Impact of Virtual Navigation on the Education and Access of Patients with Cancer: A National Mixed Methods Investigation

Susan Haag[1] (iD) and Joyce Schaffer[2]

Abstract

Introduction: Despite growing evidence of efficacy, oncology patient navigation is not ubiquitously offered. Navigation may reduce barriers to cancer care, yet geographic location may limit patient access. To overcome geographical barriers and increase patient education in oncology, our medical center developed a virtual navigation program.

Objective: To examine the efficacy of the Virtual Navigation Program designed to increase patient access and education across local and national contexts

Methods: In this mixed-methods study, a total of 105 individuals completed an online survey administered nationally to oncology patients who used the navigation program. Clinical and demographic data were collected. Nonparametric tests were used for group comparisons (Wilcoxon Signed-Ranks test).

Results: Virtual navigation increased access as the majority of patients utilized the Virtual Navigation Program beyond the local area; 42% of patients were local; 58% were patients located across the US. 55 (52%) were female; 25% were non-White. Pancreatic cancer was the largest tumor type: 51 (49%). Patients agreed the virtual cancer education helped them make critical health choices (mean 4.89 SD = 84); understand their diagnosis (mean 4.44 SD = .77); were able to make informed decisions (mean 4.43 SD = .83), and empowered to manage their cancer care (mean 4.58 SD = .82). Post navigation, the user experience survey revealed significant increases in a subset of patients' cancer knowledge ($P < 0.001$), access to quality cancer education ($P = 0.045$), decision-making in cancer care ($P < 0.05$), and coordinated cancer care ($P = 0.03$).

Conclusion: This study explores a unique role that virtual navigation may play in helping accommodate healthcare for many cancer patients in underserved areas. The use of innovative aspects of research and education in virtual navigation may be successful in promoting patient empowerment in the cancer continuum. Internet-strategies are needed to inform sustainable patient navigation in low-resource contexts.

Keywords

Oncology, medical education, technology, patient experience data, health care disparities, patient access, digital health, patient reported outcomes

Introduction

Navigation in oncology has been shown to increase patient engagement and participation in clinical trials (Chan et al., 2023; Guadagnolo et al., 2011: Holmes et al., 2012), and decrease challenges to coordinated cancer care (Kim et al., 2016; Sadigh et al., 2022). Despite outcomes highlighting value, oncology patient navigation is not ubiquitously offered (Braun et al., 2012). Patients can be hindered by location with little to no physical access. Regardless of access to navigation services, variations in navigation delivery may affect patient care and satisfaction (Harman & Brown, 2016; Zibrik et al., 2016). Access, education, and empowerment among vulnerable patients within the cancer journey are

[1]HonorHealth, Scottsdale Osborn Medical Center SOMC, Scottsdale, AZ, USA
[2]HonorHealth Research Institute. (HRI), Scottsdale AZ, USA

Corresponding Author:
Susan Haag, HonorHealth, Scottsdale Osborn Medical Center SOMC, Scottsdale, AZ 85251-6432, USA.
Email: Susan.haag@ymail.com

crucial; however, many may be confused regarding healthcare options (Drake et al., 2022).

Literature Review

In 2023, approximately 2 million individuals were diagnosed with cancer in the US and cancer numbers are rising (NIH National Cancer Institute, 2024). Health care systems are increasingly looking for medical interventions and innovative technologies to deliver health services and education to remote locations where resources are minimally available (Rettinger et al., 2024). Use of innovative aspects of research, information and communication in the healthcare field using Internet-related technologies, such as navigation, has been shown to improve the patient experience and health outcomes. (Bitkina et al., 2020; Williams et al., 2022). Our medical center has advocated the use of unique technologies to provide patient access, information, and optimal care. Thus, through Internet-related technology, our medical center developed a virtual online navigation program designed to increase patient access and education across local and national contexts in cancer care.

Our medical center, with five campuses and 427 beds, offers a level 1 trauma center, a research institute, and comprehensive medical services. Utilizing the Oncology Nursing Society Nurse Navigation Core Competencies, a virtual oncology navigation program was created to provide greater patient access to our cancer center (Baileys et al., 2018). Key Core Competencies utilized in the framework included: to provide education and resources to enable patient decision making and access to quality health care throughout the cancer care continuum; assist patients and their caregivers with cancer to overcome healthcare barriers; and provide coordinated care to patients with past, current or potential cancer diagnosis (Baileys et al., 2018).

For over a decade, under the leadership of a medical oncologist, our medical center has developed a strong oncology research program. Although the center has served residents in the southwest US market, the center has established local and national collaborations and outreach programs with oncology research spanning pancreatic, breast, ovarian, lung, head and neck, colorectal, prostate, and rare cancers. Oncology physicians and nurse navigators are both critical members in the program. Nurse navigators have been immersed in oncology faculty meetings, safety monitory boards, protocol review committees, and thus, have had immediate access to oncologists. Because of the national collaborations throughout the US, the center developed a virtual oncology navigation program (Program) that has served individuals with cancer beyond the geographic location of the local market.

Education for the center's oncology nurse navigators includes a Master's of Science in Nursing (MSN), a graduate level nursing degree with coursework in management, education in navigating the healthcare system, and an ability to assess patients' digital health literacy and technology experience in health education. Oncology navigators have been trained to deliver robust education and onboarding of patients and caregivers in addition to navigating the technology platforms. Program nurse navigators are trained to respond to all patients virtually and provide personalized follow up care. Without giving medical advice they provided talking points or other tools to the patient to take back to their clinicians to promote best patient outcomes.

This online navigation program has included telephone triage, which has the potential to provide accessible and accurate health advice to users (Riboli-Sasco et al., 2023). Operationalized, this virtual Program provided individualized patient education, cancer care coordination, referrals, and documentation through medical records and personal contact. The Program included daily meetings between the medical oncologists and navigators and communication was ongoing to effectively provide relevant cancer education to the patients. In some cases, patients would also meet virtually with the medical oncologist. Specifically, navigators met with medical oncologists for case review and maintained a database of available clinical trials to assure that referrals were made when necessary (key tasks).

Critical elements were also integrated into the Program to increase patient empowerment and self-advocacy (Eskildsen et al., 2017; Hagan et al., 2018), such as patient education regarding their diagnosis and coordinated cancer care (e.g., consultation with a medical oncologist and clinical trial consultation). Navigation has been shown to improve patient outcomes; however, more evidence-based research is needed to evaluate its efficacy on reducing barriers to coordinated care and increasing access in low resource contexts (Chidebe & Pratt-Chapman, 2022). The purpose of this study was to examine the efficacy of an online navigation program designed to increase patient access and education among patients with cancer, across local and national contexts.

Methods

Study Design

This mixed-methods design study employed a user-experience methodology, which assessed patients' perceptions utilizing the virtual navigation program both locally and nationally. A user-experience (UX) approach engenders a better understanding of patients' perceptions regarding an intervention's usability and impact (Chagas et al., 2023; Haag & Kepros, 2024). In this cross-sectional study, one measurement was taken, an online survey. Quantitative and qualitative data were collected with the online survey that assessed patient experience data (PED) and included an open-ended section for patient comments. A mixed-methods approach provided a more complete account of patient experiences and perceptions when navigating their cancer journey (Pelto, 2015).

Research Question. The research question guided the study: To what extent does Virtual Navigation increase patient access and education among patients with cancer, across local and national contexts?

Sample. The survey instrument was administered virtually and the 188 oncology patients who used the Virtual Navigation program were recruited. The study duration was October 2019 through September 2020. In some cases, we sent the survey to the email of the closest relative of the patient (emails, which were on file). We were contacted by family members and were told that several patients had passed away. After adjusting for incorrect or out-of-data emails, the number became 168. As a result, 105 patients submitted completed assessments (63% response rate). The researcher sent out two gentle reminders to patients during the survey administration. Patients were provided a consent to participate in the survey research effort. Eligibility criteria included all age groups, sex, and the type and stage of cancer. Tumor types were determined by the current or former medical oncologist. No compensation was provided for participation.

Data Collection Instrument: A Multidisciplinary Team Effort. The 26-item survey was created internally by a multidisciplinary team of medical oncologists, research scientists, physicians, and nurse navigators. Items were adapted from the and from recent literature on empowerment (Eskildsen et al., 2017). Survey items captured patient navigation satisfaction, perceptions regarding the cancer education, decision-making, empowerment, coordinated care, and demographics. The multidisciplinary team adapted items from an existing instrument but also wanted to include items that were specific to the virtual navigation program. Survey items were developed to evaluate the extent to which the program provided individualized education and access to care, facilitating patient empowerment in the cancer continuum, all patient outcome measures. Items asked the extent to which patient education provided by the virtual navigation program helped them understand their diagnosis and health issues associated with cancer. Items also elicited responses concerning decision making, such as decisions concerning cancer treatment. In addition, survey items asked whether the online program helped improve their cancer coordinated care. One survey item determined whether patients were more competent "formulating questions with the oncologist and medical team." The instrument used a 5-point scale with 5 = Strongly agree, 4 = Agree, 3 = Neutral, 2 = Disagree, and 1 = Strongly disagree.

A reliability analysis was conducted and the survey instrument had a Cronbach Alpha of .94. The Cronbach's alpha coefficient of internal consistency is the most frequently used Cronbach's alpha coefficient; a score of .70 or higher is considered "acceptable" in most social science research situations. The closer Cronbach's alpha coefficient is to 1.0 the greater the internal consistency of the scale items.

Content Validity

Increasing content validity of the survey items was instrumental for drawing conclusions about the scale's quality. One strategy involves having a multidisciplinary team of physicians, researchers, and medical nursing staff experts indicate whether each item on a scale was relevant to the construct, computing the percentage of items identified to be relevant for each medical rater. A primary measure of content validity has been the content validity index or CVI. Scale designers provide evidence of content validity by computing a content validity index (CVI), using ratings of item relevance by internal medical content professionals (Wynd et al., 2003).

In this study, content professionals were asked to rate each scale item in terms of relevance to the underlying construct. Our study employed six content experts. We used a 5-point rating scale with 1 = not relevant, 2 = somewhat relevant, 3 = moderately relevant (average), 4 = quite relevant, and 5 = highly relevant. Then for each item the I-CVI was computed. Items were subject to two rounds of rating by content experts and then, were refined for the final assessment instrument. When there are six or more judges the standard should be no lower than .78, which was exceeded in this study (.91).

Quantitative data included demographics (age, sex, race, and location such as state in the USA) and clinical data, such as tumor type. Patient experience data were captured on the navigation usability survey including patient coordinated care, decision making, education, empowerment, and satisfaction. Qualitative data were also collected on the survey, and patient comments were recorded regarding the benefits of the Program. A subset of the larger group of patients were administered a brief survey using a pre-post design (at baseline and post navigation) to capture intragroup differences regarding patients' health knowledge associated with cancer, patients' access to quality cancer education, patients' decision-making in cancer care, and patient coordinated cancer care as a result of Program education.

Statistical Analysis

Nonparametric tests, to analyze ordinal survey data, were used for between-group comparisons (Mann Whitney test). Nonparametric tests are methods of analysis that do not require a distribution to meet the typical assumptions to be analyzed (e.g., data are not normally distributed). We divided the patient data into two groups: group 1 included local patient data, those patients residing in the surrounding healthcare area where the navigation program was developed; and group 2, which included national patient data, reflecting patients living outside the local healthcare site. The aim was to determine the extent of patient access in a broader area than locally provided. We employed descriptive statistics, an analysis of data that helped describe or summarize data in a meaningful way, such that patterns might

emerge from the data. Frequencies and percentages are reported for categorical variables. Medians and means with SDs are reported for continuous variables as appropriate. All computations included 105 patients. All variables were assessed for normality. Statistical tests are 2-tailed, with a significance level of an α of .05. All statistical analyses were performed using SPSS Statistics for Windows (version 28.0; IBM Corp). A subset of patients n = 49 (47%)) participated in a pre-post survey (repeated measures design) that elicited responses regarding health knowledge associated with cancer, patients' access to quality cancer education and decision-making in cancer care, and patient coordinated cancer care. A Nonparametric statistical test (Wilcoxon Signed Rank test) was used for intragroup comparisons.

For qualitative data, patient responses were analyzed using qualitative content analysis (QCA), which uses data coding to discern meaningful categories and themes (Im et al., 2023). A specific open-ended survey item asked patients how the virtual navigation program helped them the most. Data were transcribed verbatim and names were removed for confidentiality purposes. Codes derived from questions were created to reduce large patient excerpts into manageable chunks for analysis. Qualitative data analysis included a three-step process: data reduction, data display, and conclusion drawing and verification (Raskind et al., 2019). Data reduction helped sort, focus, and condense excerpts that allowed the researcher to organize the data to develop conclusions. Data were reduced and transformed through such means as summarizing and paraphrasing. Data display was the second major activity during which the researcher reviewed the reduced data and displayed it in a compressed way so that conclusions were drawn. Excerpts served as the supportive evidence for categories, themes, and assertions concerning the programs. Conclusion drawing and verification were the final analytical activity for the researcher.

Ethical Considerations

In total, 105 oncology patients participated in the research virtually with the online survey. The study protocol was approved by the institutional review board for research ethics and subsequently approved. Informed consent was obtained from the 105 patients who met the inclusion criteria and were willing to participate. Confidentiality of information was maintained. The data are anonymized and patients are de-identified. Each patient was assigned a discrete number in the study and data are secured by the research scientist. There was no compensation for patient participation in the study.

Results

Patient Characteristics

Of the 105 patients responding to the survey, 61 (58%) using the virtual navigation program were oncology patients living across the US, while 44 (42%) were patients who living in

Table 1. Patient Characteristics.

Characteristic	Number (%)
Gender	
Male	50 (48%)
Female	55 (52%)
Age	
25–34	5 (5%)
35–44	3 (3%)
45–54	20 (19%)
55–64	26 (25%)
65–74	36 (34%)
75+	15 (14%)
Patient Location	
Local	44 (42%)
National	61 (58%)
Tumor Type	
Pancreas	51 (49%)
Breast	12 (12%)
Ovarian	7 (7%)
Lung	6 (6%)
Prostate	11 (11%)
Colorectal	4 (4%)
Head and Neck	2 (2%)
Rare Cancers	9 (9%)

Table 2. Online Navigation Patient Education.

	Local Mean (SD)	National Mean (SD)
Patient Education Provided by Virtual Navigation		
The patient education (phone) helped me Understand my diagnosis and health issues that come from cancer	4.16 (.86)	4.39 (.96)
The patient education (written information) Helped me understand my diagnosis and health Issues that come from cancer	3.88 (1.1)	4.25 (.94)

the local area (state where the navigation system was located). Findings revealed online navigation provided greater patient access to oncology navigation and education beyond resources provided in the local community. Of the 105 patients, 55 (52%) were female; 79 (75%) were White; and 21 were (25%) non-White. The largest group with 36 patients (34%) was between the ages of 65—74. Tumor types were assessed, and pancreas was the largest category, revealing 51 patients (49%). For patient characteristics see Table 1.

Survey Results

Items assessed whether the patient education, delivered over the phone or virtually, helped patients understand their diagnosis and health issues associated with cancer. Patient experience data (PED) revealed individuals felt the cancer education

provided in either format helped them understand their cancer type and associated health issues. Table 2.

Patient Decision Making and Empowerment

Key items assessed patient perceptions regarding empowerment in the cancer journey. Results revealed positive trends in the data regarding decision making and motivation, enabling empowerment. Patients agreed the virtual individualized cancer education helped them make critical health choices (mean 4.89 SD = 84). After navigation, patients better understand their diagnosis (mean 4.44 SD = .77), are able to make informed decisions (mean 4.43 SD = .83), and are more empowered to manage their cancer care (mean 4.58 SD = .82). Finally, navigation improved patients' coordinated care experience (mean 4.44 SD = .85). See Table 3.

Statistically significant differences emerged between the two groups concerning a key empowerment skill, namely "Finding strength through connecting with others" favoring the national mean ($P = 0.04$), which is noteworthy as these oncology patients are connecting with others virtually. In addition, the national mean score was significantly higher concerning "Navigation service improved my coordinated care experience."

Oncology patients were also more motivated to manage their care in the cancer continuum and agreed that navigation improved their coordinated care experience. As a result, 61 (58%) pursued referrals based on the "recent information provided by navigation," including follow-up appointments with genetic counseling 50 (48%), nutritional counseling 44 (42%).

Table 3. Patient Decision Making and Empowerment.

	Local Mean (SD)	National Mean (SD)
Patient Decision Making		
Individualized education, relating to my cancer helped me make critical healthcare choices	4.44 (.89)	4.89 (84)
Better understanding of my diagnosis and if necessary, treatment options	4.34 (.83)	4.44 (.77)
Better able to make informed decisions about cancer care and treatment	4.24 (.81)	4.43 (.83)
Better able to formulate questions with the oncologist or the medical team	4.43 (.82)	4.54 (.92)
I am finding strength through connecting with Others.	4.01 (1.11)	4.54* (.85)
I am more empowered managing my care In the cancer journey	4.22 (.89)	4.48 (.82)
Navigation service improved my coordinated Care experience	3.94 (1.14)	4.44** (.85)

*$p = 0.04$, ** $p = 0.014$.

Statistically significant increases were found in a subset of patients' health knowledge associated with cancer ($P < 0.001$), patients' access to quality cancer education ($P = 0.045$), patients' decision-making in cancer care ($P < 0.05$), and patient coordinated cancer care ($P = 0.03$) post navigation as a result of the medical education provided by the Program.

Qualitative Data Results: Patient Feedback

Qualitative data (75 qualitative responses, 71%) highlighted critical outcomes of the program with themes and categories reflected in the quantitative outcomes: a) The Program provided *access to education* concerning the cancer diagnosis, and b) The Program facilitated *cancer care management*. Reflected in the "cancer management" category, cancer education facilitated patients' ability to make informed decisions regarding their current and future cancer care. Understanding the diagnosis and health issues associated with cancer may have fostered patient empowerment and confidence to manage their care.

The qualitative data suggests that patients valued Program access and education, as seen in the following excerpt, "I appreciated the call from the nurse navigator as in my area there are few resources for cancer patients." Another patient stated, "I learned from the cancer education and disease information provided by my navigator as I now am able to discuss treatment options with my doctors." Another poignantly noted, "I live in a small town and I am not able to call and discuss my cancer diagnosis with a practitioner. I appreciate the call back and accurate information I received from a nurse navigator. I was searching online for information before, which was not useful."

Another category in the patient comments concerned "cancer care management." As a result of the Program, a patient respondent expressed renewed confidence, and felt empowered to make decisions: "The education concerning my diagnosis helped me understand additional health issues I'm experiencing. It was good to be able to talk to a qualified nurse, helping with my cancer care, which motivated me to take more control in my treatment." Another patient indicated: "I felt that I knew more about my cancer and health problems after navigation, which empowered me to make meaningful treatment choices. With more accurate knowledge, I have the confidence to move forward."

The patient comments have a theme of increased health knowledge as they voiced a renewed commitment for follow-up care. After navigation, the majority, 61 (58%) had scheduled appointments for clinical trials and for other services. One patient succinctly noted, "Navigation helped me pull everything together—coordinating my care and providing referrals." Another suggested the program helped her make future decisions, "Navigation provided knowledge, which helped me make better decisions. I will participate in a clinical trial and have scheduled a nutritional counseling appointment."

Discussion

Principal Findings

Due to increasing patient demand for access and efficient care in oncology, our center developed and implemented a virtual navigation model to provide access and education for individuals with cancer. Oncology online navigation provided individualized patient education, care coordination, referrals, and documentation through medical records and personal contact. Patient experience data highlighted that the virtual program increased patient access to oncology navigation and education (42% were local patients; 58% were oncology patients living beyond the local area.). It has been suggested that novel approaches to patient navigation are warranted in areas with low-resource contexts (Williams et al., 2022). Thus, we present a feasible model that has the potential to provide access to patients with minimal local resources. Findings also showed positive trends regarding decision making and empowerment (Table 3). Qualitative data supported the quantitative data, highlighting critical outcomes of the program: patient access to navigation, cancer education associated with their diagnosis, and coordinated care. The navigation program helped equip cancer patients with knowledge about their diagnosis and health issues, which may have enabled confidence and empowerment. Understanding variations in navigation, providing a personalized journey, and continually monitoring patient responses have been critical to improving outcomes for this population.

Strengths and Limitations

The primary limitation of the survey research included the nature of self-reporting by participants post navigation. One measure to counter this bias was to include a family member during the evaluation to corroborate the patient's self-reported data and responses. Another issue and limitation we noted, was the difficulty of trying to reconnect or contact this cancer population after virtual navigation as some of the patients were either very ill, in treatment, or had passed away.

Implications for Practice. While there have been efforts to increase health equity across the US, not all individuals have access to quality health care; in fact, many of the most vulnerable patients continue having difficulty accessing a healthcare system that is often complex (Natale-Pereira et al., 2011). This research study explores a unique role that virtual navigation may play in clinical practice in order to help accommodate healthcare services for many in underserved areas. An online navigation program may add services to current medical practices, such as facilitating cancer education, coordinated care, and patient referrals. By addressing many of the inequities in health care [Natale-Pereira et al., 2011), patient navigators will be able to foster trust and empowerment in patients living in areas with moderate to no healthcare resources.

Conclusion

The virtual oncology navigation program was developed to provide access to patients with modest local resources in the US. Results from this study suggest that navigation can impact patients in underserved areas. Overall, this study yielded initial, preliminary patient experience data to support program efficacy and patient reported outcomes. Currently, the online oncology navigation program is expanding to reach patients in regions with minimal healthcare resources. Future research includes tracking and identifying elements for sustainability, such as follow-up care and participation in clinical trials. The findings underscore the importance of patient access and medical education. Online navigation may be a viable solution to reduce health care disparities as it provides personalized contact, individualized education, referrals, and coordinated care to empower patients to overcome barriers in the cancer continuum.

Author Contributions

Susan Haag: Conceptualization, methodology, investigation, formal analysis, project administration, supervision, visualization, writing-original draft preparation and reviewing and editing the article. Joyce Shaffer: Conceptualization, supervision, writing -original draft preparation, reviewing and editing.

Data Availability Statement

Data included in article; supplementary material referenced in article.

Declaration of Conflicting Interests

The authors declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article

Ethical Statement

Written informed consent was obtained from the subjects before they participated in the study. The participants were assured about the anonymity and confidentiality of their information. According to institutional policy, this study was considered exempt from the institutional review board's (IRB) full review protocol. This is in accordance with the recommendations of the National Human Research Protections Advisory Committee.

Informed Consent Statement

Consent was obtained from all subjects who participated in the study.

ORCID iD

Susan Haag [iD] https://orcid.org/0000-0003-3508-7938

References

Baileys, K., McMullen, L., Lubejko, B., Christensen, D., Haylock, P. J., Rose, T., Sellers, J., & Srdanovic, D. (2018). Nurse navigator core competencies: An update to reflect the evolution of the role. *Clinical Journal of Oncology Nursing*, *22*(3), 272–281. https://doi: 10.1188/18.CJON.272-281. PMID: 29781454

Bitkina, O., Jeong, H., Lee, B. C., & Park, J. (2020). Perceived trust in artificial intelligence technologies: A preliminary study. *Human factors and Ergonomics in Manufacturing & Service Industries*, *30*(1689). https://doi.org/10.1002/hfm.20839

Braun, K. L., Kagawa-Singer, M., Holder, A. E., Burhansslipanov, L., Tran, J. H., Seals, B. F., Corbie-Smith, G., Tsark, J. U., Harjo, L., Foo, M. A., & Ramirez, A. G. (2012). Cancer patient navigator tasks across the cancer care continuum. *Journal of Health Care Poor Underserved*, *23*(1), 398–413.

Chagas, B. A., Pagano, A. S., Prates, R. O., Praes, E. C., Ferreguetti, K., Vaz, H., Reis, Z. S. N., Ribeiro, L. B., Ribeiro, A. L. P., Pedroso, T. M., Beleigoli, A., Oliveira, C. R. A., & Marcolino, M. S. (2023). Evaluating user experience with a chatbot designed as a public health response to the COVID-19 pandemic in Brazil: Mixed methods study. *JMIR Human Factors*, *3*(10), e43135. https://doi: 10.2196/43135. PMID: 36634267; PMCID: PMC10131797

Chan, R. J., Milch, V. E., Crawford-Williams, F., Agbejule, O. A., Joseph, R., Johal, J., Dick, N., Wallen, M. P., Ratcliffe, J., Agarwal, A., Nekhlyudov, L., Tieu, M., Al-Momani, M., Turnbull, S., Sathiaraj, R., Keef, D., & Hart, N. H. (2023). Patient navigation across the cancer care continuum: An overview of systematic reviews and emerging literature. *CA: A Cancer Journal for Clinicians*, *73*(6), 565–589. https:// doi: 10.3322/caac.21788. Epub ahead of print. PMID: 37358040

Chidebe, R. C. W., & Pratt-Chapman, M. L. (2022). Oncology patient navigation training: Results of a pilot study in Nigeria. *Journal of Cancer Education*, *37*(4), 1172–1178. htpps://doi: 10.1007/s13187-020-01935-7. Epub 2021 Jan 7. PMID: 33411251; PMCID: PMC7788275

Drake, B., James, A., Miller, H., Anandaraja, A., Davis, K. L., Jackson, S., Colditz, G. A., & Thompson, V. S. (2022). Strategies to achieve breast health equity in the St. Louis region and beyond over 15+ years. *Cancers (Basel)*, *14*(10), 2550. https://doi: 10.3390/cancers14102550. PMID: 35626157; PMCID: PMC9140077

Eskildsen, N. B., Joergensen, C. R., Thomsen, T. G., Ross, L., Dietz, S. M., Groenvold, M., & Johnsen, A. T. (2017). Patient empowerment: A systematic review of questionnaires measuring empowerment in cancer patients. *Acta Oncology*, *56*(2), 156–165. https: doi: 10.1080/0284186X.2016.1267402. Epub 2017 Jan 12. PMID: 28077053

Guadagnolo, B. A., Dohan, D., & Raich, P. (2011). Metrics for evaluating patient navigation during cancer diagnosis and treatment: Crafting a policy-relevant research agenda for patient navigation in cancer care. *Cancer*, *117*(15 Suppl), 3565–3574. https://doi: 10.1002/cncr.26269. Review. PubMed PMID: 21780091; PubMed Central PMCID: PMC4818009

Haag, S., & Kepros, J. (2024). Head protection device for individuals at risk for head injury due to ground-level falls: Single trauma center user experience investigation. *JMIR Human Factors*, *19*(11), e54854. https://doi: 10.2196/54854. PMID: 38502170

Hagan, T. L., Cohen, S. M., Rosenzweig, M. Q., Zorn, K., Stone, C. A., & Donovan, H. S. (2018). Female self-advocacy in cancer survivorship scale: A validation study. *Journal of Advanced Nursing*, *74*(4), 976–987. https://doi: 10.1111/jan.13498. Epub 2017 Dec 11. PMID: 29117439; PMCID: PMC5844819

Harman, L., & Brown, M. (2016). Creating a scorecard to monitor program growth and evaluatenavigation metrics in a multiple-market navigation program. *JONS-online*, *7*(9), 26.

Holmes, D. R., Major, J., Lyonga, D. E., Alleyne, R. S., & Clayton, S. M. (2012). Increasing minority patient participation in cancer clinical trials using oncology nurse navigation. *American Journal of Surgery*, *203*(4), 415–422. https://doi.org/10.1016/j.amjsurg.2011.02.005

Im, D., Pyo, J., Lee, H., Jung, H., & Ock, M. (2023). Qualitative research in healthcare: Data analysis. *Journal of Preventive Medicine and Public Health*, *56*(2), 110. https://doi: 10.3961/jpmph.22.471. Epub 2023 Feb 15. PMID: 37055353; PMCID: PMC10111102

Kim, K., Choi, J. S., Choi, E., Nieman, C. L., Joo, J. H., Lin, F. R., Gitlin, L. N., & Han, H. R. (2016). Effect of community-based health worker interventions to improve chronic disease management, care among vulnerable populations: A systematic review. *American Journal of Public Health*, *106*(4), 3–e28. https://doi: 10.2105/AJPH.2015.302987. Epub 2016 Feb 18. PMID: 26890177; PMCID: PMC4785041

Natale-Pereira, A., Enard, K. R., Nevarez, L., & Jones, L. A. (2011). The role of patient navigators in eliminating health disparities. *Cancer*, *117*(15 Suppl), 3543–3552. https://doi: 10.1002/cncr.26264. PMID: 21780089; PMCID: PMC4121958

NIH National Cancer Institute SEER Program. *Cancer stat facts: Pancreatic cancer*. Retrieved from November 6, 2022, https://seer.cancer.gov/statfacts/html/pancreas.html

Pelto, P. J. (2015). What is so new about mixed methods? *Qualitative Health Research*, *25*(6), 734–745. https://doi: 10.1177/1049732315573209. Epub 2015 Feb 26. PMID: 25721718

Raskind, I. G., Shelton, R. C., Comeau, D. L., Cooper, H. L. F., Griffith, D. M., & Kegler, M. C. A. (2019). Review of qualitative data analysis practices in health education and health behavior research. *Health Education and Behavior*, *46*(1), 32–39. https://doi: 10.1177/1090198118795019. Epub 2018 Sep 18. PMID: 30227078; PMCID: PMC6386595

Rettinger, L., Putz, P., Aichinger, L., Javorszky, S. M., Widhalm, K., Ertelt-Bach, V., Huber, A., Sargis, S., Maul, L., Radinger, O., Werner, F., & Kuhn, S. (2024). Telehealth Education in Allied Health Care and Nursing: Web-Based Cross-Sectional Survey of Student's Perceived Knowledge, Skills, Attitudes, and Experience. *JMIR Medical Education*, *21*(10). https://doi: 10.2196/51112PMID: 38512310

Riboli-Sasco, E., El-Osta, A., Alaa, A., Webber, I., Karki, Asmar, M., Purohit, K., Painter, A., & Hayhoe, B. (2023). Triage and diagnostic accuracy of online symptom checkers: Systematic review. *Journal Medical Internet Research*, *2*(25), e43803.

https://doi: 10.2196/43803. PMID: 37266983; PMCID: PMC10276326

Sadigh, G., Coleman, D., Switchenko, J. M., Hopkins, J. O., & Carlos, R. C. (2022). Treatment out-of-pocket cost communication and remote financial navigation in patients with cancer: A feasibility study. *Supportive Care in Cancer*, *30*(10), 8173–8182. https://doi: 10.1007/s00520-022-07270-5. Epub 2022 Jul 7. PMID: 35796885; PMCID: PMC9834906

U.S. National Institutes of Health, National Cancer Institute. April 7, 2024, <https://training.seer.cancer.gov/>.

Williams, P. A. H., Lovelock, B., & Cabarrus, J. A. (2022). A sense of coherence approach to improving patient experience using information infrastructure modeling: Design science research. *JMIR Formative Research*, *6*(4), e35418. https://doi: 10.2196/35418. PMID: 35307641; PMCID: PMC9044153

Wynd, C. A., Schmidt, B., & Schaefer, M. A. (2003). Two quantitative approaches for estimating content validity. *Western Journal of Nursing Research*, *25*, 508–518.

Zibrik, K., Laskin, J., & Ho, C. (2016). Integration of a nurse navigator into the triage process for patients with non-small-cell lung cancer: Creating systematic improvements in patient care. *Current Oncology*, *23*(3), e280–e283. https://doi: 10.3747/co.23.2954. Epub 2016 Jun 9.PMID: 27330366