Doi: 10.32481/djph.2026.03.03

Pioneering the Nation's First Nursing Research Fellowship in Robotics and Innovation

Susan D. Smith, PhD, RN;[1] Kathryn Shady, PhD, RN;[2] Briana Abernathy, BSN, RN;[3] Morgan Tallo, BSN, RN[4]

1. ChristianaCare

2. Nemours Children's Hospital

3. ChristianaCare

4. Wilmington University

Abstract

Objective: Clinical nurse attrition from the bedside calls for innovative professional development strategies that diversify skills and support wellbeing and retention. To address this issue, the largest health system in Delaware implemented the nation's first Nursing Research Fellowship in Robotics and Innovation using external grant funding. **Programmatic Methods:** Following a competitive application pool, four bachelors-prepared clinical nurses were selected from two hospital campuses across four diverse practice areas. This eight-month, paid fellowship grounded in adult learning theory combined weekly didactic instruction with mentored, hands-on research in a structured, collaborative, and independent format. The nurse fellows serve as co-investigators on an IRB approved robotics study. Longitudinal pre-, mid-, and post-fellowship surveys assessed knowledge acquisition, program experience, and well-being. **Programmatic Results:** Nurse fellows demonstrated gains in research competencies and specialty areas that included protocol development, informatics, artificial intelligence, robotics, and techquity. All fellows reported increased job satisfaction, improved psychological wellbeing, enhanced professional confidence, and intent to remain at the bedside. Scholarly outcomes included multiple accepted national and regional conference abstracts, published commentary articles, and co-authorship of an original research manuscript. **Conclusions:** This novel fellowship effectively integrated research education, innovation, and paid protected time to strengthen clinical nurses' research capability, professional fulfillment, and retention to the bedside. This program offers a replicable model for advancing nursing workforce wellbeing through immersive, mentored research experiences.

Introduction and Background

Across the United States, thousands of nurses are leaving the bedside every day, and another 900,000 nurses are projected to leave the bedside by 2027.[1] These vacancies are leading to chronic staffing shortages,[2] workplace incivility,[3] and increased clinical workloads.[4] Healthcare systems are implementing strategies to combat these issues, leading to increased employment levels from 84% to 87.7%.[5] However, workforce challenges continue to persist, which creates an impetus for healthcare systems to trial new ideas that may improve nurses' resiliency and wellbeing.

Engaging in professional development and educational activities are known strategies to alleviate bedside nursing stressors.[6] Common professional development activities include specialty certifications, continuing education, hospital-specific clinical ladder advancement, and outside

education such as conferences.[7,8] In Magnet®-designated hospitals, clinical nurse involvement in research is a requirement to demonstrate a robust culture of clinical inquiry.[8,9] However, less than 1% of registered nurses are PhD-prepared,[10] which presents a significant barrier for clinical nurses to receive research mentorship.[11,12] Further, very few healthcare systems have nursing research fellowships and those in existence vary greatly in terms of length, focus, and scholarly outcomes.[13]

At the largest healthcare system in Delaware, a small cadre of PhD-prepared nurse scientists partner with clinical nurses to conduct research together. One such collaboration was in the robotics space when collaborative robots (cobots) were deployed to explore whether they could potentially offload non-clinical tasks from inpatient nurses. While the cobots are still in the early phase of innovation,[14] their presence created an extraordinary opportunity to develop a rich research learning experience for clinical nurses who could partner with a nurse scientist to inform and shape robotics research in the hospital setting.[15] This unprecedented opportunity led to the development and implementation of the nation's first "One of a kind, first of its kind" Nursing Research Fellowship in Robotics and Innovation that was recognized as a Magnet® exemplar in New Knowledge, Innovation, and Improvements. This fellowship was specifically designed to provide clinical nurses with foundational knowledge and skills to apply research and innovation at the intersection of nursing and robotics in healthcare. Outcomes from this unique fellowship could be replicated to create new learning pathways and professional development opportunities to strengthen the nursing workforce and to provide creative outlets beyond patient care responsibilities.

Programmatic Overview

Curriculum Development

Before commencing curriculum development, establishing the fellowship's mission, vision, and purpose (MVP) was essential to guide the process. This eight-month research and robotics program was grounded in andragogy learning principles, and the length of the fellowship was determined by the remaining period of performance using external grant funding. Each week of learning consisted of two hours of virtual didactic discussion about diverse research and innovation topics, and two hours of applied robotics research with the fellowship lead and principal investigator. Each nurse fellow contributed to the research as a co-investigator on an Institutional Review Board (IRB) approved robotics study.

The structured learning activities were independent, interactive, and mentored to achieve foundational competences in nursing research. The unique curriculum included 22 internal and external presenters discussing 36 different topics (Table 1). Core curriculum included foundational principles in conducting research, human subjects protection, mixed-methods approaches, theoretical frameworks, design thinking, informatics, techquity, robotics and artificial intelligence, innovation, survey design, descriptive statistics, writing workshops, abstract submissions, and grantsmanship. At the end of the program, the nurse fellows received continuing nursing education credits and a certificate of completion at their graduation.

Table 1. Overview of Didactic Learning Topics

Differences in Research, Evidence-	Overview of Research Process	Institutional Review Board	Protocol Development

Based Practice, and Practice Improvement			
Qualitative Research Approaches	Quantitative Research Approaches	Conceptualizing Research in Robotics	Theoretical Frameworks in Robotics and Innovation
Conducting a Literature Search	Robotics and Engineering	Exploration of Abstract Writing and Submissions	Descriptive Statistics
Nursing Innovation	Human Centered Design	Health Equity	Design Thinking Approaches
US Healthcare	Apply Techquity	Quantitative Research Approaches	Mixed Methods Designs
Applying AI to Curate Information	Evaluation Research Designs	Informatics Bootcamp	Survey Design
Implementation Science	Putting Evidence into Practice	Product Lifecycle	Natural Language Processing
Writing/Publication Bootcamp	Introduction to Grants and Budgeting 101	Human-Computer Interactions	Professional Development Initiatives

Fellowship Team Structure and Setting

The fellowship team was composed of two PhD-prepared nurses at the same health system and an experienced administrative coordinator. The fellowship lead was an experienced nurse scientist, robotics principal investigator, and primary education/research mentor dedicated to a nearly full-time effort in this role. The education specialist was a PhD clinical nurse who dedicated four hours a week for instructional learning and mentorship yet was always available to support the nurse fellows as needed. The fellowship coordinator dedicated up to eight hours of time each week to manage and provide administrative support, event coordination, and overall program organization.

Recruitment and Selection

After obtaining organizational and funder approvals, an open recruitment call was disseminated among all three hospital campuses for two weeks in June 2024. Targeted emails, word of mouth, and internal online announcements were shared to recruit a diverse pool of clinical nurse applicants. Recruitment was open to part-time or full-time bachelors-prepared registered nurses who would be committed to this paid learning experience for an extra four hours a week in addition to their clinical responsibilities. All applications (N=14) were screened for feasibility that included nurse manager approval before interviews were scheduled. After a competitive

interview process, four nurse fellows were selected from two hospital campuses, Newark and Cecil, and across four practice areas - cardiovascular critical care, case management, labor and delivery, and medical/surgical nursing.

Evaluation Plan

Data Collection Procedures

Because of the pioneering nature of this fellowship, a strategic evaluation plan was developed to assess programmatic success, opportunities, and obtainment of learning outcomes. Three longitudinal surveys were developed by the fellowship PhD nurses and administered via Microsoft Forms at specific periods of learning - before the fellowship started (baseline), mid-fellowship, and post-fellowship. All programmatic surveys employed a 1-4 Likert scale. The pre- and post-fellowship surveys were designed to elicit nurse fellows' feedback about their research competencies, programmatic and organizational value and satisfaction, and fellowship strengths and opportunities for growth. The pre-fellowship 52 question survey was administered in August 2024 and the post-fellowship 57 question survey was completed in May 2025. A mid-year check-in survey was administered in December 2024 and consisted of 39 questions focused on curriculum, value of the fellowship, programmatic alignment, and future improvement suggestions. The fellows also completed weekly presenter evaluations using a 1-5 Likert scale and open-ended questions.

Data Analysis

Quantitative survey data were descriptively analyzed using Microsoft Forms analysis. The open-ended survey results were manually reviewed and discussed among the fellowship team members (SS, KS, KP). The aggregated quantitative and qualitative results were shared with the nurse fellows to validate findings and discuss their additional feedback and insights. The fellows' scholarly dissemination was measured by type, frequency, audience, and acceptance.

Programmatic Results

The nurse fellows (N=4) were all bachelors-prepared females with a mean age of 35 with 4-10 years of nursing experience. Comparing the pre- and post-fellowship knowledge assessments, substantial knowledge acquisitions gains were made in understanding and applying the research process, such as conducting a literature search (pre -*M*=2.25, SD=0.5; post -*M*=3.25, SD=0.5), writing research questions (pre -*M*=2.25, SD=0.5; post -*M*=3.5, SD=0.57), evaluating theoretical frameworks (pre -*M*=2.25, SD=0.95; post -*M*=3.5, SD=0.57), building a study protocol (pre -*M*=1.5, SD=1; post -*M*=3, SD=0), submission to the Institutional Review Board (pre -*M*=2, SD=0.82; post -*M*=3.5, SD=0.57), and statistical analyses (pre -*M*=1.75, SD=0.5; post -*M*=3, SD=0).

The nurse fellows also demonstrated significant learning gains in specialty learning areas specific to this curriculum. Those areas included Human Centered Design (pre -*M*=2.25, SD=0.5; post -*M*=3.5, SD=0.57), nursing informatics (pre -*M*=2.75, SD=0.5; post -*M*=3.5, SD=0.57), artificial intelligence (pre -*M*=2.25, SD=0.57; post -*M*=3.5, SD=0.57), robotics (pre -*M*=2, SD=0; post -*M*=3.5, SD=0.57), and techquity (pre -*M*=1.5, SD=0.57; post -*M*=3.5, SD=0.57).

Doi: 10.32481/djph.2026.03.03

Pre- and post-fellowship open-ended responses centered on the meaning of the groundbreaking fellowship, how it served to advance the nursing profession, and programmatic topics. For example, one of the nurse fellows described the meaning of this fellowship in the pre-survey as "an opportunity to learn something new. It gives me the ability to gain knowledge that I can take anywhere with me. Knowing how to properly create and implement research as a nurse is important to improve our nursing care." After the program completed, a different nurse fellow responded to the same question: "This fellowship has profoundly reshaped my understanding of what it means to be a nurse. The experience has significantly influenced my career outlook and enhanced my confidence in engaging with leadership across the hospital system, an impact that will continue to shape my professional identity for years to come."

The mid-year survey evaluated programmatic development, investment in the nursing profession, and the fellows' well-being. Highlights from the programmatic updates revealed strong agreement (N=4) that the fellowship was organized (100%), the weekly structure provided an optimal learning environment (100%), the time commitment was manageable (100%), and lecture topics were relevant and could be applied to their practice areas (100%). In addition to programmatic updates, wellbeing questions were incorporated into the strategic evaluation plan. Because of the fellowship, the nurse fellows reported increased job satisfaction (100%) and improved psychological wellbeing (100%). The fellowship further facilitated a recommitment to the organization (100%), attainment of skills not typically available to clinical nurses (100%), desire to seek additional nursing research opportunities (100%), and intent to stay at the bedside (100%). All the nurse fellows noted they would recommend the fellowship to their peers (100%) and would like to stay connected to the fellowship after it ends (100%).

Mid-year free-text survey responses centered on programmatic strengths and opportunities. For example, one of the questions asked about biggest opportunities this fellowship offers and one nurse fellow responded, "Learning new skills in research to apply to individual practice, huge networking opportunities, promoting innovation and thinking outside the box which is not always possible when you are working on the floor in an assignment day to day and get caught up in your routine." One of the nurse fellows noted a future opportunity could, "expand to a 12-month program that layers in individual project ideas to create a launching pad to implement unit-specific or systemwide research projects."

Scholarly dissemination was a critical component of this fellowship. The fellows had dedicated mentors to practice and refine their writing skills throughout the eight-month learning period. Within that time, the fellows submitted five abstracts to national conferences in which three were accepted to prestigious conferences. Each fellow authored and published a commentary article that either related to their practice area or to the fellowship. After the nurse fellows completed the program, they co-authored an original research manuscript and had two additional abstracts accepted to regional conferences.

Discussion

These programmatic findings underscore the substantial influence the Nursing Research Fellowship in Robotics and Innovation had on the nurse fellows' career outlook and professional wellbeing. Engagement in research and scholarly learning played an essential role in their wellbeing by offering enriching didactic instruction and immersive research experiences. A distinctive strength of this fellowship was the protected time coupled with compensation made possible through external grant funding. Without dedicated funding and protected time, clinical

nurses face significant barriers to participating in research without overburdening their already demanding schedules.[13,16] This dedicated time contributed to their overwhelmingly positive reports of increased job satisfaction, improved psychological wellbeing, and desire to recommend this fellowship to peers.

The fellows demonstrated substantial growth on pre- and post-knowledge assessments, reflecting meaningful gains in understanding the research process. Being directly mentored by the Principal Investigator and serving as co-investigators on an IRB-approved, hospital-wide mixed-methods study translated didactic material to applied learning. This application process enhanced their confidence in applying clinical research principles to practice.

Professional development investments are critical to foster continual growth and fulfillment in a stressful work environment.[17] This fellowship supported meaningful career advancement, including networking with nursing leadership across the health system, engaging lectures and discussions with content experts, attendance at local and national conferences, and public speaking engagements. Producing multiple publications and presenting at several conferences confidently positioned them on professional pathways that many clinical nurses report feeling unprepared to pursue due to limited knowledge of the process.[18] Further, engaging in activities outside one's usual role, particularly those that promote learning and intellectual challenge, can renew energy and motivation for day-to-day responsibilities.[19]

A major professional development goal of the fellowship was to ensure that once the fellows mastered a specific concept or research process, they would be equipped to return to their practice areas to share with their colleagues. This goal fostered a shared model of learning that extended beyond the individual. An unexpected but important finding was the depth of interpersonal professional development and relationship-building that emerged within the first cohort. The small, intimate structure of the group created space for meaningful connections, which in turn encouraged fellows to support one another in pursuing broader organizational engagement. This included prompting peers to join systemwide professional governance councils they may not have previously known about, facilitating networking with leaders across units through shared connections, and initiating conversations about systemwide research projects.

Conclusions

This pioneering fellowship successfully integrated structured research education, professional networking, and conference and publication pathways with immersive, applied research experiences. This innovative educational program expanded the nurse fellows' research knowledge and skillsets through scholarly engagement that also impacted their well-being, and career satisfaction. The weekly paid, protected time model provided the learning space to strengthen research literacy, enhance professional confidence, increase job satisfaction and organizational commitment, and ultimately support nurses' intent to remain in the clinical setting. The program offers a replicable model for advancing nursing workforce wellbeing through immersive, mentored research experiences.

Dr. Smith may be contacted at Susan.Smith@christianacare.org

Acknowledgements

The authors would like to thank Kati Patel, MPH and ChristianaCare Leaders.

Funding

Funding for this fellowship includes funds from the American Nurses Foundation *Reimagining Nursing Initiative.*

References

1. National Council of State Boards of Nursing. (2023, Apr). *NCSBN research projects significant nursing workforce shortages and crisis.* https://www.ncsbn.org/news/ncsbn-research-projects-significant-nursing-workforce-shortages-and-crisis
2. Chen, Y. C., Wu, H. C., Ho, J. J., Cheng, N. Y., Guo, Y. L., & Shiao, J. S. (2025, May 24). Exploring the association between patient-nurse ratio and nurses' occupational stressors: A cross-sectional study. *Journal of Nursing Management, 2025*, 6160674. https://doi.org/10.1155/jonm/6160674 PubMed
3. Durmuş, A., Ünal, Ö., Türktemiz, H., & Öztürk, Y. E. (2024, December). The effect of nurses' perceived workplace incivility on their presenteeism and turnover intention: The mediating role of work stress and psychological resilience. *International Nursing Review*, *71*(4), 960–968. https://doi.org/10.1111/inr.12950 PubMed
4. Center for Disease Control [CDC]. (2024, December 3). *About workplace violence*. https://www.cdc.gov/niosh/violence/about/index.html
5. National Council of State Boards of Nursing [NCSBN]. (2025, April 17). *NCSBN research highlights small steps toward nursing workforce recovery; burnout and staffing challenges persist*. https://www.ncsbn.org/news/ncsbn-research-highlights-small-steps-toward-nursing-workforce-recovery-burnout-and-staffing-challenges-persist
6. Tallo, M., Smith, S., & Birkhoff. (2025, September 26). Bedside brain breaks: How stepping back into education can step healthcare forward. *Delaware Journal of Public Health, 11*(3), 96–97. https://doi.org/10.32481/djph.2025.09.18 PubMed
7. American Nurses Association. (n.d.). *Career and professional development.* https://www.nursingworld.org/resources/individual/
8. Drenkard, K. N. (2022, September 1). The business case for magnet ® designation: Using data to support strategy. *The Journal of Nursing Administration*, *52*(9), 452–461. https://doi.org/10.1097/NNA.0000000000001182 PubMed
9. American Nurses Credentialing Center. (2017, Oct 20). *Magnet model*. American Nurses Association. https://www.nursingworld.org/organizational-programs/magnet/magnet-model/
10. American Association of Colleges of Nursing. (2022, Jul 6). *Data spotlight: Trends in nursing PhD program*. https://www.aacnnursing.org/news-data/all-news/data-spotlight-trends-in-nursing-phd-programs
11. Connell, K., Yu, H., Hobensack, M., & Turi, E. (2026, January-February). Is the nursing PhD in terminal decline? The case for clinician-scientist pathways. *Nursing Outlook*, *74*(1), 102596; Advance online publication. https://doi.org/10.1016/j.outlook.2025.102596 PubMed
12. Halabicky, O. M., Scott, P. W., Carpio, J., & Porat-Dahlerbruch, J. (2024, November-December). Examining observed and forecasted nursing PhD enrollment and graduation

trends in the United States: Implications for the profession. *Journal of Professional Nursing*, *55*, 81–89. https://doi.org/10.1016/j.profnurs.2024.09.006 PubMed

13. Gannon, R. B., Jackman, K., & Rivera, R. R. (2025). Empowering clinical nurses in research: Evaluating the impact of a multisite fellowship program. *Nurse Leader*. https://doi.org/10.1016/j.mnl.2025.102640
14. Birkhoff, S. S., Merring, P., Spence, A., Bassett, W., & Roth, S. C. (2024, December 23). Integrating collaborative robots into a complex hospital setting: A qualitative descriptive study. *Delaware Journal of Public Health*, *10*(5), 20–27. 10.32481/djph.2024.12.05 PubMed
15. Christiana Care Health System. (2025). Smith, S.D., McPherson, S. Mascaro, P., & Anderson, B. (Eds). Charting nurse-led innovation. *ChristianaCare's blueprint for integrating collaborative robots into a hospital setting*. https://christianacare.org/us/en/for-health-professionals/nursing/nurse-led-innovation
16. Mulkey, M. A. (2021, May-June). 01). 01). Engaging bedside nurse in research and quality improvement. *Journal for Nurses in Professional Development*, *37*(3), 138–142. https://doi.org/10.1097/NND.0000000000000732 PubMed
17. Soper, K. (2022, June 1). Reducing burnout and promoting professional development in the palliative care service. *Journal of Hospice and Palliative Nursing : JHPN : the Official Journal of the Hospice and Palliative Nurses Association*, *24*(3), 181–185. https://doi.org/10.1097/NJH.0000000000000847 PubMed
18. Bellicoso, D., Valenzano, T. J., & Topolovec-Vranic, J. (2022, December). Effectiveness of a manuscript writing workshop on writing confidence amongst nursing and health disciplines clinicians. *Journal of Medical Imaging and Radiation Sciences*, *53*(4S), S79–S84. https://doi.org/10.1016/j.jmir.2022.06.002 PubMed
19. Pladdys, J. (2024, June 1). Mitigating workplace burnout through transformational leadership and employee participation in recovery experiences. *HCA Healthcare Journal of Medicine, 5*(3), 215–223. https://doi.org/10.36518/2689-0216.1783 PubMed