

# Rapid Health Care Improvement Science Curriculum Integration Across Programs in a School of Nursing

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*This article describes the systematic efforts undertaken by a school of nursing in the Northeastern United States to foster innovation in health professions education. We present an application of modified team coaching and plan-do-study-act improvement methods in an educational context to rapidly integrate a quality and safety curriculum across programs. We discuss applications in generalist, advanced practice, doctoral, residency, and advanced fellowship programs and provide examples of each.*

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Systems-based health care improvement approaches are currently used in many health care settings across the United States. This shift toward quality, value, and a focus on systems improvement has necessitated that nursing education programs incorporate health care improvement science competencies into standard education programs.<sup>1-4</sup> The Quality and Safety Education for Nurses (QSEN) Competencies<sup>5</sup> and American Association of Colleges of Nursing (AACN) Essentials Series<sup>6</sup> describe specific proficiencies for quality and safety education at undergraduate, master's, and doctoral levels of nursing education.

Health care quality and safety disciplines and the burgeoning new discipline of health care improvement science have their roots in business. Popular modern improvement

approaches commonly used in health care settings derive from these business approaches, including clinical micro-systems, Lean/Six Sigma, the Institute for Healthcare Improvement (IHI) Model for Improvement, and the Intermountain Healthcare model.<sup>7</sup>

There is a widespread understanding that quality and safety education is a critical aspect of health professions education and practice. However, health professions education institutions struggle with developing, implementing, integrating, and sustaining quality and safety curriculum. Time and resource constraints, competing demands, and lack of faculty with expertise in health care quality and safety are common barriers to progress. We describe an economical yet systematic approach, which has been successful in surmounting these barriers.

## Methods

Donabedian<sup>8</sup> asserts that key contributors to any outcome are the structures and processes inherent in a system. We focused on modifying the structure of the curriculum across programs in our school of nursing by integrating new applied learning activities in health care quality and safety within core nursing courses. This was done mindfully with respect to minimizing unintended disruptive effects to faculty practice, course objectives, and core curriculum and sensitivity to the ownership of the curriculum by course faculty. We used modified team coaching, a plan-do-study-act (PDSA) improvement approach, a diffusion of innovations perspective,<sup>9</sup> and a curriculum threads orientation to guide our work.

## Team Improvement Coaching

Godfrey and Oliver<sup>10</sup> described *team coaching* in health care quality improvement (QI) as a method of guidance to

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empower others to lead and improve. The goal of the coach is to develop improvement capability and eventually not be needed for support. In the team coaching approach, the coach functions to educate, guide, and facilitate rather than to dictate or lead. In our work, we adapted this approach to create the role of *consultant-liaison*, which was performed by a faculty member with a high level of expertise in improvement coaching and health care improvement methodology. The consultant-liaison worked with faculty innovators and early adapters to create applied learning activities in health care quality and safety and integrate them into existing core curriculum. Throughout the process, course faculty rather than the consultant-liaison maintained control and ownership of the curriculum, and curriculum changes could not be made if they increased credit burden or cost to students.

### Plan-Do-Study-Act Improvement Approach

The IHI Model for Improvement<sup>11</sup> is built on the PDSA cycle. We used the PDSA approach in our curriculum integration work to emphasize that the work was not “one-stop shopping” but rather was never done. Like health care improvement, it is sequential, iterative, and continuous. Course faculty and the consultant-liaison worked together to *plan* new curriculum innovations, *do* them, *study* them, and then to *act* on what was learned to redesign and redeploy a new plan for the next iteration. In the educational context, PDSA iterations occurred at 14-week (1 semester) intervals, a time frame that might be considered slow in health care improvement applications, but compared with traditional academic practices was quite rapid. With each successive iteration, the curriculum intervention was improved, and the core faculty gained greater confidence, skill, and ownership of the work. Conversely, over time reliance on the consultant-liaison decreased.

### Curriculum Threads

Because we did not create new required courses, we had to use an approach that could connect the applied learning activities that we embedded into core courses in a sequential manner. We used a *curriculum threads*<sup>12</sup> approach to link learning activities across courses and programs as part of a sequential trajectory with guidance from the AACN Essentials Series for quality and safety<sup>6</sup> for each stage. This produced a stepwise curriculum thread pathway (see Figure, Supplemental Digital Content 1, <http://links.lww.com/NE/A387>) that progressed from the generalist (RN) level to advanced practice (nurse practitioner [NP]) level, to the doctoral (DNP) level, and ultimately to postgraduate education opportunities including residencies for master’s level NPs and advanced fellowships for postdoctoral DNPs and nurse PhDs.

### Results

Over a 3-year period, we achieved curriculum innovation and integration of new content and applied learning activities in health care quality and safety in 8 nursing courses. We also created a new postgraduate residency program for NPs and affiliated with a postdoctoral fellowship program in health care quality and safety. Courses affected ranged across all 3 program levels in the school of nursing and were in a curriculum thread pathway leading toward postgraduate residency and fellowship opportunities. We achieved this

without requiring any changes in course objectives, the creation of any new required courses, and any additional investment in faculty cost beyond a portion of the faculty consultant-liaison workload. The next section and the Table provide examples of curriculum integration in each program.

### Accelerated BSN

We developed a semester-long learning experience in the accelerated BSN program embedded within the maternal-child nursing course. In this course, nursing students integrated knowledge about a clinical condition and specified population (eg, adults with diabetes) with knowledge of a clinical practice environment (eg, a primary care clinic in a specified city or town).

In the first half of the semester, the students were organized by clinical group, and each group selected a clinical practice issue from the current literature and developed a “Did You Know?” poster summarizing generalizable knowledge about the clinical issue. In the second half of the semester, the clinical group conducted a context assessment to understand the clinical practice itself (ie, the clinical microsystem, the smallest replicable unit of health care service delivery). The student groups then summarized their findings and proposed a PDSA improvement cycle. We observed that the students were able to develop fish bone diagrams and process flowcharts with minimal assistance. Based on this initial experience, we have further modified the program to include education of clinical instructors to act as coaches, the use of data standard collection work sheets to help with the context assessment, and sharing of findings with unit staff and management at the clinical sites involved.

### Pilot Implementation in the Accelerated Direct Entry Nursing Program

Biobehavioral principles and theories is one of the introductory core courses for direct entry MS degree students studying to become NPs. It is a 5-credit combined theory and clinical course that assists students at the prelicensure level to examine the interrelationship of biological, cultural, spiritual, physiological, and psychological domains from historical, philosophical, and scientific perspectives. The course coordinator worked with the consultant-liaison to pilot the integration of improvement science into the course. The curriculum consisted of an online learning platform called the Introduction to Quality and Safety (IQS) Learning Series. The IQS Learning Series consisted of 5 modules: (1) defining quality and safety, (2) introduction to QI, (3) introduction to clinical microsystems, (4) introduction to basic QI interventions, and (5) introduction to basic improvement measurement. Each module included a video lecture and associated learning materials and a premodule/postmodule quiz, which measured knowledge and student experience outcomes.

In the following semester, the students progressed to a medical surgical course. In that course, the students built on the IQS Learning Series from the previous semester and applied it to an assessment of actual clinical settings. The students formed clinical rotation groups and completed an applied context assessment of their clinical sites using the Microsystem Assessment Tool (MAT).<sup>13</sup> Students, clinical instructors, and clinical staff at each clinical rotation could participate in the MAT assessment, and each clinical group submitted

**Table. Curriculum Integration by Program Level**

Level	Course(s)	Framework and Skills Focus	Learning Activities
Accelerated BSN	Maternal-child nursing (1 semester)	Batalden formula for improvement	Evidence synthesis and 5P context assessment, PDSA cycles
Direct entry nursing—generalist level	Biobehavioral nursing process and skills (2 courses, 2 semesters)	Introduction to Quality and Safety Learning Series, IHI Open School (optional)	Microsystem Assessment Tool; simulation
Direct entry nursing—advanced practice level	Primary care I-III (3 courses, 3 semesters)	Batalden formula for improvement	System level improvement simulation over 3 semesters
DNP	<i>Outcomes Measurement</i> (1 course, 1 semester)	Dartmouth Microsystem Improvement ramp, IHI Model for Improvement, IHI Open School, Basic Statistical Process Control	Applied improvement assessment of a real-life setting, business case, data analytic plan
Graduate elective (interprofessional)	Informatics and applied QI (1 course, 1 semester)	Clinical Microsystems, LEAN/Six Sigma, Informatics	Unfolding case study; applied informatics, QI project
Postgraduate NP residency	VA Nursing Academic Clinical Partnership for Graduate Education (1 year)	Clinician-leader-improver applied residency curriculum	Applied improvement project in VA primary care setting
Postdoctoral advanced fellowship in health care quality and safety	VA National Quality Scholars (2-3 y)	Advanced methods—multiple perspectives; can specialize as educator, leader, researcher, or frontline improver	Applied improvement project, research project, service project, publications, grant writing

VA, Veterans Affairs; QI, quality improvement; IHI, Institute for Healthcare Improvement; PDSA, plan-do-study-act.

a MAT. Ultimately, a comprehensive MAT performance dashboard was created from aggregating all MAT results and shared back with the class and clinical sites as an example of performance assessment and benchmarking.

To enhance improvement science knowledge, some students used optional resources that were posted. For example, 1 student enrolled in the IHI Open School Basic Certificate program.<sup>14</sup> The students also commented that they were challenged with the amount of material presented in addition to their other work for this course, suggesting that some modifications may be needed for the next iteration. Based on our initial experience, we reduced the amount of IQS material presented to the students, dividing the material between 2 courses. Both courses eventually incorporated the MAT, IQS, and PDSA simulation activities.

### Team-Based Learning in Primary Care Core Courses Using Simulated Populations

The family NP faculty integrated education in QI across 3 primary care courses. The faculty chose Batalden's<sup>15</sup> formula for improvement using a simulation approach. In the first semester, the teams of students were assigned a simulated clinical population with a specific health problem and were tasked with completing a literature review and evidence synthesis. In the second semester, teams learned about the importance of context and completed a clinical microsystem assessment of a simulated "School of Nursing Health Center" that would be serving the same population studied in the first assignment.

In the third semester, the teams proposed a change idea and developed performance measures that were designed to incorporate evidence-based practice. The simulated data were provided before intervention and after a couple of PDSA cycles. The teams were tasked with analyzing the run charts to evaluate if their change idea resulted in an improvement. The students submitted and presented a data dashboard at the end of the semester, which summarized the 3 steps of the model.

In the third semester assignment of the first year, the teams were provided access to a QI coach to help them with the process. In the second year iteration of this multisection assignment, access to the coach was introduced in the second semester and is planned to continue through the third semester. Overall, this experience created an opportunity for students to work in improvement teams for a full year and engage in applied improvement work for a simulated clinic and population with the support of improvement coaching.

### Informatics and Applied QI Hybrid Elective

An Informatics and Applied Quality Improvement course was introduced as a graduate level elective to provide an enhanced learning opportunity for students who desired a QI experience beyond their regular course of study. The course was open to all matriculating students across degree programs as well as non-matriculating students external to the institution. The course used a published case study, which followed the progression of a large health system through a period of significant improvement. Students acted as a team in evaluating the successes and failures of various QI methods used by the health system and received real time feedback to the individually identified improvement opportunities within

the case study throughout the course. By the end of the semester, each student had demonstrated basic mastery of at least 1 QI method evidenced by a completed case study assignment.

### Doctor of Nursing Practice Outcomes Measurement Course

The outcomes measurement course provided a unique opportunity to execute course redesign and integrate the previously discussed principles of improvement science within a course where application of improvement measurement in actual improvement work was a major focus. In this course, the students conducted assessments and improvement interventions in their own clinical settings after the Dartmouth Microsystem Improvement curriculum.<sup>16</sup> We used a modified team coaching approach<sup>10</sup> to provide feedback for projects in which students applied work to real clinical contexts and populations. Teams submitted work demonstrating the application of each step of the microsystem improvement process: (1) assessment, (2) global and specific aims, (3) intervention (change ideas), (4) improvement measurement including statistical process control,<sup>17</sup> and (5) proposed improvement (PDSA) cycles. We used frequent faculty and coach debriefings to examine student progress and target course adjustments needed to enhance learning. The course culminated in a seminar style professional poster session during which student teams presented their work and findings in oral presentations with subsequent discussion with course faculty and invited faculty and students from the school of nursing.

### The Academy for Improvement Science: An Online Shared Information Environment

One of the critical success characteristics of high performing systems established by Nelson and colleagues<sup>18</sup> is a shared information environment. We emulated this in our educational innovation work by creating an online repository for our improvement curriculum work using the online learning platform used by the school of nursing. We created a new course in this environment called the *Academy for Improvement Science*. Curriculum materials, learning activities, examinations and evaluations, and supplementary information from all of our efforts across programs and courses were housed in this environment, creating easy access and sharing. Improvement-related scholarly works by students supervised by nursing faculty were also gathered in this area to create a record of scholarly work.

Additional sites devoted to residency and fellowship programs and faculty-driven improvement work were developed. The Academy for Improvement Science work also led to the development of a faculty writing and scholarship special interest group devoted to the study, publication, and other dissemination of this work. This article and other related work represents products of this group and served the dual purpose of continuing to develop faculty in this area by engaging them in its scholarship. This shared information environment helped to establish the groundwork for a learning community in health care improvement among the nursing faculty. It also created an opportunity for us to demonstrate performance in this area for regulatory and accreditation review purposes.

### Postgraduate Education: Residency and Fellowship Education

Even with a successful integration of quality and safety education in nursing education, professional nurses will have great difficulty succeeding as health care improvers without formalized opportunities to bridge their learning to practice.<sup>19-30</sup>

Recognizing this need in our setting, we strove to create residency and fellowship opportunities for nursing graduates, which could provide this bridge to practice and create advanced education opportunities for those aiming for careers in health care quality and safety.

### Veterans Affairs National Quality Scholars Fellowship

Established in the 1990s, the Department of Veterans Affairs National Quality Scholars (VAQS) program<sup>31</sup> is among the longest-standing and largest collaborative advanced education fellowships in health care quality and safety in the United States. Veterans Affairs National Quality Scholars was initially a fellowship only for physicians. However, through pioneering work by QSEN, the nursing profession joined VAQS in 2009, and the first wave of nursing fellows graduated in 2011. Since that time, there has been dramatic growth in nursing presence in VAQS, and today, it represents one of the only interprofessional advanced quality and safety fellowships in health care. Veterans Affairs National Quality Scholars consists of academic-clinical partnerships between veterans' affairs (VA) medical centers, schools of nursing, and schools of medicine. The program provides significant development, mentorship, and networking opportunities for fellows. The VAQS fellows can choose to specialize as educators, leaders, scholars, or frontline improvers (project managers, coaches, methodologists, etc), and predoctoral/postdoctoral nurses (DNP, PhD, or other doctoral degrees) are eligible for part- or full-time fellowships.<sup>31</sup> The fellows participate in applied learning and service activities at the VA medical center, our school of nursing, and collaboratively with other VA programs.

We established an affiliation with a VAQS site in the Northeastern United States, which included the appointment of a VAQS faculty nurse senior scholar at that site to our school. This affiliation dramatically increased VAQS recruitment, interest, and productivity of students in the DNP program in health care improvement domains and collaboration between VAQS and the school of nursing. There are currently 5 postdoctoral VAQS nursing fellows engaged in advanced education recruited from our school of nursing, who are among the highest composition of nursing fellows in the program at any regional VAQS site. This growth was achieved over 3 years.

### Nurse Practitioner Clinician-Leader-Improver Primary Care Residency Program

The Department of Veterans Affairs Office of Academic Affiliations administers the VA Nursing Academic Clinical Partnerships for Graduate Education (VANAP-GE) program<sup>32</sup> competitively to fund innovative academic-clinical partnerships between schools of nursing and VA medical centers. The program also offers funding opportunities for generalist and advanced practice nurses. The rural VA that we partnered with faced challenges of preparing and recruiting

skilled primary care NPs interested in serving the primary care needs of underserved veterans. Through a competitive application process, we obtained funding to establish a formal academic-clinical partnership between the 2 entities and create a developmental pathway for NP students interested in rural health VA careers. These students become part of a new VA Rural Health Scholars (VARHS) cohort within the school of nursing. The VARHS students complete clinical rotations at the rural VA medical center and then are eligible for a 1-year advanced residency program at the VA after graduation. The residency program provides a full-time trainee stipend and benefits and preference for hire after satisfactory residency completion.

The residency component of the program is designed to prepare clinician-leader-improvers and includes advanced seminars in health care improvement, leadership, and clinical topics. It also includes improvement coaching education and an applied improvement project targeting priority need areas in the VA medical center lead by VANAP-GE NP residents with coaching support from VAQS postdoctoral fellows. Currently, the first cohort of NP residents is matriculating, all of whom were VARHS participants at our school of nursing before graduation. The VANAP-GE program is a great example of mutually beneficial bridge linkages between a school of nursing, clinical partner VA, and postdoctoral VA fellowship program. The result of this program was the creation of 24 new clinical placement opportunities per year, 6 residency slots per year, and preparation of up to 6 new rural health VA-based NPs per year. These NPs can then lead and improve primary health care for rural and underserved veterans in the Northeast United States.

## Conclusion

Our work represents a rapid, coordinated, and systematic effort by our school of nursing to develop a sequenced curriculum pathway for the development of professional nurses in health care quality and safety at the undergraduate, graduate, doctoral, and postgraduate levels. We used a modified team coaching and PDSA improvement approach to support course faculty innovators and early adapters across programs to empower innovation and a curriculum threads method to create a sequential learning pathway. We tailored applied learning curricula to align with existing course context and learning objectives (rather than the other way around) and avoided the creation of new required courses (keeping credit burden and cost to students unchanged). We favored applied active learning curricula over passive didactic formats and linked “small bites” of curriculum nested in sequenced individual courses. Ultimately, we linked these to academic-clinical partnerships to extend reach beyond graduation and into practice. This approach can be considered in situations where rapid improvement curriculum innovation is required in resource constrained environments.

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