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Filipino-American Nurses' Knowledge, Perceptions, Beliefs and Practice of Genetics and Genomics[1]

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Abstract

Introduction—There is limited information on the knowledge, perceptions, beliefs, and practice, about genetics and genomics among Filipino-American nurses. The National Coalition of Ethnic Minority Organizations (NCEMNA), in which the Philippine Nurses Association of America (PNAA) is a member organization, conducted an online survey to describe the genomic knowledge, perceptions, beliefs, and practice of minority nurses. This study reports on responses from Filipino-American survey participants, which is a subset analysis of the larger NCEMNA survey.

Objective—The purpose of this study was to explore the knowledge, perceptions, beliefs, practice and genomic education of Filipino-American nurses.

Method—An online survey of 112 Filipino-American nurses was conducted to describe the knowledge, perceptions, beliefs, and practice of genetics/genomics. Survey responses were analyzed using descriptive statistics.

Results—Most (94%) Filipino-American nurses wanted to learn more about genetics. Although 41% of the respondents indicated good understanding of genetics of common diseases, 60% had not attended any related continuing education courses since RN licensure, and 73% reported unavailability of genetic courses to take. The majority (83%) of PNAA respondents indicated that they would attend genetics/genomics awareness training if it was offered by their national organization during their annual conference, and 86% reported that the national organization should have a visible role in genetics/genomics initiatives in their community.

Conclusion—Filipino-American nurses wanted to learn more about genetics and were willing to attend genetics/genomics trainings if offered by PNAA. The study findings can assist PNAA in planning future educational programs that incorporates genetics and genomics information.

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Keywords

Filipino Nurses; Minority Nurses; Genetics and Genomics education; Genetics and Genomics knowledge and practices

Introduction

Recent findings from a national nursing workforce survey on nursing attitudes, knowledge, and practice in genomics from 619 registered nurses practicing in the United States revealed that more than 50% of nurses are inadequately prepared to translate genomic information into clinical practice (Calzone, Jenkins, Culp, Bonham & Badzek, 2013). The group that conducted the survey recommended that targeted genomic nursing education is necessary to optimize workforce preparation to integrate genomic information into clinical practice (Calzone et al., 2013). Two concepts that are important for nurses to understand are genetics and genomics. Genetics is the study of specific genes and their role in inheritance, and genomics refers to an organism's entire genetic makeup (National Human Genome Research Institute (NHGRI) (2014). Both concepts are very important to health, because errors in single genes (genetic) can predispose an individual to specific genetic disorders, while understanding the interactions of genes (genomics) with non-genetic factors such as diet, exercise, or smoking, may prevent the development of complex diseases.

The integration of genomic information into routine clinical practice for nurses has the potential to improve care outcomes (Calzone, Jenkins, Culp, Bonham & Badzek, 2013). Moreover, translation of genomic information to clinical practice will assist patients and families with making therapeutic decisions, understanding their susceptibility to diseases, and monitoring disease burden and recurrence (Calzone et al., 2013). Another major role in the application of genetics and genomics is assisting families in making decisions related to preconception, prenatal testing, and newborn screening (Calzone et al., 2013). Thompson and Brooks (2011) found that nurses are unprepared to deal with questions raised by patients/families or by health care providers related to genomic information. Increasing nurses' understanding of the relevance and the limitations of genetic and genomic information will enable nurses to better assist families with options related to health.

Study Aims

This paper reports findings on the knowledge, perceptions, beliefs, practice, and genomic education of Filipino-American nurses who participated in the survey conducted by the National Coalition of Ethnic Minority Nurse Associations (NCEMNA). In addition, this paper provides publicly available resources that can assist Filipino-American nurses learn basic and advanced genetic/genomic concepts and information. The ultimate goal of this paper is to assist Filipino-American nurses to acquire and translate genomic knowledge into practice.

The collaborative goal in conducting the parent NCEMNA survey was to explore how well nurses have integrated genomics into practice. The specific study aims of the NCEMNA survey were: (1) to determine minority nurses' beliefs, practices and competency of

integrating into practice genomic information related to common multi-factorial diseases, and (2) to assess the knowledge of minority nurses on human genetic variation and the use of patient characteristics including ethnicity, gender, genes, and race in diagnostics, treatment, and referral decisions. The NCEMNA represents 350,000 nurses and is composed of five ethnic minority nursing organizations, namely: Asian American/Pacific Islander Nurses Association, Inc. (AAPINA), National Alaska Native American Indian Nurses Association, Incorporated (NANAINA), National Association of Hispanic Nurses, Incorporated (NAHN), National Black Nurses Association, Incorporated (NBNA), and the Philippine Nurses Association of America, Incorporated (PNAA) (Coleman, Calzone, Jenkins, Paniagua, Rivera, Hong, Spruill, Bonham, 2014).

Filipino nurses make up almost 40% of internationally trained nurses practicing in the United States (U.S.), comprising about 3.7% of the total U.S. nursing workforce (Xu & Kwak, 2005). Most Filipino nurses practicing in the U.S. hold a Bachelor's degree in Nursing earned from nursing schools in the Philippines. However, not all nursing schools in the Philippines are teaching courses related to genetics/genomics or on how to manage genomic information.

Methods

Study Design

A descriptive survey design with a convenience sample was used in this study. Responses from PNAA participants who voluntarily participated in the parent NCEMNA survey were included in the analyses. The detailed data collection procedure and results of the parent NCEMNA survey has recently been published (Coleman et al., 2014). The study was conducted online and there were 112 PNAA members who participated in the NCEMNA survey. Some of the PNAA respondents opted not to answer some items of the survey, hence total responses from survey items ranged from 106-112, as described in the tables.

Instrument

The instrument used was a compilation of the following five instruments, namely: Knowledge, Attitude and Interest of African American Nurses (α =0.65), Bonham and Sellers' Genetic Variation Knowledge Assessment Index, Bonham and Sellers' Health Professionals Beliefs about Race scale (HPBR-BD α=0.69, four items and HPBR-CD α = 0.61, three items), Bonham and Sellers' Radial Attributes in Clinical Evaluation (RACE) scale (α=0.86, seven items) and the Genetics and Genomics in Nursing Practice, which have been combined and piloted by Coleman et al (2014). The compiled survey was a 61-item instrument divided into seven sections: beliefs, knowledge, practices, use of race, ethnicity, education, and demographics. The tool included multiple choice, dichotomous (Yes or No), and Likert scale questions. The instrument may be completed in 20 minutes or less. Data were stored in a password-protected file available only to study investigators.

Procedure

An institutional review board approval was obtained from Cedars Sinai and the National Institutes of Health Office of Human Subjects Research and Protection prior to conducting the study. Recruitment was made through email invitation, newsletters, and during each NCEMNA members association's annual event. PNAA members were also provided with a hyperlink to the survey, which was posted on the PNAA and NCEMNA websites. Participants were not offered any incentives. They received written instructions that participation in the survey was voluntary and required informed consent. No identifying information from survey participants was collected or stored. The survey was available electronically to all PNAA members for a total of 10 months. Participation to the survey was limited to licensed registered nurses with access to the online survey. Membership to any NCEMNA organization was not an eligibility requirement for survey participation.

Statistical Analyses

Demographic data are presented as raw numbers and/or percentages. Descriptive data analysis was conducted on survey responses presented as frequencies and percentages. All analyses were conducted using SPSS 19.0 program.

Results

Demographic and Work Characteristics of Participants

There were 389 participants who participated in the parent NCEMNA survey, 112 of those are PNAA members, which is <1% of the current estimated PNAA membership (3,957 PNAA members). The PNAA participants were primarily women (89%). All (N=112) identified themselves as non-Hispanic and 90% reported Asian as their ethnicity. Overall, 66% worked in the hospital, where half primarily provided direct patient care and 61% of their work time was spent seeing patients. Respondents worked in nursing for an average of 31 years, and 50% held a baccalaureate degree and 44% held a master's degree. Table 1 lists the demographic characteristics of the sample.

Beliefs

Table 2 provides an overview of the respondents' beliefs related to genetic/genomic information. The majority of Filipino-American nurses (87%) strongly agreed that family health history can help identify at risk families and believed that family health histories can be used to teach patients and family members about the importance of genetics/genomics and disease prevention. However, majority of participants either held a neutral opinion (30%) or disagreed (28%) that genetic testing discriminates against ethnic minorities.

Of the PNAA respondents, 60% believed that self-reported race is informative of a racial group's genetic ancestral background, and majority (57%) agreed that a clinician's best predictor of treatment response is the patient's self-identified race. Further, 44% strongly agreed that a patient's race can also identify who can benefit from referral to genetic services for certain diseases, and 46% of the sample strongly agreed that human genetic variation

provides clues to unraveling the primary causes of specific racial and ethnic disparities in health.

PNAA participants believed that integrating an understanding of genetics of common diseases into their clinical practice will have potential advantages. These advantages included better decisions about recommendations for preventive services (86%), better treatment decisions (61%), improvement of services to patients (59%), better adherence to clinical recommendations among patients (57%), and optimizing patient's visit time by better genetic risk triaging (50%). However, they also believed that integrating use of genetic information of common diseases into their clinical practice would also have some disadvantages. These disadvantages included an increase in insurance discrimination (57%), increase patient anxiety about risk (52%), may not be reimbursable or may be too costly (50%), a need for professional “re-tooling” (31%), can pose medico-legal problems for nurses related to testing (27%), can place greater burden of responsibilities on nurses (27%), and can take too much time (27%).

Practice

The PNAA respondents reported that family history (71%), age (64%), race/ethnicity (57%), genetic profile (54%), and gender (52%) are essential information to consider when delivering nursing care. Majority of respondents (73%) completed a heath history on patients in their practice setting (Table 3, page 53). Wh4en a patient indicates a disorder in the family, 91% of the sample expressed that a standard family history assessment should include information about the patients' relationship to family members afflicted with the disorder, 82% wanted to know whether the disorder is present in both sides of family, 80% wanted to know the age at diagnosis of family members with the condition, 76% chose race/ethnicity, and 66% selected age at death of family members with the condition.

When respondents were asked about important factors that influence decision-making in their clinical practice, 31% always considered a patient's race to be an important factor to understand one's genetic predispositions. Further, 26% of sample always took into account their patient's race when administering medications and 17% always considered the patient's race when deciding to initiate screening for certain diseases. Of the sample, 13% always considered a patient's race in determining how aggressively to treat particular genetically-linked diseases.

Knowledge

When asked about broad genetic knowledge, 76% of the respondents know that common structural genetic variations is important to health and disease, and 65% know that all genetic variations in an individual can be attributed to inherited changes in the human genome. However when asked about specific genetic knowledge, close to 40% of the PNAA respondents did not know that DNA sequences of two randomly selected healthy individuals of the same sex were 90-95% identical, or that a single gene variant caused most common diseases. Further, 47% of participants either did not know or not sure whether variations in human genome may be disease-causing or have no effect on health and disease. Additionally, 75% of participants did not know or were not sure that most common diseases

such as diabetes and heart disease are not caused by a single gene variant (Table 4, page 54). These high numbers of wrong and unsure responses from survey participants related to genomics and genetics knowledge affirm that further education is necessary.

Perceptions

Majority of PNAA participants (77%) reported that both genetics and environment contribute to racial/ethnic and gender differences in health outcomes. Similarly, 63% perceived that absence of a family history for a given disease may reduce a patient's risk to below average, if the health status of the relatives is verified. Within the context of the influence of environment on disease, 56% of the sample perceived that environmental modifications (e.g., drugs, diet) are effective in helping prevent disorder.

Table 5 describes that majority of PNAA respondents perceived that genetic risks play a great deal of clinical relevance for most cancers. Further, majority of PNAA respondents also perceived that genetic risk has a great deal of clinical relevance for other chronic illnesses.

Genomic education

Although 41% of the sample indicated good understanding of genetics of common diseases, 60% had not attended any continuing education courses that included genetics as a major component since RN licensure, and 73% reported a lack of available genetic courses to take. In addition, 39% of PNAA respondents did not know if their senior staff members see genetics as an important part of a junior staff members' role, while 51% didn't know if their senior staff members see genetics as an important part of a senior staff's role.

Discussion

Responses obtained from the PNAA participants of the NCEMNA survey provide empirical evidence that Filipino-American nurses are in need of continuing education or necessary resources to improve their knowledge, perceptions, beliefs, and practice in handling genetic and genomic information. The fact that a large majority of PNAA respondents want to learn more about genetics is a call for action for the PNAA leadership to address this need. These results are consistent with the responses from other minority nurses who participated in the parent NCEMNA survey. Majority of the parent survey respondents also felt that their understanding of genetics was poor or fair, and they overwhelmingly (94%) indicated their strong interest to learn more about genetics (Coleman et al., 2014). Further, the responses from PNAA participants were also very similar to a survey conducted by the American Nurses Association (ANA) (Calzone et al., 2013), affirming that our results demonstrated knowledge deficits in genetics, which is not unique to PNAA nurses, but seems to be echoed by all nurses, based on responses from both the NCEMNA and ANA surveys (Coleman, et a., 2014; Calzone et al., 2013).

Our findings support previous report that knowledge of genetic information among health care workers from different educational backgrounds, has been inadequate (Catz, et al., 2005; Singer, Antonucci & Hoewyk, 2004). One of these previous studies explored the attitudes and beliefs of New York patients and health workers towards genetics by

conducting several focus groups (Catz et al., 2005). Regardless of cultural affiliations of focus group participants, most expressed desire for more information about genetics (Catz et al., 2005). However, Black American focus group participants expressed the most concern for possibly harmful use of genetic information, but still understand the importance of genetic testing as a preventative screening measure (Catz, et al., 2005). Another study involving African-American nurses also share similar concerns; however, these nurses do not believe that such risks should interfere with the integration of genetics and genomics in health care (Powell-Young & Spruill, 2013). Chinese and Latino focus group participants showed the least concern for the potential consequences of the use of genetic information (Catz et al., 2005).

Overall, there is a disconnect between genetics knowledge and its immediate implications for patient care among health care providers (Guttmacher, Porteous & McInerney, 2007). Although, it is important to educate health care professionals in genomics that can be used today, it is critical to teach the key underlying concepts and instill an appreciation of the future clinical importance of genomics in our health care students. Efforts to enhance nursing genomic competence began back in 2005 when the ANA partnered with the National Cancer Institute, the National Human Genome Research Institute, and the Office of Rare Diseases at the National Institutes of Health to develop nursing core competencies in genetics for nurses. The final document containing genetic and genomic core competencies for all nurses was entitled, “The Essential Core Competencies and Curricula Guidelines for Genetics and Genomics,” which is endorsed by 49 nursing organizations, the Genetic Alliance, the March of Dimes, and the National Coalition for Health Professional Education in Genetics (NCHPEG) (http://www.nursingworld.org/genetics). The NCHPEG also issued its own core genetics competencies in 2007 to assist health care faculty members in incorporating genetics in their curriculum development and to provide individual health professional with additional genomic-specific resources (http://www.nchpeg.org/index.php?option=com_content&view=article&id=237&Itemid=84). Several educational strategies have been recommended and implemented since then in educational institutions and continuing education activities; however, major gaps are still evident as observed in our findings.

Genomic developments are rapidly changing health care. As such, the management of genomic information is no longer assigned to one specialty, but is relevant for all disciplines of the healthcare delivery system. Therefore, nurses are expected to meet this expanded role and must be competent in genomics to provide safe, cost-effective, quality health care (Calzone et al., 2010). The need was also identified in the recent Institute of Medicine (IOM) report on the future of nursing, which suggested enhancing the preparation of nurses for these expanded roles through timely changes in scope of practice and nursing education (IOM, 2011). Further, patients and families are protected from insurance and employment discriminations based on their genetic information as mandated by the Genetic Information Non-Discrimination Act (GINA), which was signed into law in the U.S. in May 2008. Assisting nurses to be aware of their knowledge, perceptions, beliefs, and practices on genetics and genomics, will allow them to provide a most unbiased and supportive care. In addition, this awareness equips nurses to better educate their patients with relevant genetic

and genomic information, and GINA-related resources to assist in making informed health decisions.

The NCEMNA survey was conducted to fill the gap identified by the nursing science blueprint proposed by the Genomic Nursing State of the Science Advisory Panel (Genomic, Nursing State of the Science Advisory Panel, 2013). The NCEMNA survey serves as a needs assessment and provides opportunities for each minority organization to assist in preparing their respective nurses to meet the goals proposed by the Consensus Panel on Genetic/Genomic Nursing Competencies (Consensus Panel on Genetic/Genomic Nursing Competencies, 2009). The efforts to analyze responses from PNAA participants of the NCEMNA survey are aimed to provide information to the national PNAA organization about the knowledge, perceptions, beliefs, and practices of PNAA members in handling genetic and genomic information, so gaps in knowledge can be addressed through educational activities, to assist PNAA nurses in providing genomically-competent care.

Although the PNAA members who responded to the parent NCEMNA survey were mostly women (89%), but the male PNAA respondents (11%) were higher than the total male NCEMNA survey participants (7%). Further, more PNAA respondents (66%) work in the hospital, compared to the overall NCEMNA respondents (49%), providing a better glimpse of the knowledge, perceptions, beliefs, and practices of minority nurses on genetics/genomics in the clinic. In addition, most of the PNAA nurses (68%) worked in the same clinical site since start of RN employment, higher than the NCEMNA respondents (50%). The PNAA respondents also held either a baccalaureate (50%) or master's degree (44%), a much higher rate than the total NCEMNA respondents (baccalaureate = 34%, master's degree = 39%, respectively). Nevertheless, PNAA respondents shared similar overall ratings related to knowledge, perceptions, beliefs, and practices on genetics/genomics as the overall NCEMNA survey respondents.

The Journal of Nursing Scholarship (JNS) recently published a special, virtual issue on genomics nursing (http://onlinelibrary.wiley.com/doi/10.1111/jnu.2013.45.issue-1/issuetoc). This JNS special issue provides education and a wide range of resources that can be useful for nurse clinicians and educators for clinical decision making and for curriculum integration of genetics/genomics, respectively. In addition to publicly available resources gathered from the JNS special issue articles, Table 6 lists educational resources gathered from review of literature and recommendations from nurse genomic experts from the NHGRI that can assist PNAA nurses to become knowledgeable in genetics and genomics.

Over half of PNAA participants preferred workshops, described as a combination of presentations and group activities, as the most helpful format to learn about genetics/genomics. This is important information for the PNAA organization to take into account in planning future continuing education activities, considering that 89% of PNAA respondents would encourage their national organization or local chapter to support a genetics/genomics awareness initiative, 86% believed that the PNAA should have a visible role in genetics/genomics awareness initiatives in local communities, and 83% would attend genetics/genomics training if offered during the PNAA annual educational conference.

An exhaustive review of available resources that the PNAA organization can tap is essential to respond to the genetic and genomic knowledge, perceptions, beliefs, and practice needs of its membership. The resources listed in Table 6 will further address the needs expressed by the PNAA participants of the NCEMNA survey, because 46% of the PNAA respondents also expressed that combined printed and web-based information is the second most helpful format to learn more about genetics/genomics. Most of the resources listed in Table 6, such as the case studies offered by the Global Genetics and Genomics Community (G3C) and the National Genetics and Genomics Education Centre of the United Kingdom's National Health Service, are web-based and provide options to print out transcripts of the case stories, which could be beneficial to both learners and educators. G3C is specifically useful because this resource offers bilingual collection of educational, disease-specific information that can be directly applied to clinical practice. These cases range from heart disease to diabetes, where recommendations are suggested to guide nurses on how to provide genetically/genomically appropriate care. Further, this resource analyzes one's responses to evaluation questions for each case study and determines the genetic/genomic competencies gained.

Resources listed in Table 6 can also be useful to novice and advanced learners in genetics/genomics. Novice learners can take advantage of the Genetics 101 short course for health professionals offered by NHGRI, which provides basic understanding of genetic and genomic information. The talking glossary of the same NHGRI website (http://www.genome.gov/) is also helpful to novice learners because it provides basic genetic terms that can help jumpstart one's understanding about the topic. Advanced learners can register at the Center of Disease Control and Prevention (CDC), Public Health Genomics website (http://www.cdc.gov/genomics/) to stay current on the issues related to genetics and genomics. The weekly CDC updates also list upcoming educational events and funding opportunities. Further, the Evaluation of Genomic Applications in Practice and Prevention (EGAPP™) by the CDC establishes a very extensive and systematic mechanism to evaluate the highest level of evidence to issue recommendations for clinical practice (e.g., genetics of depression or genetic testing for colorectal screening). The Physician Data Query (PDQ®) on cancer genetics by the National Cancer Institute also provides latest evidence on the genetics and genomics of different types of cancer and the current recommendations for health professionals.

For nurse clinicians, the Genetic Testing Registry (GTR) by the National Center for Biotechnology Information can be useful to determine what genetic tests can be conducted for the selected condition and what laboratory perform those tests. In addition, the site also provides reviews of different genes related to specific conditions, as well as a way to find a genetic professional. These resources can provide basic, as well as advanced information necessary to improve one's knowledge about genetics and genomics. It is highly recommended that each PNAA member should assess his/her current level of genetic/genomic competency to determine what resources he/she needs. The NCEMNA survey instrument contains specific items that assess genetic/genomic competency of nurses (Calzone et al., 2012). This instrument is available for public use; hence PNAA members are encouraged to use this instrument to obtain baseline information of genetic/genomic knowledge, perceptions, beliefs, and practice. For nurses who prefer self-learning formats, the G3C website is a good resource to assess one's genetic/genomic competency level. More

importantly, conducting PNAA-sponsored genetic/genomic workshops, which was reported by the PNAA members to be the most preferred format to improve genetic/genomic knowledge, should be supported by both leadership and general membership. In addition, patient support groups specifically organizations supporting patients and families with genetic conditions are also very good resource for clinical services, diagnostic laboratories, and innovative research available.

Limitations

This is the first study that describes the knowledge, perceptions, beliefs, and practice of PNAA nurses on genetics and genomics. However, the results of this study should be considered in light of its limitations. Similar to another study in this area (Calzone et al., 2013), this study used self-report and voluntary participation. Participants may have response bias from high levels of motivation to complete the survey, which could include concern about genomics or other influencing factors. Another limitation is the mean years of experience of PNAA survey participants which was 30 years, reflecting older generation of PNAA nurses, and the number of PNAA participants, which is <1% of the total PNAA membership. Therefore, findings cannot be generalized to the overall PNAA community. However, the data gathered should be useful in planning educational programs on genetics and genomics.

Implications

The findings of this survey confirm the existence of genomic knowledge deficits among Filipino-American nurses, a similar finding revealed in the parent study which reported similar genomic knowledge deficits among minority nurses (Coleman et al., 2014). Therefore, the recommendation is clear, that genomics education is needed by all nurses. The preparation of Filipino-American nurses with essential genetic and genomic competencies will help facilitate the effective use of genomic information in clinical care which can promote and protect the public's health. Overall, nurses can take a leading role in their institutions to assure that patients and families are provided with clinically relevant genetic and genomic information and protections to make informed health decisions. Nurses can also take advantage of the multiple educational resources to improve their knowledge of genetics and genomics and share appropriate educational resources with their patients. Once nurses can improve their knowledge in genetics and genomics, only then can we assure that in this genomic era of healthcare, nurses being an integral member of the workforce, are prepared to deliver responsible, effective, and accountable care.

Conclusion

The study findings described the knowledge, perceptions, beliefs, practice and genomic education of Filipino-American nurses. The findings provide empirical evidence that Filipino-American nurses are in need of educational opportunities to improve their knowledge on genetics and genomics, which should improve their clinical practice. This paper identifies a number of resources that can assist learners at every level to improve their knowledge about genetics and genomics. Additionally, findings from this study will assist

PNAA in planning future educational programs that will incorporate topics on genetics and genomics.

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Biographies

Leorey N. Saligan, PhD, RN, CRNP, FAAN has been a nurse for 22 years, evolving into various roles from a staff nurse, nursing faculty, nurse practitioner, and currently, as a nurse scientist. As a nurse scholar, he makes highly visible contributions to nursing by initiating innovative clinical trials, translating genomic discoveries into practice. Further, he models strong collaborative inter-institutional and multidisciplinary relationships to advance symptoms science, as well as create opportunities for students interested in nursing research and scholarship. In addition to his publication record, he has been asked to conduct scholarly presentations on translational approaches for health care delivery by various research societies, academic institutions, and professional organizations across the United States and internationally. He is a recipient of several recognitions from national organizations and international, multidisciplinary groups. He recently was inducted as a fellow of the American Academy of Nursing.

Reynaldo R. Rivera, DNP, RN, NEA-BC, FAAN is the Director of Nursing Research and Innovation at NewYork-Presbyterian Hospital. Rey is past President of the Philippine Nurses Association of America (PNAA), PNA New York, and the American Association of Critical-Care Nurses (AACN), New York City Chapter. In 2006, he established the PNAA's Leadership Institute to empower PNA Chapter Leaders as catalysts for change and ensuring a well-prepared next generation of leaders to significantly impact the nursing profession and enhance the contributions of Filipino nurses. He is recipient of numerous awards, in May 2014, he received the Flame of Excellence Awards from AACN, which honors sustained contributions to acute and critical care nursing at high level with broad reach. He is currently a board member of the American Organization of Nurses Executives and a fellow of the American Academy of Nursing. He is co-founder of the New York City Men in Nursing. He received his BS Nursing from UERMMMC, MA in Psychology from Ateneo de Manila University, MA and Masters of Education from Columbia University in New York City, Advanced Nursing Practice from New York University, and Doctor of Nursing Practice from Case Western Reserve University.

Table 1
Demographic Characteristics of PNAA Participants of the NCEMNA survey

Demographics Total N=112	***n* (%)**
Sex (*n*=108)	
Male	12 (11%)
Female	96 (89%)
Highest Level of Nursing Education (*n*=109)	
Diploma	1 (1%)
Associate Degree	2 (2%)
Baccalaureate Degree	54 (50%)
Master's Degree	48 (44%)
Doctorate Degree	4 (4%)
Number of Years in Nursing (*n*=106)	
Mean	31
Number of Years in Current employment (*n*=108)	
0-2	12 (11%)
3-5	10 (9%)
6-10	12 (11%)
>10	74 (68%)
Primary Role (*n*=111)	
Administration	28 (25%)
Education	8 (7%)
Research	2 (2%)
Patient Care	56 (50%)
Other	17 (15%)
Percent of Time Spent Seeing Patients (*n*=102)	
Mean	(61%)

Table 2

Beliefs Measures (Total N = 112)

Measure	*n* (%)
Do you believe that family health history can help to identify at risk families? (*n*=109)	
Strongly agree	95 (87%)
Agree	12 (11%)
Neutral	0 (0%)
Disagree	1 (1%)
Strongly disagree	1 (1%)
Do you believe that family health histories can be used to teach patients and family members about the importance of genetics/ genomics and disease prevention? (*n*=111)	
Strongly agree	97 (87%)
Agree	11 (10%)
Neutral	0 (0%)
Disagree	2 (2%)
Strongly disagree	1 (1%)
Do you believe that genetic testing can be used to discriminate against ethnic minorities? (*n*=106)	
Strongly agree	18 (17%)
Agree	30 (28%)
Neutral	30 (28%)
Disagree	19 (18%)
Strongly disagree	9 (8%)
There are genetic differences in racial groups that influence health (*n*=106)	
Strongly agree	62 (58%)
Somewhat agree	36 (34%)
Somewhat disagree	4 (4%)
Strongly disagree	2 (2%)
Unsure	2 (2%)
Race is the best proxy clinicians have to identify genetic effects on health (*n*=105)	
Strongly agree	31 (30%)
Somewhat agree	40 (38%)
Somewhat disagree	18 (17%)
Strongly disagree	11 (10%)
Unsure	5 (5%)

Table 3

Practice Measures (Total N = 112)

Measure	*n* (%)
Do you know how to complete a family health history? (*n*=111)	
Yes	97 (87%)
No	4 (4%)
Uncertain	10 (9%)
Have you ever completed a family health history on yourself? (*n*=109)	
Yes	77 (71%)
No	32 (29%)
Have you ever completed a family health history on your family? (*n*=110)	
Yes	51 (46%)
No	59 (54%)
Have you ever completed a family health history on patient(s) in practice setting? (*n*=110)	
Yes	80 (73%)
No	30 (27%)
I consider my patient's race to better understand their genetic predispositions. (*n=108*)	
All the time	33 (31%)
Most of the time	45 (42%)
Some of the time	13 (12%)
A little of the time	7 (6%)
None of the time	10 (9%)
I consider my patient's race when administering medications. (*n*=108)	
All the time	28 (26%)
Most of the time	25 (23%)
Some of the time	23 (21%)
A little of the time	11 (10%)
None of the time	21 (19%)
I consider my patient's race when determining age of initiation of screening for certain diseases. (*n*=108)	
All the time	18 (17%)
Most of the time	36 (33%)
Some of the time	25 (23%)
A little of the time	2 (2%)
None of the time	9 (8%)
Not applicable	18 (17%)
I consider my patient's race in determining genetic risk for single gene conditions. (*n*=107)	
All the time	30 (28%)
Most of the time	36 (34%)

Measure	***n* (%)**
Some of the time	14 (13%)
A little of the time	9 (8%)
None of the time	18 (17%)
I consider my patient's race in determining how aggressively to treat particular diseases. (*n*=108)	
All the time	14 (13%)
Most of the time	26 (24%)
Some of the time	29 (27%)
A little of the time	4 (4%)
None of the time	17 (16%)
Not applicable	18 (17%)

Table 4

Knowledge Measures (Total N = 112)

Measure	*n* (%)
Common structural genetic variation (changes in the human genome, such as deletions, duplications and large-scale copy- number variants) is important in health and disease. (*n*=108)	
True	82 (76%)
False	4 (4%)
Don't Know	22 (20%)
All the genetic variation in an individual can be attributed either to spontaneous (i.e., de novo) or inherited changes in the human genome. (*n*=108)	
True	70 (65%)
False	13 (12%)
Don't Know	25 (23%)
The variation in the human genome includes both disease-causing gene variants and variants that have no effect on health and disease. (*n*=109)	
True	58 (53%)
False	25 (23%)
Don't Know	26 (24%)
The DNA sequences of two randomly selected healthy individuals of the same sex are 90-95% identical. (*n*=108)	
True	24 (22%)
False	42 (39%)
Don't Know	42 (39%)
Most common diseases such as diabetes and heart disease are caused by a single gene variant. (*n*=109)	
True	40 (37%)
False	27 (25%)
Don't Know	42 (38%)

Table 5

Perceptions Measures (Total N = 112)

Measure	*n* (%)
Do you think that genetic risk (e.g., as indicated by Family Health History) has clinical relevance for breast cancer? (*n*=106)	
Not at all	0 (0%)
Somewhat	21 (20%)
A Great Deal	85 (80%)
Do you think that genetic risk (e.g., as indicated by Family Health History) has clinical relevance for colon cancer? (*n*=106)	
Not at all	1 (1%)
Somewhat	24 (23%)
A Great Deal	81 (76%)
Do you think that genetic risk (e.g., as indicated by Family Health History) has clinical relevance for coronary heart disease? (*n*=104)	
Not at all	1 (1%)
Somewhat	21 (20%)
A Great Deal	82 (79%)
Do you think that genetic risk (e.g., as indicated by Family Health History) has clinical relevance for diabetes? (*n*=107)	
Not at all	1 (1%)
Somewhat	16 (15%)
A Great Deal	90 (84%)
Do you think that genetic risk (e.g., as indicated by Family Health History) has clinical relevance for ovarian cancer? (*n*=104)	
Not at all	1 (1%)
Somewhat	23 (22%)
A Great Deal	80 (77%)

Table 6
Genetic and Genomic Educational Resources

Resource	Uniform Resource Locator	Sponsor	Utility
Genetics/Genomics Competency Center for Education (G2C2)	http://www.g-2-c-2.org/	National Institutes of Health (NIH), NHGRI	Development of competency guidelines and curricula
Global Genetics and Genomics Community (G3C)	http://g-3-c.org/en	NIH, NHGRI	Bilingual collection of genetic/genomic case studies for students and practicing health care providers
NHGRI website	http://www.genome.gov/	NIH, NHGRI	**1** Talking glossary of genetic terms **2** Genetics 101 short course for health professionals
Public Health Genomics website	http://www.cdc.gov/genomics/	Center of Disease Control (CDC) and Prevention	Weekly updates of the current evidence, conferences and funding opportunities.
Evaluation of Genomic Applications in Practice and Prevention (EGAPP™)	http://www.cdc.gov/genomics/gtesting/EGAPP/	CDC	Provide the highest level of evidence to issue recommendations for clinical practice
Physician Data Query (PDCf)	http://www.cancer.gov/cancertopics/pdq/genetics	NIH, National Cancer Institute (NCI)	Provides latest evidence of genetics/ genomics of different types of cancer, and the current recommendations for health professionals
Genetic Testing Registry (GTR)	https://www.ncbi.nlm.nih.gov/gtr/	NIH, National Center for Biotechnology Information	**1** Can search for specific conditions to determine what genetic tests can be conducted and what laboratory perform those tests. **2** Provides reviews of different genes related to specific conditions. **3** Helps find a genetic professional.
National Genetics and Genomics Education Centre	http://www.geneticseducation.nhs.uk/	United Kingdom's National Health Service (NHS)	**1** Case scenarios for faculty members. **2** Provides guidance in obtaining a health history, identifying patients, recommends a patient pathway for clinical management. **3** Provides guidance for workforce competencies.
Telling Stories website	http://www.tellingstories.nhs.uk/index.asp	NHS	**1** Presents experiences of real patients. **2** The presentations are embedded with expert commentaries in educational platforms. **3** Can print out the transcripts of the stories.