: by() values are unlabeled, option nolabel implicit


Kruskal-Wallis equality-of-populations rank test

  +---------------------------+
  | idevice | Obs |  Rank Sum |
  |---------+-----+-----------|
  |       1 | 455 | 232086.50 |
  |       2 | 464 | 249706.50 |
  |       4 | 117 |  71108.00 |
  |       5 |  22 |  12291.00 |
  |       6 |   9 |   4586.00 |
  +---------------------------+

chi-squared =     9.727 with 4 d.f.
probability =     0.0453

chi-squared with ties =     9.893 with 4 d.f.
probability =     0.0423


              Dunn's Pairwise Comparison of iother by idevice
                              (No adjustment)
Col Mean-|
Row Mean |       1           2           4          5
---------+--------------------------------------------
       2 |  -1.392887
         |     0.0818
         |
       4 |  -3.084003  -2.201813
         |     0.0010     0.0138
         |
       5 |  -0.728643  -0.307796   0.691191
         |     0.2331     0.3791     0.2447
         |
       6 |   0.005101   0.278162   0.929115   0.406324
         |     0.4980     0.3904     0.1764     0.3423

alpha =   0.05
Reject Ho if p = P(Z <= |z|) <= alpha/2
```

STROBE Statement—Checklist of items that should be included in reports of ***cross-sectional studies***, ADAPTED FOR A SURVEY STUDY: Informed consent, shared-decision making and a reasonable patient's wished based on a national survey in the United States using a hypothetical scenario.
An (X) indicates that the checklist item is included in the manuscript if applicable for a survey study.

	Item No	Recommendation
Title and abstract	1	(*a*) Indicate the study's design with a commonly used term in the title or the abstract X
		(*b*) Provide in the abstract an informative and balanced summary of what was done and what was found X
Introduction		
Background/rationale	2	Explain the scientific background and rationale for the investigation being reported X
Objectives	3	State specific objectives, including any prespecified hypotheses X
Methods		
Study design	4	Present key elements of study design early in the paper X
Setting	5	Describe the setting, locations, and relevant dates, including periods of recruitment, exposure, follow-up, and data collection X
Participants	6	(*a*) Give the eligibility criteria, and the sources and methods of selection of participants X
Variables	7	Clearly define all outcomes, exposures, predictors, potential confounders, and effect modifiers. Give diagnostic criteria, if applicable X
Data sources/ measurement	8*	For each variable of interest, give sources of data and details of methods of assessment (measurement). Describe comparability of assessment methods if there is more than one group X
Bias	9	Describe any efforts to address potential sources of bias X
Study size	10	Explain how the study size was arrived at X
Quantitative variables	11	Explain how quantitative variables were handled in the analyses. If applicable, describe which groupings were chosen and why X
Statistical methods	12	(*a*) Describe all statistical methods, including those used to control for confounding X
		(*b*) Describe any methods used to examine subgroups and interactions X
		(*c*) Explain how missing data were addressed NOT APPLICABLE
		(*d*) If applicable, describe analytical methods taking account of sampling strategy X
		(*e*) Describe any sensitivity analyses NOT APPLICABLE
Results		
Participants	13*	(a) Report numbers of individuals at each stage of study—eg numbers potentially eligible, examined for eligibility, confirmed eligible, included in the study, completing follow-up, and analysed NOT APPLICABLE
		(b) Give reasons for non-participation at each stage NOT APPLICABLE
		(c) Consider use of a flow diagram NOT USEFUL
Descriptive data	14*	(a) Give characteristics of study participants (eg demographic, clinical, social) and information on exposures and potential confounders X
		(b) Indicate number of participants with missing data for each variable of interest X
Outcome data	15*	Report numbers of outcome events or summary measures X
Main results	16	(*a*) Give unadjusted estimates and, if applicable, confounder-adjusted estimates and their precision (eg, 95% confidence interval). Make clear which confounders were

		adjusted for and why they were included NOT APPLICABLE
		(*b*) Report category boundaries when continuous variables were categorized NOT APPLICABLE
		(*c*) If relevant, consider translating estimates of relative risk into absolute risk for a meaningful time period *NOT RELEVANT*
Other analyses	17	Report other analyses done—eg analyses of subgroups and interactions, and sensitivity analyses X
Discussion		
Key results	18	Summarise key results with reference to study objectives X
Limitations	19	Discuss limitations of the study, taking into account sources of potential bias or imprecision. Discuss both direction and magnitude of any potential bias X
Interpretation	20	Give a cautious overall interpretation of results considering objectives, limitations, multiplicity of analyses, results from similar studies, and other relevant evidence X
Generalisability	21	Discuss the generalisability (external validity) of the study results X
Other information		
Funding	22	Give the source of funding and the role of the funders for the present study and, if applicable, for the original study on which the present article is based X

*Give information separately for exposed and unexposed groups.

Note: An Explanation and Elaboration article discusses each checklist item and gives methodological background and published examples of transparent reporting. The STROBE checklist is best used in conjunction with this article (freely available on the Web sites of PLoS Medicine at http://www.plosmedicine.org/, Annals of Internal Medicine at http://www.annals.org/, and Epidemiology at http://www.epidem.com/). Information on the STROBE Initiative is available at www.strobe-statement.org.