



North Dakota Nursing Research Collaborative

Simulation Use in North Dakota Nursing Programs

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Executive Summary

In 2023, UND recognized a need to bring North Dakota nursing clinical and academic partners together and create a more unified nursing voice in North Dakota and initiated the North Dakota Nursing Research Collaborative (NDNRC). The NDNRC completed its inaugural study in February 2024, focusing on the integration of simulation in nursing education within ND. The comprehensive survey encompassed data from 11 undergraduate and post-graduate nursing programs. Three institutions opted out of participation.

Nursing simulation provides opportunities for students to advance their hands-on skills, practice solving critical situations, and receive constructive feedback in a supportive learning environment. It has been a crucial part of ND nursing education since 2005. Simulation has become increasingly vital due to the limited nursing student clinical placement sites and availability across the state. Current evidence demonstrates that simulation can replace up to 50% of clinical hours while retaining both excellent educational and practice outcomes.

Primary findings for the 11 participating schools include:

Use of Simulation

- Nursing program simulation hours increased by 420% between 2017 – 2022.
- In ND, 73% of pre-licensure programs include simulation as part of total clinical hours, while 27% employ simulation as a substitute for clinical hours on an as-needed basis. Nationwide figures show 60.9% of pre-licensure programs use simulation as part of total clinical hours and 14.3% on an as-needed basis (Smiley, 2019).
- Limited clinical placements and evidence supporting simulation’s efficacy in replacing 50% of patient care hours drive the shift from clinical hours to simulation. Competition for clinical experience via direct patient care and insufficient nursing faculty numbers exacerbate this challenge.
- 73% of ND nursing institutions expressed a need for greater utilization of simulation in their programs, surpassing the national average of 61% (Smiley, 2019).

Barriers to the Increased Use of Simulation

- Compared to the national average of 11.90% (Smiley, 2019), an overwhelming 91% of ND nursing programs identified funding as the predominant barrier to increasing the use of simulation, followed by faculty training and workload.
- The initial purchase price of one high-fidelity simulator, such as the commonly used SimMan 3G from Laerdal, ranges from \$65,000-\$85,000. However, some more advanced, and highly realistic simulators can cost up to \$250,000 (Costiuc, 2021).
- Faculty training on simulator use and pedagogy can range from \$1000-\$2000 per faculty member initially, with continued annual renewal requirements.
- Few of the ND nursing schools can afford to allocate faculty workload to meet national standards for simulation education.
- Including simulation in faculty workload would significantly increase the number of overall faculty needed in ND nursing programs, in which faculty are already in shortage.

Cost of Simulation

- Despite increased simulation hours (420%) and increased student enrollment (22%), the budget allocated for simulation in the Nursing Education Consortium (NEC) has been reduced to \$1,320,073.00 since the 2011 biennium. That represents a 14% reduction in funding available through the NEC for simulation support since 2011.
- With current NEC funding, nearly 158,000 simulation hours are conducted across ND, amounting to a mere \$8.40 per simulation hour. Conversely, a national study found that 1-hour high-fidelity simulation could cost up to \$73.10 per student (Haerling, 2018).
- Most ND nursing programs spend well over their NEC allocation primarily to cover equipment, staff salaries, and supply costs.

- Nationwide, annual simulation program budgets range from \$85,000 to over \$360,000 (\$170,000-\$720,000 per biennium) (King, 2018; Isaranuwachai, et al, 2014; Bumbach, Culross, & Datta, 2022). If that number is used for reference, ND programs could require up to \$5,040,000.00 annually.
- Institutions are exceeding their biennial allocations from NEC prompting programs to seek external funding to meet essential simulation needs.
 - All participating programs indicated a need for an increase of, at least, \$80,000* per biennium to meet minimum expenses. This is a bare minimum request. It would not allow for any growth of simulation programs, cover unexpected repairs, or provide for adequate staff training.
 - Based on this data* for the 14 nursing institutions** to meet minimum expenses, the least possible increase to the biennial NEC budget is \$1,120,000.00.
- Expanding simulation programs to meet growing demand for nursing workforce will require a substantial influx of funding support above this amount.
 - Purely adjusting for inflation, the 2011-2013 NEC budget (\$1,607,270.00) would translate to approximately \$2,250,942.87 in 2024.
 - This inflation adjusted budget, with the minimal increase based on this study average of an additional \$80,000 per ND nursing institution, would equal an increased funding amount of \$3,370,942.87.

*Important to note the survey did not ask for exact dollar amounts from each program, rather a categorical amount. All institutions responded with the highest amount listed, thus actual needs may be significantly more than reported.

**Note that 11 schools responded to the survey. Costs for the non-responding schools were estimated based on responses from participating institutions.

Nationwide, there continues to be a decline in the readiness of nurses entering the workforce (Kavanagh, & Sharpnack, 2021). Healthcare is rapidly changing due to the pace of innovation and technology. Simulation use in nursing education needs to continue expanding to prepare an agile workforce adept at meeting needs of healthcare into the future.

Information in this Executive Summary has been provided to members of CUNEA representing the following schools:

Sitting Bull College
University of Jamestown
ND State College of Science
Dickinson State University
Williston State College
Bismarck State College
Lake Region State College
Dakota College at Bottineau
Mayville State University
University of North Dakota
North Dakota State University
Minot State University
University of Mary
Rasmussen College, Fargo

North Dakota Nursing Research Collaborative

The North Dakota Nursing Research Collaborative (NDNRC) unites nurses in clinical, academic, and leadership positions statewide. Our vision is to establish a standard of excellence in clinical education, cultivate high-quality, supportive practice environments for nurses, translate nursing research into practice, and ensure the comprehensive representation of nurses' voices.

Our mission entails conducting interprofessional research to showcase the value of the nursing workforce and improve healthcare outcomes. To achieve this mission, we outlined specific objectives, including bringing together academic, clinical, and organizational partners, developing integrated research teams, identifying areas of nursing research need, combining resources for optimal project design, and conducting collaborative research to enhance nursing outcomes.

North Dakota Nursing Education Consortium

Established during the 2007-2009 biennium, the North Dakota Nursing Education Consortium's (NEC) purpose is to provide simulation support to all non-profit nursing education programs in North Dakota, including publicly funded, private, and tribal programs. Members of the Consortium include the department or college of nursing at:

University of North Dakota (lead)
North Dakota State University
North Dakota State College of Science
Jamestown College
Mayville State University
Lake Region State College
Minot State University
University of Mary
Dickinson State University
Bismarck State College
Sitting Bull Community College
Dakota College- Bottineau
Williston State College

During the 2009-2011 biennium, the funding allocated \$500,000 to purchase simulation equipment for each program. Subsequently, funds have been provided to the NEC biennially to maintain and expand simulation programs. The 2011-2013 biennium saw over \$1.6 million allocated to the NEC. The most recent 2021-2023 funding was reduced to \$1.32 million and distributed among all NEC members. This report outlines the utilization of simulation within the programs, barriers encountered, and further assistance needed.

What is Simulation?

Simulation in healthcare education encompasses a diverse range of activities designed to replicate real-world clinical scenarios for educational purposes. Simulation is a dynamic educational strategy that utilizes various tools and techniques, including high-fidelity mannequins, virtual reality simulations, and standardized patient encounters (Roberts, Kaak, & Rolley, 2019). Through simulation, learners are provided with opportunities to practice clinical skills, apply theoretical knowledge, and develop critical thinking abilities in a safe and controlled environment.

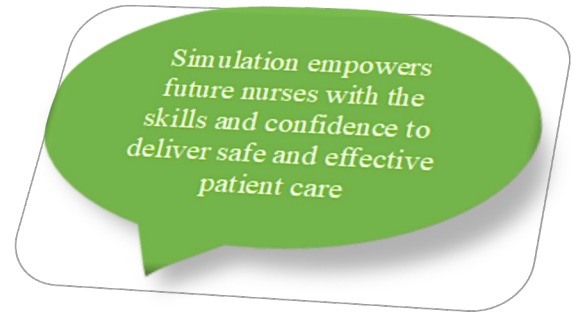
Simulation can take various forms, each offering unique benefits and applications in healthcare education. Smiley (2019) outlines different types of simulation, including task trainers for skill practice, partial task

trainers for specific procedures, and high-fidelity simulators for comprehensive scenario-based training. Additionally, virtual simulations and standardized patient encounters simulate realistic clinical environments and interpersonal interactions, respectively, further enriching the learning experiences.

The primary purpose of simulation in healthcare education is to bridge the gap between theory and practice by providing learners with hands-on experiential learning opportunities. Nye et al. (2019) emphasize the role of simulation in enhancing clinical skills, critical thinking, and decision-making among healthcare students. Simulation also serves as a means of assessing competency and readiness for clinical practice, allowing educators to evaluate learners' performance in simulated scenarios and provide targeted feedback for improvement.

Use of Simulation in Nursing

Over the past decade, simulation-based education has undergone significant evolution, driven by advancements in technology and pedagogical approaches. Widespread adoption of simulation has occurred across prelicensure nursing programs, highlighting its increasing sophistication and versatility (Smiley, 2019). High-fidelity simulators, virtual reality platforms, and computerized mannequins have enhanced the realism and effectiveness of simulation-based learning experiences, offering students immersive opportunities to practice clinical skills and decision-making.



The integration of simulation into nursing education has sparked a transformative shift, redefined traditional pedagogical approaches and enhanced learning outcomes for aspiring nurses. Historically, nursing education heavily relied on clinical experiences as the cornerstone of learning, providing students with hands-on opportunities to apply theoretical knowledge in real-world settings. However, the limitations inherent in clinical placements, including logistical constraints, variability in experiences, and safety concerns, have spurred educators to seek innovative alternatives, such as simulation-based education – a dynamic approach that leverages technology to recreate clinical scenarios in controlled environments. Moreover, the COVID-19 pandemic prompted educators to rethink traditional clinical placements, leading to an accelerated adoption of simulation as a safe and flexible alternative (Kaminski-Ozturk, & Martin, 2023). Simulation offers students a safe and standardized platform to practice clinical skills, foster critical thinking, decision-making, and teamwork – all essential competencies for nursing practice (Roberts, Kaak, and Rolley, 2019).

The use of simulation in nursing education represents a paradigm shift towards innovative, experiential learning approaches. As technology continues to advance and educational paradigms evolve, simulation will undoubtedly remain a cornerstone of nursing education empowering future nurses with the skills and confidence to deliver safe and effective patient care in an ever-changing healthcare landscape.

Assessment Procedure

This report is based on a survey conducted among nursing programs participating in the NEC. The tool, adapted from a nationwide survey by the National Council of State Boards of Nursing (NCSBN) (Smiley, 2019), was distributed to each nursing school in North Dakota through their respective College and University Nursing Education Administrators (CUNEA) representative. Surveys were completed by individuals within each school

most knowledgeable about their institution's simulation program, often a collaborative effort. Respondents addressed three main topics: utilization of simulation, barriers to its use, and associated costs. Responses were received from 11 out of 14 North Dakota nursing schools, yielding a response rate of 79%. For purposes of this simulation study, programs not leading to initial licensure were excluded, such as PhD, post-Master's Doctor of Nursing Practice (DNP), and non-Advanced Practice Registered Nurse (APRN) Master of Science (MS) programs. With the 11 responding schools, 23 programs were represented. This included 7 Licensed Practical Nurse (LPN), 5 associate degree RN (ADRN), 7 Bachelor of Science in Nursing (BSN), 1 MS, and 3 DNP programs.



Results

North Dakota touts 14 nursing schools, not uncommon for a rural state. Most highly rural states such as Wyoming, Montana, Idaho, and North Dakota have between 9 and 15 schools of nursing each. Urban states can have 50-100 or more. Evidence shows that nurses and other healthcare providers tend to stay near the schools or in the states from which they graduated. The importance of keeping ND nursing schools running and at full capacity is one of workforce necessity and growing our own. It is, therefore, imperative we put extensive effort and resources into all our nursing programs, as all are either rural, or rural serving.

A huge barrier to increasing enrollment in our nursing programs across the state is the difficulty in placing students for clinical practicum assignments. Often there are healthcare system, facility, or preceptor restrictions limiting the number of students, number of hours, or even the schools allowed to have placement opportunities. Nursing schools have had to be creative in finding clinical experiences in community settings and other situations due to these restrictions. However, students still need a well-rounded experience that includes a variety of specialties and levels of care.

Across the country, simulation has begun to replace some of the required clinical hours for pre-licensure nursing students. In fact, evidence has demonstrated that up to 50% of clinical hours can be replaced by simulation (Smiley, 2019). There are also, unfortunately, barriers to increasing use of simulation in nursing programs to replace clinical hours. These can include lack of access to a high-fidelity simulation center, lack of funds for supplies or equipment, or additional training needed for faculty and staff to incorporate simulation. This project was undertaken to understand the use of simulation in ND nursing schools.

Of the 14 ND nursing schools, 11 chose to participate in this study. There are nine public, one private not-for-profit, and one private for-profit school represented. These include seven schools in university or college settings and four community college settings. Five schools are in urban areas, three in large towns, one in a small town, and two in isolated rural areas, based on the U.S. Department of Agriculture RUCA coding system (USDA, 2019).

Table 1. Descriptive Information on ND Nursing Programs

	Programs	Graduates (2022)	Enrollees (23-24)	Clinical Hours*	Simulation Hours^ (2017)	Simulation Hours* (2022)
LPN	7	215	282	82168	5,774	15,949
ADRN	5	269	300	131436	5,070	31,284
BSN	7	576**	1294**	366971**	24,066**	101,005**
MS	1	210	305	126,000	0	3360
DNP	3	69***	193***	119,840***	2535***	5506***
Total	23	1338	2183	826,415	37,445	157,104

*clinical and sim hours determined based on each program's reported hours and number of students in 2022 grad cohort.

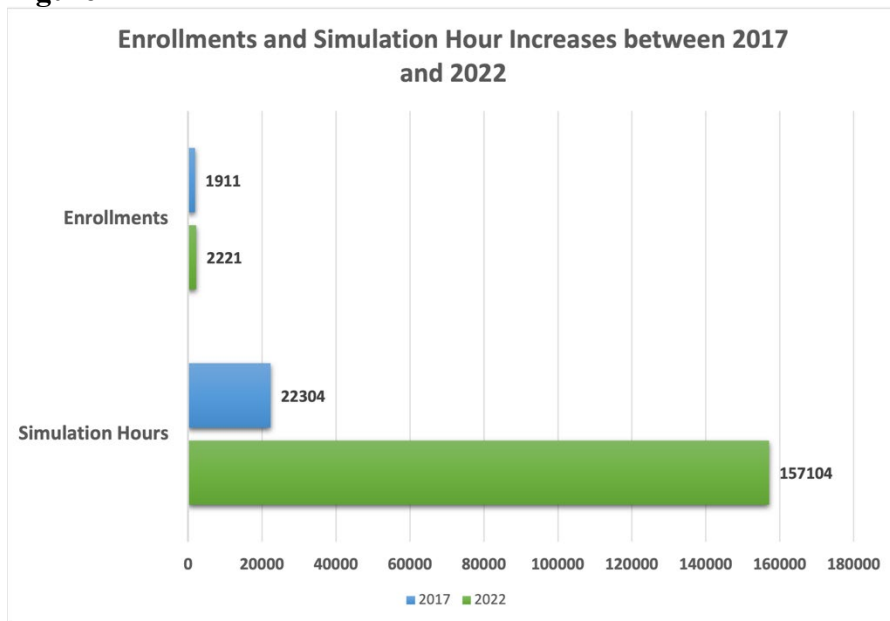
**includes BSN, RN-BSN, LPN-BSN, Accelerated BSN programs

***includes NP and CRNA DNP programs

^ sim hours determined based on each program's reported hours and number of students in 2017 grad cohort.

Table 1 delineates the number of programs, graduates, enrollees, and calculated clinical and simulation hours across the state. Simulation hours have increased by 420% between 2017 and 2022, while enrollments have only increased by 16% in that same timeframe as shown in Figure 1. This could indicate that schools need to rely on simulation to replace clinical practicum hours due to difficulties placing students in clinical facilities across the state. To further expand nursing programs to meet the state's needs, simulation needs to expand to accommodate lack of clinical sites.

Figure 1



Use of Simulation in ND Nursing Programs

Since 2017, prelicensure nursing programs in North Dakota (ND) have increased the substitution of direct patient care clinical hours with simulation by approximately 20%. This shift, primarily driven by a shortage of clinical sites and heightened competition for experiences among programs, is detailed in Table 2. Currently, approximately 75% of ND’s pre-licensure programs routinely use simulation as an alternative for clinical hours, while the remainder adopt this approach on an as-needed basis.

Table 2. Responses to “Why are you substituting clinical hours with simulation?”

	# of schools responding yes	%
Lack of clinical placement sites	9	82%
Evidence demonstrates simulation can successfully replace up to 50% of direct patient care clinical hours	9	82%
Competition with other health programs for clinical experiences	7	64%
Not enough faculty for direct patient care clinical oversight	3	27%
Costs for students/travel	1	9%

The rate of adoption in ND significantly surpasses the national average, where 60.9% of pre-licensure programs across the United States consistently utilize simulation, while 14.3% employ it contingently (Smiley, 2019). Evidence confirms the effectiveness of such strategies, demonstrating that educational outcomes remain comparable for students substituting up to 50% of their required direct patient care clinical hours with simulation (Roberts et al., 2019).

Regulatory frameworks reflect this shift. Thirty-eight states currently have regulations regarding the use of simulation in pre-licensure nursing programs (Smiley, 2021). More than half of these states permit up to 50% of clinical hours supplementation with simulation; an increase from one state in 2014 to twenty-two in 2021 (Smiley, 2021). In ND, the adoption levels vary among programs. Less than half of the surveyed pre-licensure

programs substitute up to 50% of direct patient care clinical hours with simulation. An equivalent number limit substitution to 30%, with one program allowing a substitution rate of 31-40%.

Notably, all RN* programs in ND utilize high-fidelity and computer-based simulation tools. The LPN programs universally employ high-fidelity simulation, with 75% also incorporating computer-based simulation. DNP programs, including Nurse Practitioners (NP) and Certified Registered Nurse Anesthetists (CRNA), predominantly use high-fidelity simulations; however, one DNP NP program also utilizes computer-based simulation. The MS NP programs employ computer-based and task trainer simulations.

The sentiment across ND nursing schools is largely in favor of increasing simulation usage, with 73% indicating a need for more incorporation. This perspective is slightly more prevalent than the national response, where 61.7% of schools believe they should be using more simulation, whereas 37.6% felt their implementation is adequate (Smiley, 2019). These insights reflect a growing recognition of simulation’s role in enhancing nursing education, adapting to the evolving demands and limitations of clinical training environments.

Barriers to Simulation Use/Increase

When queried to identify barriers to expanding simulation use within their programs, educational institutions provided the following responses:

Table 3. Barriers to Increasing Simulation Use in ND nursing programs

	ND Schools	Nationwide
	% Yes	% Yes
We have no barriers to increasing simulation use	0%	NA
Not enough faculty prepared at the appropriate academic level	18%	NA
Not enough space to accommodate expanded simulation use	36%	11.9%
Difficult to schedule additional time in the lab due to number of students/groups using lab	45%	23.2%
Not enough task trainers, supplies, standardized patient models	64%	NA
Not enough staff to run the simulation controls and oversee students	73%	33.8%
More faculty need training on scenario writing, debriefing, and facilitating simulations	82%	30.23%
Faculty workload does not include additional time for simulation (development, execution)	82%	20.6%
Not enough funding for additional equipment, space, faculty, staff, training	91%	11.9%

Nationwide data from Smiley, 2019

Educational institutions in North Dakota face many challenges in expanding simulation within their programs. A staggering 91% of respondents highlighted a critical lack of funding, affecting their ability to acquire additional equipment, expand facilities, and hire or train faculty and staff. Furthermore, the inadequacy of faculty workload allocation for simulation-related activities and the need for more comprehensive faculty training in scenario writing, debriefing, and facilitation were cited by 82% of the institutions.

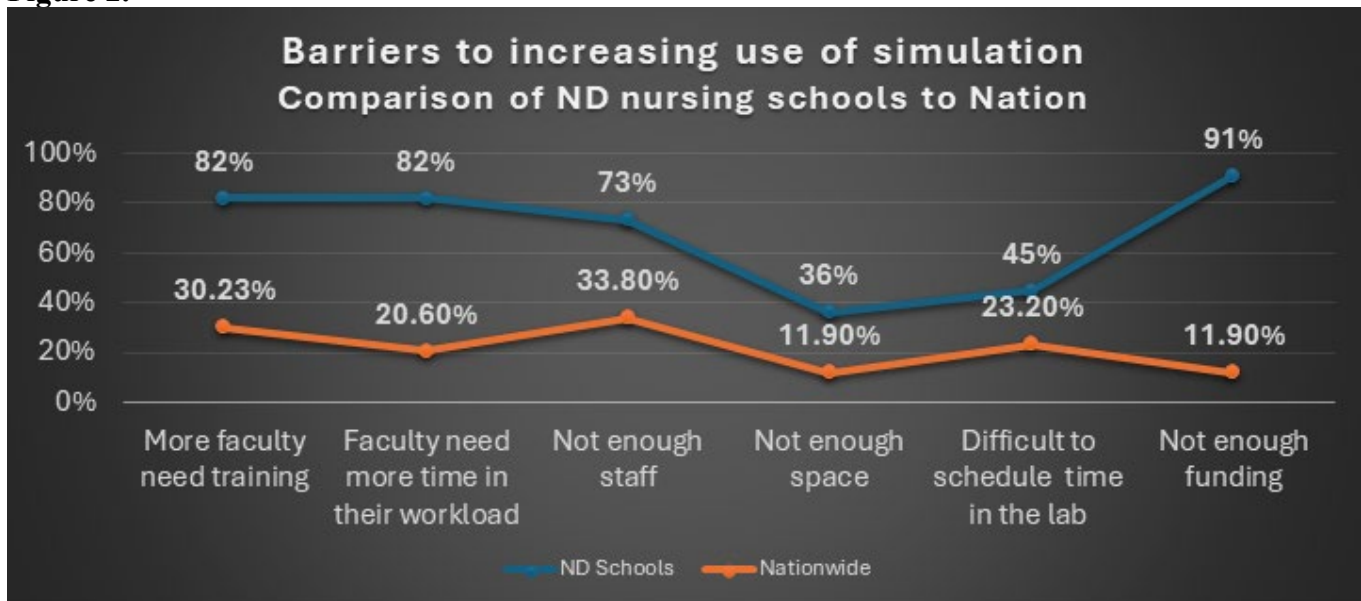
91% of ND Schools, compared to 11.9% of schools nationwide, state lack of funds is a barrier to increasing simulation use in their programs.

In addition, the survey uncovered that 73% of schools are hindered by a lack of staff to manage simulation controls and monitor student activities effectively. The availability of necessary simulation resources such as task trainers, supplies, and standardized patient models is another significant hurdle, with 64% of respondents indicating a shortage in this area.

Logistical issues complicate the implementation of simulation-based learning. Approximately 45% of schools reported difficulties scheduling additional lab time due to the high volume of students and groups needing access. Space constraints pose another significant barrier, with 36% of respondents expressing that they do not have adequate room to expand their simulation facilities. Lastly, 18% of the institutions indicated a lack of faculty with the requisite academic preparedness to effectively lead and expand simulation programs.

Nationwide, programs reported a substantial reduction in barriers to increasing simulation use between 2010 and 2017, with most obstacles decreasing by at least 50% (Smiley, 2019). In contrast, nursing schools in ND face significantly greater challenges compared to their national counterparts, as detailed in Table 3. A primary issue is the lack of funding, which could rectify several barriers should additional funding be available.

Figure 2.



Costs Associated with Simulation

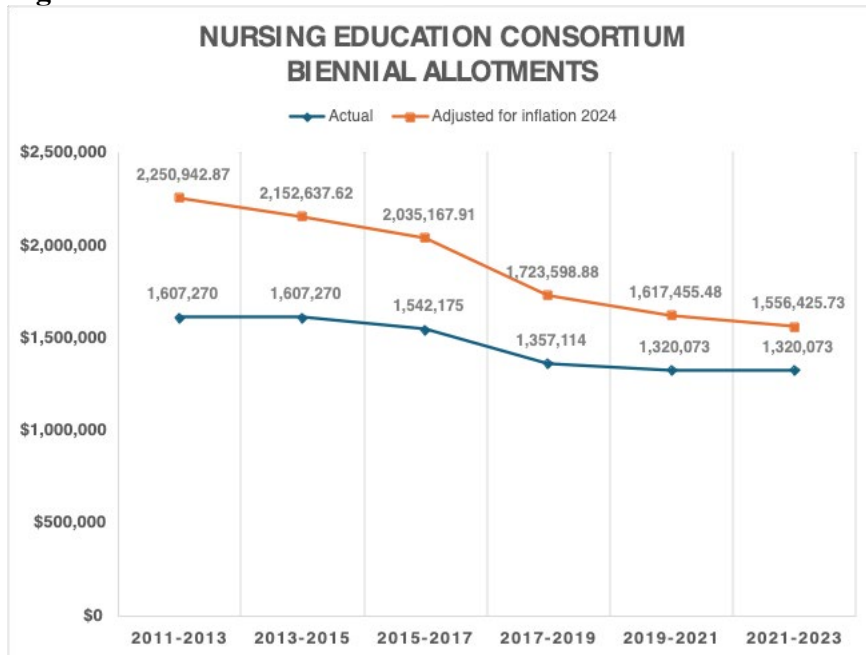
The costs associated with simulation programs in nursing education are substantial, encompassing the initial purchase, ongoing maintenance, training, supplies, and updates due to advancing technologies. High-fidelity simulators, such as the widely used SimMan 3G from Laerdal, typically have a lifespan of seven years, due to wear and technological advancements. The SimMan 3G purchase price ranges from \$65,000-\$85,000, while more advanced and realistic simulators can escalate to as much as \$250,000 (Costiuc, 2021).

Annual costs for one simulation program can range from \$85,000 to \$360,000.

In North Dakota, nursing schools identify their top three simulation-related expenses as equipment, salaries, and supplies, in that order. Approximately half of these institutions allocate up to 60% of their annual simulation budget to equipment. Salary expenditures vary, with up to 30% of the budget allocated in half of the schools, while the remaining half may allocate as much as 60%. Budgets for supplies are more modest, ranging from 10% to 40% of the total simulation budget.

From 2011 to 2013, the Nursing Education Consortium (NEC) operated with a budget of \$1,607,270.00. Adjusting for inflation, this amount would equate to approximately \$2,250,942.87 in 2024. Despite a significant increase in simulation hours by 420% and a 22% rise in student enrollment, the allocated budget for simulation within the NEC has decreased to \$1,320,073.00, representing a reduction of over 14% since the 2011 biennium.

Figure 3.



Currently, the NEC facilitates nearly 158,000 simulation hours across ND, which translates to a cost efficiency of approximately \$8.40 per simulation hour. This figure contrasts with national data, where the cost for one hour of high-fidelity simulation is estimated to be as high as \$73.10 per student (Haerling, 2018).

Most ND nursing programs spend well over their NEC allocation primarily to cover equipment, staff salaries, and supply costs. Nationwide, annual simulation program budgets range from \$85,000 to over \$360,000 (\$170,000-\$720,000 per biennium) (King, 2018; Isaranuwachai, et al, 2014; Bumbach, Culross, & Datta, 2022). If that number is used for reference, ND only programs could require up to \$5,040,000.00 annually.

Institutions are exceeding their biennial allocations from NEC prompting programs to seek external funding to meet essential simulation needs. All participating programs indicated a need for an increase of, at least, \$80,000* per biennium to meet minimum expenses. This is a bare minimum request. It would not allow for any growth of simulation programs, cover unexpected repairs, or provide for adequate staff training. Based on this data* for the 14 nursing institutions** to meet minimum expenses, the least possible increase to the biennial NEC budget is \$1,120,000.00.

Expanding simulation programs to meet growing demand for nursing workforce will require a substantial influx of funding support above this amount. Purely adjusting for inflation, the 2011-2013 NEC budget (\$1,607,270.00) would translate to approximately \$2,250,942.87 in 2024 (BLS, 2024). This inflation adjusted

budget, with the minimal increase based on this study average of an additional \$80,000 per ND nursing institution, would equal an increased funding amount of \$3,370,942.87.

*Important to note the survey did not ask for exact dollar amounts from each program, rather a categorical amount. All institutions responded with the highest amount listed, thus actual needs may be significantly more than reported.

**Note that 11 schools responded to the survey. Costs for the non-responding schools were estimated based on responses from participating institutions.



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