Section Editors: Theresa Wicklin Gillespie and Constance Visovsky

QUALITY IMPROVEMENT

Implementation of a Malignant Hematology Education Intervention and its Impact on Hematology Nurse Practitioner Knowledge and Self-Efficacy to Practice

LAUREN CLERMONT,[1] DNP, NP-C, AOCNP®, BMTCN, MARY LEWIS,[2] DrPH, RN, FAAN, SU YON JUNG,[2] PhD, TIA WHEATLEY,[2] DNP, RN, AOCNS®, BMTCN, EBP-C, and WENDIE ROBBINS,[2] PhD, RN, FAAN, FAAOHN

From [1]City of Hope Comprehensive Cancer Center, Duarte, California; [2]University of California Los Angeles, Los Angeles, California

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Correspondence to: Lauren Clermont, DNP, NP-C, AOCNP®, BMTCN, City of Hope Comprehensive Cancer Center, 1500 East Duarte Road, Duarte, California 91010-3012

E-mail: lclermont@coh.org

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Abstract

Background: Nurse practitioners (NPs) entering the malignant hematology specialty often lack hematology-specific knowledge needed for practice; many have reported they want and need more hematology education. Deficiencies in hematology education stem from the minimal amount of hematology content included in NP programs and during job orientation. Knowledge deficits among NPs are associated with unpreparedness to practice and feelings of anxiety, insecurity, inadequacy, and guilt. Self-efficacy (SE) is a correlate to NP knowledge acquisition and competency development. **Purpose:** This was a process improvement effort to examine the impact of a malignant hematology education module on NP knowledge and SE to practice in malignant hematology. **Methods:** A convenience sample of 11 NP participants were recruited during onboarding to a hematology department in a tertiary care cancer hospital in Southern California. Participants completed an online learning module containing education about hematological malignancies. A pretest and posttest design using questionnaires was employed for data collection. Knowledge and SE scores obtained before and after the intervention were compared to assess for improvement. **Results:** Posttest NP knowledge scores increased by a mean of 2.4 points (20%; mean pretest: 7.1/12, posttest: 9.5/12), $p < .05$. Posttest scores for NP SE were similar to baseline (mean pretest: 32.6/40 points, posttest: 32.3/40), $p > .05$. Participants reported that the intervention

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was helpful in the onboarding process. **Implications/Conclusion:** The findings help establish the feasibility of a malignant hematology learning module in increasing knowledge for NPs during onboarding. Integrating an education module into NP job training may increase knowledge and preparedness to practice in malignant hematology.

Malignant hematology is a small, highly specialized focus of health care in need of support from nurse practitioners (NP). The American Cancer Society estimates that in 2024, there is expected to be a little over 2 million new cancer diagnoses in the United States, 8% of which are hematological malignancies such as leukemia and lymphoma. As of 2018, there were approximately 270,000 practicing NPs in the United States, with an estimated 3,600 to 4,800, about 1% to 2%, working in hematology/oncology (Coombs et al., 2020). Given these data, a greater number of NPs is needed to fulfill the advanced practice nursing role within this specialty.

One barrier to meeting this demand is that many NPs lack sufficient hematology knowledge, thus making it difficult to transition into specialty practice. Nurse practitioner professional licensure programs and job orientations in particular often provide little, if any, oncology-focused education for NPs. A needs assessment conducted by Hwa and colleagues (2019) corroborates this, having found that 90% of NP respondents felt unprepared to practice in hematology and bone marrow transplant with the education received in graduate school. It was also noted that approximately 57% of them reported their respective programs' curricula contain less than 5% of hematology-related content.

Findings from a separate web-based assessment conducted by Rosenzweig and colleagues (2012) also confirmed the need for more on-the-job oncology training during the first year of practice. Their survey of 610 self-reported oncology nurse practitioners (ONP) found that 78%, 70%, and 61% of ONPs described themselves as either "not at all prepared," or only "somewhat prepared" in chemotherapy regimens, recognition and management of oncologic emergencies, and detection and management of drug-related toxicities, respectively. The data suggest that a majority of hematology-oncology NPs require a more extensive knowledge base regarding the different treatment modalities within this specialty upon initial entry into practice. However, many health-care institutions have limited orientation programs for new NPs, thus presenting a barrier to meeting this need (Bush & Lowery, 2016). For these reasons, NPs new to the malignant hematology specialty often report feelings of inadequacy, anxiety, stress and insecurity (Rosenzweig et al., 2012; Schofield & McComiskey, 2015). Additionally, a lack of comprehensive education upon hire is known to affect NP confidence to practice in the specialty, which can further impact job turnover (Kramer & Valente, 2020).

Self-efficacy (SE), or the belief in one's ability to perform a given task competently, plays a crucial role in nurse education and contributes to knowledge acquisition, competency development, and learning. It is well established that nurse SE impacts the role transition experience, job satisfaction, and intent to stay in a job position (Baker & Blakely, 2023; Rambod et al., 2018). Thus, higher levels of SE are needed to enhance NP training and help NPs feel confident and competent to practice.

Similar to the literature, a need for more hematology education was identified among hematology NPs working in a National Cancer Institute (NCI)-designated comprehensive cancer center, which became the setting of this quality improvement (QI) effort. To better identify the learning needs of newly hired NPs at this institution, a preliminary informal needs assessment was conducted. All six of the respondents expressed a strong desire to receive education on specific hematologic diseases, chemotherapy regimens, cellular therapy, immunotherapies and oncologic emergencies, in addition to wanting more time with preceptor-led orientation. These findings, and those illuminated from the published literature, confirm NPs want and need more malignant hematology education to enrich their practice.

METHODS

Purpose

This QI effort sought to measure the impact of a malignant hematology-focused education intervention and its effect on NP knowledge and SE to practice in the hematology specialty.

Design

This study used a quasi-experimental, pretest and posttest design.

Sample and Setting

Convenience sampling was employed to recruit NPs who were onboarding in the hematology department at a large comprehensive cancer center in Los Angeles County, California. Eligible participants met the following inclusion criteria: current NP license and board certification (an institutional requirement) and hired to the hematology department within 18 months of this study's implementation start date. A hire date within 18 months was chosen because it aligns with Patricia Benner's novice-to-expert model. According to Benner, nursing competence is typically achieved in the first 2 years of practice (Benner, 2004). Nurse practitioners who were hired to the department before July 1, 2020, were excluded from this study. Based on this criterion, a total of 13 NPs were initially recruited to participate, and 11 completed all study requirements and were included in the final data analysis.

Ethical Considerations

This study was reviewed and approved by the Institutional Review Board prior to implementation.

Instruments

This study measured NP knowledge and SE. Knowledge was measured using a 12-item knowledge test created by the principal investigator (PI). Items on the knowledge test were presented in multiple-choice and true/false format, each having only one correct answer, and all of which were based on content presented within the education module. Participant SE was measured using the General Self-Efficacy Scale (GSE) by Schwarzer and Jerusalem, a valid and reliable tool consisting of 10 statements each with four responses organized on a Likert scale. The responses aim to assess the degree to which each statement is true for the person completing the survey; a numeric response of 1 on the Likert scale indicates that the statement is "not at all true" to the individual, while a numeric response of 4 indicates the statement is "exactly true." A numeric value is assigned to each response in numerical order (e.g., response option 1= 1 point, response option 2 = 2 points, etc.). The scale has a maximum score of 40 points; the higher the score, the higher the level of SE. Schwarzer (2012) asserts the tool positively correlates with positive emotions, including work satisfaction and optimism. Negative coefficients obtained from prior studies have linked the GSE to feelings of depression, anxiety, stress and burnout. The Cronbach's alpha for this scale ranged between .76 and .90, as measured from study samples spanning 23 countries (Schwarzer, 2012).

Demographic data were collected using a brief survey that assessed the following factors: age, gender, number of months working in the hematology advanced practice provider (APP) department, number of years of registered nurse (RN)/NP experience, history of previous hematology experience as an RN/NP, NP certification specialty (e.g., family, acute care, etc.) and type of advanced practice nursing degree (Master of Science in Nursing or Doctor of Nursing Practice). Participant feedback was also collected in this study using a 7-item survey containing four questions formatted on a Likert scale and three free response questions. The survey sought to assess the participants' perception of the module, its utility, and to identify strengths, weaknesses and opportunities for improving the module for future use.

Intervention

The intervention was an online learning module titled "Understanding Hematological Malignancies: Clinical Pearls." The module was developed by the PI and contained educational slides that highlighted the definition, clinical presentation, and diagnosis and staging of leukemia, lymphoma, and multiple myeloma. The module consisted of 75 slides and took approximately 2 hours to complete. The content was selected based on hematology NP learning needs that were identified in the literature and within the hematology APP department where this study was conducted. The information presented in the module was derived from

educational references and resources that are well-known and recognized within the oncology community, including *Williams Hematology*, *Harrison's Hematology and Oncology,* and the National Cancer Institute. The Leukemia and Lymphoma Society (LLS) granted permission to adapt their educational handouts for this study. The module and survey materials were also approved for use by the APP department supervisor at the study site.

Procedures

This study took place from late January 2022 to late April 2022. Convenience sampling via email was used to recruit participants from the hematology APP department. Participant enrollment continued throughout the implementation period since the institution of focus hires providers on a rolling basis. Recruited participants attended one of two in-person meetings with the PI to discuss the intent of the study and how to access study materials. After attending the meeting, all participants received an email link to the pretest surveys. Access to the education intervention module was granted to participants upon completion of the baseline surveys. Participants were then able to review the content in the module at their convenience. Upon completion of the module, each participant completed the same knowledge and SE surveys they received prior to the intervention to remeasure knowledge and SE. Participant feedback was collected upon completion of the intervention. Research Electronic Data Capture (REDCap) software was used to distribute the data collection tools; this also ensured that the anonymity of participants was maintained and data were stored securely.

RESULTS

Demographics

Thirteen subjects were initially recruited to participate in this study, and 11 completed all study procedures. Therefore, the data described is inclusive of the 11 participants who completed all required components of this QI effort.

The study sample comprised 11 hematology NPs who met the eligibility criteria to participate (see Table 1 for demographic characteristics). The majority of participants were female (81%), age 36 years or older (45%), and working in the hematology APP department for less than 3 months (45%). One participant had 5 or more years of previous hematology experience as an NP, while the remaining 10 participants reported no hematology experience as an NP. Seven participants (64%) had prior RN experience in hematology, with four of them reporting 5 or more years of RN experience.

Knowledge

Survey data were extracted from REDCap and analyzed using Microsoft Excel version 16.1 software. A Wilcoxon signed-rank test was used to compare baseline and post-intervention scores for knowledge and SE. Knowledge posttest scores increased by an average of 2.4 points (20%) compared to pretest scores. Participants scored a mean of 7.1 out of 12 possible points (59.2%) on the knowledge pretest and a mean of 9.5 of 12 possible points (79.2%) on the posttest (Figure 1). Pretest scores ranged from 4 to 10 points, with a median score of 7 points. Knowledge scores after the intervention ranged from 4 to 12 points with a median score of 10 points. Five participants scored 100% on the knowledge posttest. Findings showed that NP knowledge increased after receiving the intervention (Wilcoxon signed rank test [W]: 5.5, critical W: 8.5, $p < .05$). An item analysis of each knowledge test question was also performed to identify any specific knowledge deficiencies in the module's content. Overall, the number of correct responses to each test question had a fairly even distribution.

Self-Efficacy

There was not a significant difference between the mean SE pretest and posttest scores; the mean pretest score was 32.6 points (out of 40 possible points), and the mean posttest score was 32.3 points. Pretest scores ranged between 29 and 36 points, while posttest scores ranged between 29 and 39 points. Interestingly, 5 of the 11 participants had lower SE scores after the intervention compared to before the intervention, and three participants demonstrated increased SE on the posttest survey. The remaining three participants had the same score both before and after the intervention (Figure 2). An item analysis for each statement on the GSE revealed that 9 of the 10 survey items received a response of 3 ("moderately true") or 4 ("exactly true") on both the pre- and posttest surveys; "moderately true" was the most frequently reported response for each

item both in the pretest and posttest. Although NP SE scores were lower on the posttest, analysis of these data found that this was not a statistically significant finding (W: 13, critical W: 5, $p < .05$).

Participant Feedback

Participant feedback was collected to assess the strengths and weaknesses of the intervention. All 11 participants either "strongly agreed" (54.5%) or "agreed" (45.5%) that the learning module was helpful to their practice. Subjects also "agreed" (54.5%) or "strongly agreed" (45.5%) that the module gave them a greater understanding of the most commonly seen and treated hematological malignancies in their work setting. Eight of the participants (72.3%) also "strongly agreed" that they learned something new about hematology. Seven NPs "strongly agreed" that the interventions should be integrated into the institution's orientation for incoming hematology NPs. Additionally, the free response question "What did you like about the module?" revealed that participants believed the module to be concise yet thorough, informative, and easy to follow. Suggestions for improving the module were also provided, and the following suggestions were of particular importance: adding content about other relevant hematology topics, first-line treatments for each condition, and information about hematopoietic cell transplant. In addition, three participants suggested that the module be presented either in person or with audio commentary on each slide to help enhance the learning experience.

DISCUSSION

Findings demonstrate that NP knowledge of hematological malignancies improved after completing the education module when compared to baseline data. Nurse practitioner SE scores after the module were about the same, suggesting that the NPs' perceived ability to practice in hematology was not impacted by the addition of an education intervention. It is unclear why NP SE was lower after receiving the intervention. The literature widely supports a positive relationship between nurse training and increased SE. Furthermore, a systematic review of NP SE with respect to job training indicated that no single method of learning was more effective in increasing NP SE (Abusubhiah et al., 2023). However, adverse workplace experiences among nurses, such

Table 1. Participant Demographics (n = 11)

Characteristics	No.	%
Sex		
Male	2	18.2
Female	9	81.2
Age		
Under 25 years	0	0
25–30 years	2	18.2
31–35 years	4	36.4
36 years or older	5	45.4
Length of time working in the hematology APP department		
Less than 3 months	5	45.4
3–6 months	2	18.2
7–12 months	2	18.2
13–18 months	2	18.2
Number of years of NP experience		
Less than 1 year	3	27.3
1–2 years	3	27.3
3–5 years	3	27.3
6–10 years	1	9.1
More than 10 years	1	9.1
History of NP experience in hematology		
Yes	1	9.1
No	10	90.9
If yes, how many years of experience? (n = 1)		
Less than 1 year	0	0
1-2 years	0	0
3-5 years	0	0
More than 5 years	1	100
History of RN experience in hematology		
Yes	7	63.6
No	4	36.4
If yes, how many years of experience? (n = 7)		
Less than 1 year	0	0
1-2 years	1	14.3
3-5 years	2	28.6
More than 5 years	4	57.1
NP certification specialty		
Family practice	6	54.6
Adult-gerontology	5	45.4
Other	0	0
Type of nursing degree		
MSN	10	90.9
DNP	1	9.1

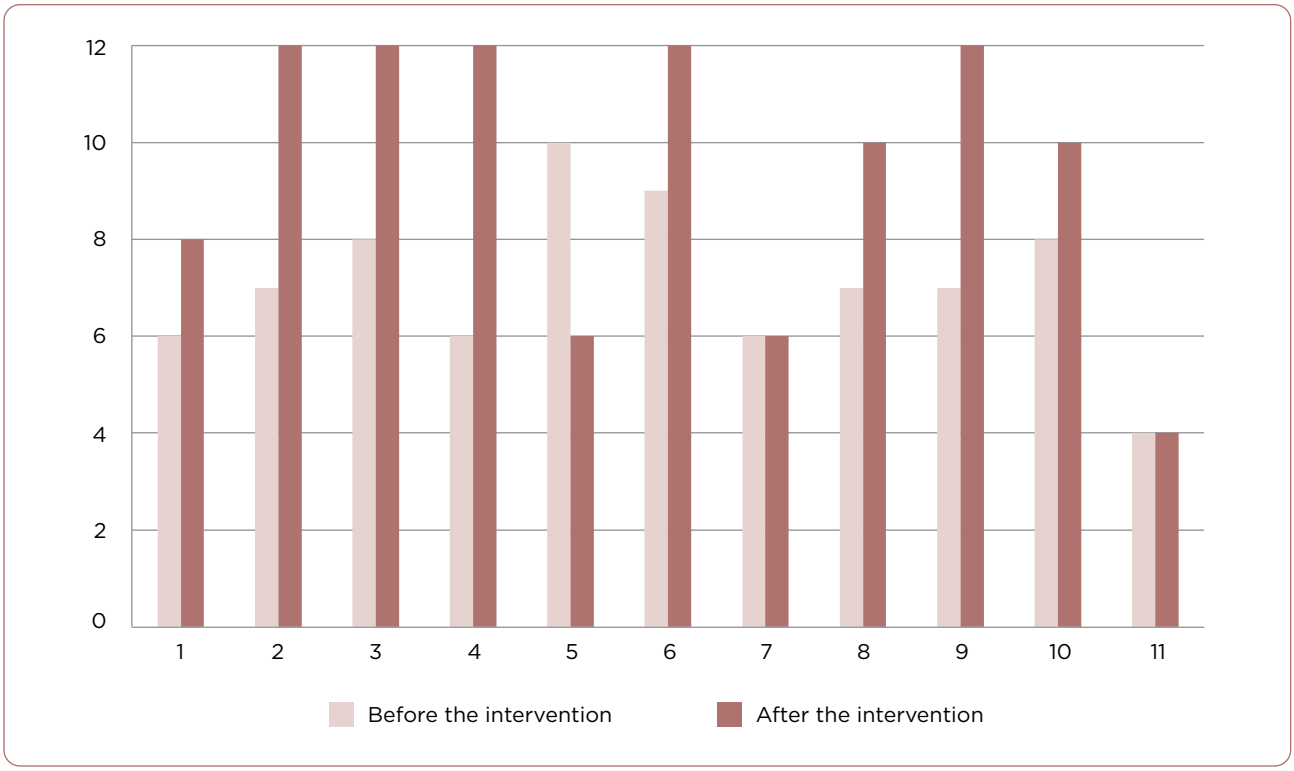

Figure 1. Participant knowledge scores before and after the intervention. Mean preintervention: 7.1, mean postintervention: 9.5.

as poor clinical placement and failure within one's job, may negatively affect SE. Moreover, alienation and challenging social interactions in the workplace can negatively impact nursing motivation to learn (Cox & Simpson, 2016). Therefore, it is possible that the perceived SE of NP subjects in this study may have been impacted by factors outside of the intervention. Despite this finding, participants found the learning module helpful and felt it would be helpful to integrate into orientation for incoming hematology NPs.

Limitations

There are several limitations to this study. Convenience sampling, for one, does not guarantee a diverse study population and can therefore threaten the external validity of the results to the general population. Participant retention was also an unforeseen challenge in this study that ultimately impacted the sample size used for data analysis. A single-group pretest and posttest design like the one used in this study can potentially affect the internal validity of results through lack of a control group and repeated testing rather than the intervention itself (Melnyk & Morrison-Beedy, 2019). As a result, it is difficult to confidently conclude there is a significant relationship between the variables being measured. There is also concern that each participant's work experience could have affected the results that were obtained. Four of the seven participants who had prior RN experience in hematology also had a perfect posttest score for knowledge; it is possible that the content provided in the intervention might not have been new to them, which may affect the validity of their pretest and posttest results.

Time constraints could have also contributed to the results obtained from this study. Participants were enrolled throughout the implementation period, which may have impacted the amount of time each individual had to review the intervention and take the posttests. Additionally, each subject's daily work schedule could have limited the time they had to review the module thoroughly, which may have impacted their learning and retention of the content. In the future, it would be ideal to present the module in person and measure both variables

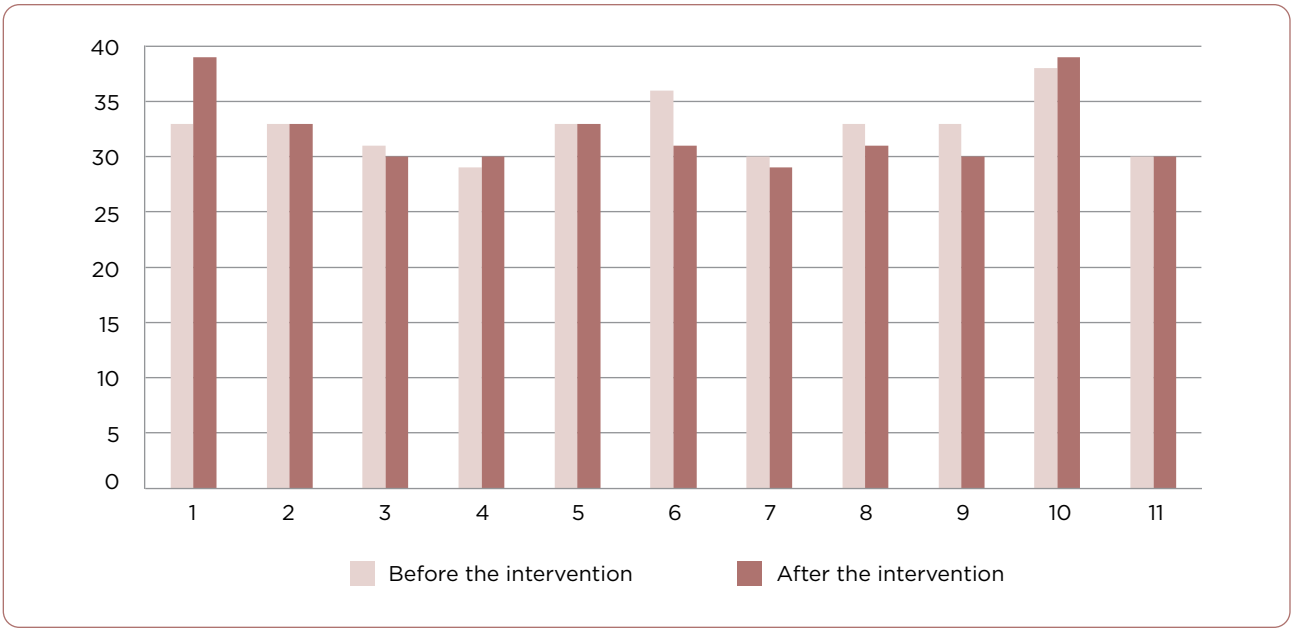

Figure 2. Participant self-efficacy scores before and after the intervention. Mean preintervention: 32.6, mean postintervention: 32.3.

immediately before and immediately after its completion. This would ensure that all subjects have ample time to complete the intervention and surveys, and improve the likelihood of capturing more accurate results. The short implementation window of this project also presents a limitation. Nurse practitioner SE was notably lower after receiving the intervention; additional time to investigate this finding in greater detail would be helpful so that the module may be optimized for future use. Lastly, content validation of the module and knowledge test by an education specialist is another consideration to help improve learning outcomes.

IMPLICATIONS FOR PRACTICE AND RECOMMENDATIONS

This study sought to evaluate the effectiveness of a hematology education module on hematology NP knowledge and SE to practice in the specialty. Increased knowledge scores after the intervention and their statistical significance prove that the module is capable of increasing knowledge and help establish the feasibility of adding a learning module to NP training. The literature supports that foundational hematology education provided during orientation improves nursing knowledge; employing a combined learning approach with online education, mentoring, and preceptorship modalities is proven to increase NP knowledge and SE (Martina et al., 2016; Hoffmann et al., 2018; Rambod et al., 2018). Furthermore, comprehensive training programs are recognized as facilitators of a favorable NP role transition experience and job satisfaction and are deemed an essential component of the NP role transition process itself (Bush & Lowery, 2016; Faraz, 2019; Urbanowicz, 2019).

The development of an extensive NP training program would be an ideal next step in preparing novice hematology NPs for practice. Key stakeholders in this study are developing and studying the impact of a comprehensive NP residency containing all of these elements, and plan to integrate this project's education module into the learning curriculum. Should the NP residency program prove successful, it would have positive implications for the NP and the institution, including increased NP job satisfaction and retention, a reduction in employee turnover, and reduced costs associated with hiring and training new employees that are incurred by the institution (Aufferman, 2020). An NP residency program would also provide opportunities for continued measurement of NP knowledge and SE over an extended period, which may be helpful since NP SE did not improve in this study.

CONCLUSION

Hematology is a challenging yet rewarding specialty in need of NPs. A need for more hematology education has been identified in the literature and within the hematology APP department at a local NCI-designated comprehensive cancer center. A hematology education module for hematology NPs was successful in increasing NP knowledge of hematology. Nurse practitioner SE was lower after completing the module, suggesting that it made NPs feel less confident with their knowledge of hematology. This finding is not yet clearly understood; additional time to investigate NP SE would be helpful to gain more insight. Still, the outcomes of this study create opportunities for future large-scale studies that can streamline hematology knowledge acquisition and improve SE for novice hematology NPs. Although this cannot completely close the knowledge gap that currently exists within the hematology specialty, it is a promising start with great potential to produce more competent and confident NPs. Integrating this module into onboarding practices may improve the role transition experience and job satisfaction of future NPs who are hired into the malignant hematology specialty.

Disclosure

The authors have no conflicts of interest to disclose.

References

Abusubhiah, M., Walshe, N., Creedon, R., Noonan, B., & Hegarty, J. (2023). Self-efficacy in the context of nursing education and transition to practice as a registered practitioner: A systematic review. *Nursing Open, 10*(10), 1–18. https://doi.org/10.1002/nop2.1931

American Cancer Society. (2024). Cancer Facts & Figures. https://www.cancer.org/content/dam/cancer-org/research/cancer-facts-and-statistics/annual-cancer-facts-and-figures/2024/2024-cancer-facts-and-figures-acs.pdf

Auffermann, K., O'Keefe, R., Smith, T., & Cohn, T. (2020). Exploring novice nurse practitioner job satisfaction. *Journal of the American Association of Nurse Practitioners, 33*(10), 802–810. https://doi.org/10.1097/JXX.0000000000000454

Baker, N. R., & Blakely, K. K. (2023). Unfolding case studies: Improving nurse practitioner students' self-efficacy. *The Journal for Nurse Practitioners, 19*(1), 104415. https://doi.org/10.1016/j.nurpra.2022.07.023

Benner, P. (2004). Using the Dreyfus Model of skill acquisition to describe and interpret skill acquisition and clinical judgment in nursing practice and education. *The Bulletin of Science, Technology & Society, 24*(3), 188–199. https://doi.org/10.1177/0270467604265061

Bush, C. T., & Lowery, B. (2016). Postgraduate nurse practitioner education: Impact on job satisfaction. *The Journal for Nurse Practitioners, 12*(4), 226–234. http://dx.doi.org/10.1016/j.nurpra.2015.11.018

Coombs, L. A., Noonan, K., Barber, F., Mackey, H., Peterson, M. E., Turner, T., & LeFebvre, K. B. (2020). Oncology Nurse Practitioner Competencies: Defining Best Practices in the Oncology Setting. *Clinical Journal of Oncology Nursing, 24*(3), 296–304. https://doi.org/10.1188/20.CJON.296-304

Cox, J., & Simpson, M. D. (2016). Exploring the link between self-efficacy, workplace learning and clinical practice. *Asia-Pacific Journal of Cooperative Education, 17*(3), 215–225.

Faraz, A. (2019). Facilitators and barriers to the novice nurse practitioner workforce transition in primary care. *Journal of the American Association of Nurse Practitioners, 31*(6), 364–370. https://doi.org/10.1097/JXX.0000000000000158

Hoffmann, R. L., Klein, S., Connolly, M., & Rosenzweig, M. Q. (2018). Oncology nurse practitioner web education resource (ONc-POWER): An evaluation of a web-enhanced education for nurse practitioners who are new to cancer care. *Journal of the Advanced Practitioner in Oncology, 9*(1), 27–37. https://pmc.ncbi.nlm.nih.gov/articles/PMC6296413/

Hwa, Y. L., Marshall, A. L., Shelly, J. L., Colborn, L. K., Nowakowski, G. S., & Lacy, M. Q. (2019). Assessment of the need for a hematology-specific fellowship curriculum for advanced practice providers using a needs-based survey. *Journal of Oncology Practice, 15*(7), e593–598. https://doi.org/10.1200/JOP.18.00697

Kramer, J. A., & Valente, C. P. (2020). Development of a hematology-oncology advanced practice provider fellowship program. *Journal of the Advanced Practitioner in Oncology, 4*(11), 407–410. https://doi.org/10.6004/jadpro.2020.11.4.7

Martina, K., Ghadimi, L., & Incekol, D. (2016). Development of a workshop for malignant hematology nursing education. *Clinical Journal of Oncology Nursing, 20*(1), 98–101. https://doi.org/10.1188/16.CJON.98-101

Melnyk, B. M., & Morrison-Beedy, D. (Eds.). (2019). Intervention research and evidence-based quality improvement (2nd ed.). Springer Publishing Company.

Rambod, M., Farkhondeh, S., & Khademian, Z. (2018). The impact of the preceptorship program on self-efficacy and learning outcomes in nursing students. *Iranian Journal of Nursing and Midwifery Research, 23*(6), 444–449. https://doi.org/10.4103/ijnmr.IJNMR.67.17

Rosenzweig, M., Giblin, J., Mickle, M., Morse, A., Sheehy, P., Sommer, V., & Bridging Gap Working Group. (2012). Bridging the gap: A descriptive study of knowledge and skill needs in the first year of oncology nurse practitioner practice. *Oncology Nursing Forum, 39*(2), 195–201. https://doi.org/10.1188/12.ONF.195-201

Schofield, D. L., & McComiskey, C. A. (2015). Postgraduate nurse practitioner critical care fellowship design, implementation, and outcomes at a tertiary medical center. *The Journal for Nurse Practitioners, 11*(3), e19–e26. https://doi.org/10.1016/j.nurpra.2014.11.001

Schwarzer, R. (2012). The general self-efficacy scale (GSE). http://userpage.fu-berlin.de/%7Ehealth/engscal.htm

Urbanowicz, J. (2019). APRN transition to practice: Program development tips. *The Nurse Practitioner, 44*(12), 50–55. https://doi.org/10.1097/01.NPR.0000605520.88939.d1