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Commentary

Nursing Undergraduate Students in Biomedical Research: a Promising Pathway for Increasing Nursing Scientists and Promoting Evidence-Based Practice

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Introduction

In this commentary, we share the successful experience of two young faculty researchers at a medical school who invited nursing undergraduate students to join their interdisciplinary biomedical research teams. Our objective is to motivate other biomedical and basic sciences researchers to prioritize mentoring nursing students when they have positions available in their laboratories.

San Juan Bautista School of Medicine (SJBSM) is an accredited academic center in Puerto Rico offering three graduate degrees: medicine, public health, and physician assistant, and one undergraduate degree in nursing. SJBSM has a Research Center and a Research Strategic Plan that promotes and facilitates extracurricular and interdisciplinary research. From 2018 to 2022, we mentored 13 undergraduate nursing students in diverse biomedical research areas to broaden their scope of nursing evidence-based practice and career choices. Our goal is consonant with the importance of advocating for the inclusion of nursing scientists in the clinical and translational research workforce [1-3]. This upcoming generation of nursing scientists needs new skills and experiences to be successful in teamwork to transform research findings into new knowledge applied to better health and health equity [4,5].

Interdisciplinary Extracurricular Biomedical Research in a Medical School

Nowadays, accrediting agencies for health professions-related education (e.g., nursing) encourage institutions to involve students in research, promoting learning by developing scientific knowledge, critical thinking, and the scientific basis for clinical care and practice [6-8]. Nurses also need a basic understanding of how evidence-based medicine is influenced by the research process. For these reasons, we have developed a novel extracurricular initiative that includes nursing students in biomedical research teams for at least one year. What could have been an overwhelming experience turned out to be very rewarding because of the creation of interdisciplinary teams with eager and enthusiastic students.

We have incorporated several strategies to promote our student's professional development. First, the mentor and the students meet to select the research schedule that works for both, and the students must be comfortable and committed to following it. Then, the mentor explains the correlation between basic sciences and biomedical research within health care. The second is to promote the students' independence to perform the experiments. This action challenges them to pay close attention and take notes during the training and discussion of the protocol of each experiment. Another strategy is to stimulate leadership

in them to train those new to the Laboratory. We facilitate the students shadowing the mentor while they tackle problems in experiments, and the mentor discusses their rationale for choosing that solution. In that way, the student could familiarize themselves with the research-related reasoning, and next time, the mentor can ask the student how to solve a similar problem. Other techniques to motivate reasoning and critical thinking are encouraging the students to ask questions, analyze and report the results of the experiments, discuss and support arguments to accomplish the research goals, and accept corrections. Furthermore, promoting a professional but friendly laboratory environment and learning to work as a good team player are essential.

Interdisciplinary Teams Opportunities

Integrating students from different disciplines create new approaches with diverse perspectives, resulting in an opportunity to produce well-trained professionals. This experience, in turn, will improve students' employment opportunities. To this end, we established a mentorship plan to assist and facilitate to track the progress of the students by the mentors. The students participated in monthly group meetings consisting of the study team directly involved in research projects. These meetings are devoted to issues directly related to study progress, data analysis, and review of current literature. These interdisciplinary group meetings foster the students' critical thinking. The nursing students presented at least once a year at group meetings. In addition, we established the SJBSM's Interdisciplinary Research Symposium, in which students and faculty presented their work. Students from the SJBSM research training program participated in this activity to accomplish two important tasks; 1) share the scientific findings with the community, and 2) stimulate interest in research as an essential complement to health education and better clinical care. These opportunities develop students' skills for successfully writing abstracts and oral and poster presentations under the guidance of mentors.

Biomedical Research Areas

Cancer Biology and Potential Therapeutics

Biotechnology and medicine have worked together in the past two decades to improve cancer prevention, diagnosis, and treatments. Currently, cancer treatments have evolved from different modalities (i.e., surgery, radiation, and chemotherapy) to a more specific and personalized rationale design (e.g., drug delivery systems nanoparticles and immunotherapies) [9]. Nurses in oncology settings must administer and instruct patients and caregivers on the science of traditional and novel cancer therapies to guide patients to make decisions based on evidence and ensure patient safety [10]. Because of nurses' integral role in this interprofessional oncology setting, understanding cancer biology and anticancer therapies must be included in the formation of nurses who plan to continue graduate studies. Based on this, a group of seven nursing students has had the experience of working on projects in biochemistry, nanobiotechnology, and molecular biology.

Delgado's Drug Design & Delivery (4D's) Laboratory focuses on developing synergistic therapeutic approaches using phytochemicals and drug delivery system nanoparticles against cancer. These students gained substantial experience in mammalian cell culturing and in vitro assays. These include viability and metabolic assays to determine mechanistic cell death induction and gene and protein expression. To accomplish these studies, they learned about the following techniques: UV/vis and fluorescence spectroscopy, real time-qPCR, dialysis, centrifugation, ultrasonication, flow cytometry, polyacrylamide electrophoresis, light, and fluorescence microscopy and freeze dryer lyophilization. Students also have the experience of presenting the results of their projects at local and national conferences.

Our most important outcomes from these seven students are that two are currently in biomedical graduate programs focused on cancer therapeutics and developing drug delivery systems nanoparticles. One is working as a clinical research coordinator, two are in clinical laboratories, one is in a hospital setting, and one will apply for Nursing Graduate Programs next year.

Neuroinflammation

There is particular interest in understanding inflammatory responses within the brain, and spinal cord, generally referred to as "neuroinflammation" [11]. Neuroinflammation causes and exacerbates neurological damage and contributes to existing pathology in many ways [12]. Nurses in neurology settings must care for patients with chronic and acute neurological diseases and help them during rehabilitation [13]. Nurses need a great understanding of the nervous system, prevention methods, and standard and novel treatment options to work with these patients. The Neuroinflammation Inostroza Lab centers on understanding the impact of signal transduction pathways regulating inflammation, specifically studying the role of microglia activation in neurodegenerative diseases and the mechanism of action of anti-inflammatory drugs in neurodegenerative diseases. Microglia and astrocytes are essential in the pathology of neurodegenerative diseases, such as Alzheimer's disease and Parkinson's disease. Compounds that can shift microglia from pro-inflammatory to anti-inflammatory states could be beneficial for neurodegenerative diseases.

The Neuroinflammation Inostroza Lab started operating in 2018 with medical and biomedical students. Three nursing students were incorporated in 2020 and worked in an interdisciplinary team

to study a new compound as an inhibitor of interferon-gamma-induced microglial activation. Currently, the second group of three nursing students is working on a project to study the effect of psychosocial stress and obesogenic diet on neuroinflammation. From this experience, six nursing students had worked on projects using human microglia, astrocytes, and neuron cell lines. The nursing students worked to identify mechanisms of new anti-inflammatory agents via inhibiting microglial activation, using viability and toxicity assays, and detecting cytokines and reactive oxygen species. Students learned molecular biology techniques such as cell culture, RNA extraction, qPCR, western blotting, ELISA, fluorescent spectroscopy, and flow cytometry. The students have presented in several scientific meetings, and we are working on a manuscript for publication.

Summary

Past and present nursing students positively perceived the SJBSM research training program and are grateful for all the knowledge and skills obtained. Some skills mentioned by the students are teamwork, organizational skills, working independently, self-taught, writing and oral communication skills, and leadership. Students gave feedback about their experiences: "this is an enriching experience letting me know the science behind disease treatments and how they are discovered"; "this experience gave me the technical skills that will help me in my future profession"; "The research training program helps me explore other alternatives inside health sciences. This experience showed me how to contribute to science to fight against disinformation and give better health care based on scientific evidence." Furthermore, the students loved the trips to present at national conferences due to the experience of interacting with different people from the scientific community and felt confident in explaining their projects.

Conclusion

Achieving this new generation of a research workforce, where physicians and nurses join other disciplines to advance translation, needs knowledge and skills implemented early in their training. Therefore, what we started as an extracurricular initiative for undergraduate nursing students has evolved until we developed an elective course called NUR 306 Biomedical Research for Nursing in the program curriculum to begin in 2023. We aim to continue creating experiences leading to interdisciplinary and collaborative contributions that can significantly advance and impact community health.

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References

1. Heitkemper M, McGrath B, Killien M, Jarrett M, Landis C, et al. (2008) The role of centers in fostering interdisciplinary research. Nurs Outlook 56: 115-122.e2.
2. Tingen MS, Burnett AH, Murchison RB, Zhu H (2009) The importance of nursing research. J Nurs Educ 48: 167-170.
3. Hastings CE, Fisher CA, McCabe MA, National Clinical Research Nursing Consortium, Alliso J, et al. (2012) Clinical research nursing: a critical resource in the national research enterprise. Nursing outlook 60:149-156.e1563.
4. Wright ML, Higgins M, Taylor JY, Hertzberg VS (2019) NuRsing Research in the 21st Century: R You Ready?. Biol Res Nurs 21: 114-120.
5. Zenk N (2022) The Role of Nursing Research in Achieving Health Equity. Retrieved December 1, 2022
6. The Essentials of Baccalaureate Education for Professional Nursing Practice. Retrieved December 1, 2022.
7. Kiyimba B, Atulinda L, Nalunkuma R, Asasira I, Kabunga J, et al. (2022) Research involvement among undergraduate health profession students in a resource-limited setting: awareness, attitude, motivators and barriers. BMC Med Educ 22: 249.
8. Erickson RA (2001) Why involve students in research? Retrieved December 1, 2022.
9. Jarrell DK, Drake S, Brown MA (2020) Advancing Therapies for Cancer-From Mustard Gas to CART. Sci 2: 90.
10. Rieger PT, Yarbro CH (2003) Role of the Oncology Nurse. Holland-Frei Cancer Medicine. 6th edition. Hamilton (ON): BC Decker 2003.
11. DiSabato DJ, Quan N, Godbout JP (2016) Neuroinflammation: the devil is in the details. J Neurochem 139: (Suppl 2): 136-153.
12. Lyman M, Lloyd DG, Ji X, Vizcaychipi MP, Ma D (2014) Neuroinflammation: the role and consequences. Neurosci Res 79: 1-12.
13. Hinkle JL, Alexander S, Avanecean D, Batten J, Bautista C, et al. (2022) Research Priority Setting: The Current Landscape of Neuroscience Nursing Research. J Neurosci Nurs 54: 55-60.