



FOSTERING FUTURE LEADERSHIP IN QUALITY AND SAFETY IN HEALTH CARE THROUGH SYSTEMS THINKING

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There is a critical need for leadership in quality and safety to reform today's disparate spectrum of health services to serve patients in complex health care environments. Nurse graduates of degree completion programs (registered nurse–bachelor of science in nursing [RN-BSN]) are poised for leadership due to their recent education and nursing practice experience. The authors propose that integration of systems thinking into RN-BSN curricula is essential for developing these much needed leadership skills. The purpose of this article is to introduce progressive teaching strategies to help nurse educators achieve the student competencies described in the second essential of the *BSN Essentials* document (American Association of Colleges of Nursing, 2009), linking them with the competencies in Quality and Safety Education for Nurses (QSEN; L. Cronenwett et al., 2007) using an author-created model for curricular design, the Systems-level Awareness Model. The Systems Thinking Tool (M. A. Dolansky & S. M. Moore, 2013) can be used to evaluate systems thinking in the RN-BSN curriculum. (Index words: Quality and safety; Systems thinking; RN-BSN education; QSEN) *J Prof Nurs* 32:15–24, 2016. © 2016 Elsevier Inc. All rights reserved.

Background

IN SPITE OF the enormous national effort to make improvements in today's health care system, most health care organizations have shown little progress in improving quality and safety (Clark, 2013). Although some improvements in hospital safety scores have been recently seen, 400,000 lives are lost annually to medical errors (Leapfrog Group, 2014). The need for nurses to

lead quality and safety in health care and to advance patient health care outcomes is exceedingly critical.

Registered nurses (RNs) who are returning to school for a baccalaureate degree in nursing (BSN) bring a multitude of experience, setting the stage for leadership in quality and safety in today's health care system. In particular, they are poised to lead changes in nursing practice through systems thinking.

In his landmark book, *The Fifth Discipline*, Peter Senge (2006) identified systems thinking as “a way of thinking about, and a language for describing and understanding the forces and interrelationships that shape the behavior of systems” (p. 69). Identified early in the literature regarding its application to the complexities in health care, systems thinking is the ability to recognize, understand, and synthesize the interactions and interdependencies in a set of components designed for a specific purpose (Batalden & Stolz, 1993; Deeming & Appleby, 2000).

Systems thinking helps nurses to see how to change systems more effectively and to act more in tune with the larger processes by having the potential to prevent errors in practice, improve delegation and priority setting, and enhance problem solving and quality improvement initiatives (Dolansky & Moore, 2013). The authors

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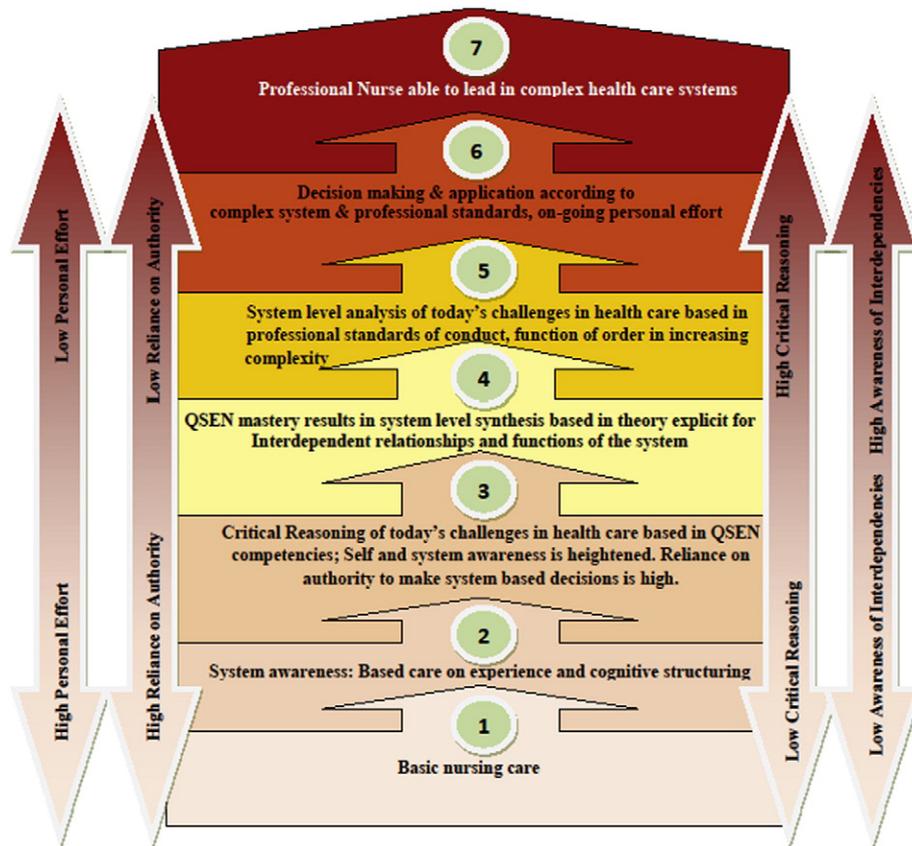


Figure 1. Process of increasing RN system level awareness.

propose that systems thinking is foundational to adoption, implementation, and evaluation of the BSN Essential II, Basic Organizational and Systems Leadership for Quality and Safety (American Association of Colleges of Nursing [AACN], 2009), and the Quality and Safety Education for Nurses (QSEN) competencies (Cronenwett et al., 2007), to educate RN-BSN students for leadership in quality and safety in health care because of their recent experience in clinical practice.

In addition, systems thinking includes the ability to recognize patterns and interactions (Case Western Reserve University, 2013). Pattern recognition at the systems level links the person's environment to his or her behavior (Oshry, 2007). In nursing practice, systems thinking allows the nurse to value and understand how the care of an individual patient is linked to health care system outcomes. For example, systems thinking moves a nurse from individualized care, turning a patient from side to side to avoid decubiti, to monitoring the pressure ulcer rate on the unit and comparing the unit rate to national benchmarks.

Consequently, a question that arises, in light of the profound influx of RNs returning for further higher education (Mancini, Ashwill, & CIPHER, 2013), is how can we teach systems thinking in the context of the BSN Essential II and the QSEN competencies? Would increasing systems thinking in RN-BSN education increase RN's knowledge, skills, and attitudes of quality and safety in health care? Can the adoption of systems

thinking in BSN completion program curricula assist the needed leadership to improve quality and safety in the clinical practice environment?

The purpose of this paper is to suggest teaching strategies for the integration of systems thinking, linking the BSN Essential II (AACN, 2009) and QSEN competencies (Cronenwett et al., 2007), in RN-BSN completion program curricula, to develop leadership in quality and safety in health care. The author-created Systems-level Awareness Model can be used to assist faculty in helping students to achieve competencies in quality and safety in complex health care systems. The Systems Thinking Scale (STS; Dolansky & Moore, 2013) can be used to evaluate systems thinking in RN-BSN students and graduates.

Educating RN-BSNs for Leadership, Using the BSN Essential II, QSEN Competencies, and the Systems-Level Awareness Model

According to the *BSN Essentials* (AACN, 2009), knowledge and skills of basic organizational and system leadership are vital for quality care and patient safety. In addition, the *BSN Essentials* specify that upon graduation, baccalaureate nurses should be prepared to practice with individuals, groups, and populations with increasing complexity across life spans and health care settings.

The authors propose RN-BSN leadership in health care systems results as a seven-phase process of learning to think and act at the systems level, as seen in the

Systems-level Awareness Model (Figure 1), created by the authors and based on the framework of Dolansky & Moore (2013). The full effect of safe and quality care can only be realized at the individual and systems levels. Thinking is defined, according to critical reasoning, as “a process whereby knowledge and experience are applied in considering multiple possibilities to achieve desired goals while considering the patient situation” (Benner, Sutphen, Leonard, & Day, 2010, p. 262).

In the Systems-level Awareness Model, action is determined by the system-based practice behaviors of personal effort, reliance on authority, critical reasoning, and awareness of interdependencies, which are continuums that change during the education process. Personal effort and reliance on authority are characterized inversely to critical reasoning and awareness of interdependencies, which is when a nurse thinks in terms of the health care system. For example, as education increases, so does critical reasoning and awareness of interdependencies, whereas personal effort and reliance on authority decrease. Systems thinking is divided into progressing phases as delineated by beginning (phases 1–3), intermediate (phases 4 and 5), and advanced (phases 6 and 7).

Phase 1 of the seven phase process of increasing RN system level awareness begins with ADN/diploma-prepared nurses who are licensed to provide basic nursing care. From their education and work experiences, they possess preexisting cognitions and meaningful awareness of health care systems. In phase 2, “System awareness: Based on experience and cognitive structuring,” they have built-in cognitive structures about the environments within which they work and the role they have within them. Phase 3, “Critical Reasoning of today's challenges in health care based in QSEN competencies, the nurse's self and system awareness is heightened.” Reliance on authority to make system-based decisions is high. A system-based curriculum, based on the *BSN Essential II*, can provide a mechanism for not only heightening system awareness but also allowing critically analyzing clinical situations. Self-awareness is crucial to heightening system awareness.

Phase 4 involves “QSEN mastery that results in system level synthesis based in theory explicit for interdependent relationships and functions of the system.” The knowledge, skills, and attitudes required for QSEN mastery provide a foundation for understanding not only the broad impact of nursing actions on patients and teams, information and evidence, but also the overall quality, safety, and function of the entire health care organization. As nursing education increases, RNs become progressively aware of their social duty to maintain safety because of the broad system level impact of nursing actions.

Phase 5, “System level analysis of today's challenges in health care based in professional standards of conduct, function of order in increasing complexity” represents that RNs begin to analyze the system according to the standards and recognize the complexity of the system. Baseline ethical decision making is substantiated by professional standards of conduct. Phase 6, “Decision making and application according to complex systems

and professional standards, on-going personal effort” signifies that as RNs adopt professional standards of conduct, they continue to give effort toward making safe, patient-centered decisions that respect team members. In addition, they apply best practice using technology and information that yield effective outcomes and that reduce negative impacts on the health care macro systems. The end result, Phase 7, is a “Professional nurse able to lead in complex health care systems.”

Curriculum rich in clinical relevancy for today's health care arena (e.g., affordable care act; accountable care organizations; bundling of services; aging society) allows for system-level analysis based on professional standards of care and conduct. The result is the understanding of increasing more complex system functions and nurses' professional responsibility within the system. Next, decision making and application of professional responsibilities increase with comprehending the magnitude and impact of nurse actions within complex health care systems. Ongoing personal effort toward quality improvement and safety occur. Finally, a professional nurse able to lead in complex health care systems evolves as a result of emergent systems thinking.

Examples of Teaching Strategies for Systems Thinking

To assist nursing programs with incorporation of QSEN competencies in their curricula, a multitude of teaching strategies have been developed to assist faculty in incorporating them, both at the baccalaureate and the graduate levels (Barton, Armstrong, Preheim, Gelmon, & Andrus, 2009; QSEN, 2014).

Using the Systems-level Awareness Model (Figure 1), RN-BSN completion programs can tailor learning experiences to meet the learning needs of students who have experience in working in health care, but have not necessarily had the opportunities to learn about incorporating systems thinking to lead quality and safety efforts in improving patient care outcomes. These principles can be adopted in beginning, intermediate, and advanced phases in clinical, classroom, online, and simulation learning environments. Examples of the assignments are described below and are linked with the *BSN Essentials II*, QSEN Competencies, teaching strategies, phases and levels of the Systems-level Awareness Model, proposed clinical outcomes, and student learning outcomes (Table 1).

Beginning-Level Assignments

The RN-BSN students will bring a wealth of information from their clinical experiences; however, they may not be thinking in terms of systems and application of improvements beyond their individual patients (phase 1). An assignment that links *BSN Essential II*, QSEN competencies, and system awareness (phase 2) may be a perfect place to start for the beginning RN-BSN student. For example, in Table 1 (phases 1–3, row 1), students apply the *BSN Essential II*, preparation 1: applies leadership concepts, skills, and decision making in the provision of high-quality nursing care, health care team

Table 1. Examples to Integrate Phases (1-3) of Systems Thinking

BSN Essential II preparation *	QSEN competency †	Teaching strategy	Assignment	Phase of Systems-level Awareness model phases	Proposed clinical outcomes	Student learning outcomes
Beginning level—phases 1–3						
1. Apply leadership concepts, skills, and decision making in the provision of high-quality nursing care, health care team coordination, and the oversight and accountability for care delivery in a variety of settings.	1. Patient-centered care 2. Teamwork and collaboration 3. Evidence-based practice (EBP) 4. Quality Improvement (QI) 5. Safety	Discussion boards, unfolding case studies, clinical practice assignment to survey staff knowledge and practice related to CHF	Examines self-knowledge, skills and feelings related to CHF Examines current evidence/practice guidelines for CHF Investigates how the health care facility advocates for patients with CHF	Phase 1: Identifies self-knowledge, skills and feelings related to CHF Phase 2: System awareness of CHF care and discharge policies Phase 3: Surveys team members about roles, responsibilities and policies	Aware of current practice guidelines specific to CHF care Aware of system variables Increased knowledge of gaps, barriers and policies specific to CHF	Evaluate theories and concepts from nursing and liberal education to provide improved holistic nursing care for CHF patients Determine team responsibilities in delivering patient centered CHF care Proposes improved care based on evidence and including entire team.
2. Demonstrate leadership and communication skills to effectively implement patient safety and quality improvement initiatives within the context of the interprofessional team.	1. Patient-centered care 2. Teamwork and collaboration 3. EBP	Clinical practice assignment presentations to nursing practice partners regarding end-of-life care	Examines self-knowledge, skills and feelings about end-of-life care Examines current evidence/practice guidelines for end-of-life care Investigates how the health care facility advocates for patients with end-of-life care	Phase 1: Identifies self-knowledge, skills and feelings related to end-of-life care Phase 2: System awareness of end-of-life care management Phase 3: Critical reasoning about best practice related to end-of-life care	Aware of current practice guidelines specific to end-of-life care Aware of system variables related to providing evidenced based end-of-life care Increased knowledge of gaps, barriers and policies related to end-of-life care	Evaluate theories and concepts from nursing and liberal education to provide improved holistic nursing care for end-of-life patients Determine team responsibilities in delivering end-of-life patient centered care Propose improved end-of-life care based on evidence and including entire team.
3. Demonstrate an awareness of complex organizational systems.	3. EBP	Clinical practice application exercise to examine use of evidence to improve practice in complex health care organizations.	Examines knowledge and feelings about health care facilities' policies and procedure to maintain best practice standards. Review policy manuals for specific nursing interventions. Identify reliable sources	Phase 1: Identifies self-knowledge and feelings related to current practice and settings where care is provided. Phase 2: System awareness of policies, procedures and how	Aware of current practice guidelines specific to agency policies and procedure maintaining best practice standards. Aware of system variables related to agency policies and	Able to explore current evidence using clinical reasoning in one's professional nursing practice

<p>4. Demonstrate a basic understanding of organizational structure, mission, vision, philosophy, and values.</p>	<p>1. Patient-centered care</p>	<p>Clinical practice exercise to investigate health care facilities' mission, vision, philosophy, and values and their impact on cancer patients' quality of life.</p>	<p>for locating evidence-based clinical and best practice guidelines Describe strength and relevance of evidence Appreciate need for continuous improvement in clinical practice based in evidence Surveys nurses' use policy manuals, their spirit of inquiry for questioning validity, skills set for identifying accurate evidence, the availability of resources with current knowledge, and the process for updating the manuals</p>	<p>best practice is identified Phase 3 Critical reasoning about how complex organizations develop and implement policies and procedures based on evidence</p>	<p>procedure maintaining best practice standards. Increased knowledge of gaps, barriers and policies related to health care agency policies and procedure to maintain best practice standards.</p>	<p>Evaluate theories and concepts from nursing and liberal education to provide improved holistic nursing care for cancer patients Determine team responsibilities in delivering patient-centered cancer care Proposes improved care based on evidence and including entire team.</p>
<p>Intermediate level—phases 4 and 5 5. Participate in quality and patient safety initiatives, recognizing</p>	<p>5. Safety</p>	<p>Discussion Board, unfolding case study, clinical practice</p>	<p>Explores system-wide gaps for threats to patient safety through</p>	<p>Phase 4: System level synthesis based in theory explicit for</p>	<p>Presents findings to multiple units, committees, team</p>	<p>Incorporate interdependent principles of quality and</p>

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Table I. (Continued)

BSN Essential II preparation *	QSEN competency †	Teaching strategy	Assignment	Phase of Systems-level Awareness model phases	Proposed clinical outcomes	Student learning outcomes
that these are complex issues, which involve individuals, families, groups, communities, populations, and other members of the health care team.		application exercise to identify, synthesize, and analyze patient safety initiatives based on nurse-sensitive indicators.	nurse-sensitive indicators such as preventing patient falls with injuries and pressure ulcer rates	interdependent relationships and functions of the system Phase 5: System level analysis of today's challenges in health care based in professional standards of conduct, function of order in increasing complexity	leaders and administrative personnel in scholarly format	safety in caring for patients, families, aggregates, members of the health care team and health care settings.
6. Apply concepts of quality and safety using structure, process, and outcome measures to identify clinical questions and describe the process of changing the current practice.	1. Patient-centered care 6. Informatics	Clinical practice exercise to determine systems involvement in improving improve medication compliance through technology.	Explores system-wide gaps related to medication knowledge, administration, medication documentation, patient education, compliance and patient outcome measures Seeks out intradepartmental and multidisciplinary perspectives on improving medication competency, safe administration and documentation of, patient education, compliance and patient outcome measures	Phase 4: System level synthesis based in theory explicit for interdependent relationships and functions of the system Phase 5: System level analysis of today's challenges in health care based in professional standards of conduct, function of order in increasing complexity	Presents findings and proposals to improve medication compliance through technology to multiple units, committees, team leaders and administrative personnel in scholarly format	Proposes opportunities for interdependent system innovations in information management and technology to improve delivery of quality patient care.
7. Promote factors that create a culture of safety and caring.	1. Patient-centered care 2. Teamwork and collaboration 3. EBP	Clinical practice assignment to survey and observe patients, staff, inter-professional teams and administration across multiple units and health care agencies	Investigates how the health care facility and systems manage isolation precautions in relation to patient satisfaction	Phase 4: System level synthesis based in theory explicit for interdependent relationships and functions of the system Phase 5: System level	Identifies knowledge gaps, skills deficits, barriers and interpretations related to isolation precautions and patient satisfaction Educates team on how	Analyzes principles of cultural sensitivity for patients in contact isolation, providing safe holistic, individual care. Proposes a change in practice to include

		regarding contact isolation precautions and patient satisfaction		analysis of today's challenges in health care based in professional standards of conduct, function of order in increasing complexity	increased patient satisfaction on HCAHPS scores with improved patient outcomes related to safety and caring	hourly rounding of isolation patients to increase patient satisfaction.
8. Promote achievement of safe and quality outcomes of care for diverse populations.	1. Patient-centered care 2. Teamwork and collaboration 3. EBP 4.QI 5. Safety	Discussion boards, unfolding case studies, clinical practice assignment to survey patients, staff, inter-professional teams and administration to propose a pet therapy program for diverse patient populations to improve quality of life	Develops a policy and procedure manual for pet therapy program Develops metrics for determining program success	Phase 4: System level synthesis based in theory explicit for interdependent relationships and functions of the system Phase 5: System level analysis of today's challenges in health care based in professional standards of conduct, function of order in increasing complexity	Develops policies and procedures manuals for a pet therapy program Develops benchmarks to determine success	Propose a pet therapy program to improve quality of care for diverse patient populations. Evaluate the impact of pet therapy program on diverse patients' quality of life.
Advanced level—phases 6 and 7						
9. Apply QI processes to effectively implement patient safety initiatives and monitor performance measures, including nurse-sensitive indicators in the microsystem of care	2. Teamwork and collaboration 4. QI	Classroom or online assignments to implement a QI project related to nurse-sensitive indicators.	Implement a QI project using nurse-sensitive indicators, i.e., preventing nosocomial infections with interprofessional teams to be presented to peers	Phase 6: Decision making and application according to complex system and professional standards, on-going personal effort Phase 7: Professional nurse able to lead in complex health care systems	System-wide adoption of QI project to enhance inter-professional collaborations in order to prevent nosocomial infections	Apply principles of leadership, QI, and safety necessary to provide high-quality inter-professional care in complex systems related to nurse-sensitive indicators.
10. Use improvement methods, based on data from outcomes of care processes, to design and test changes to continuously improve the quality and safety of health care.	5. Safety 6.Informatics	Clinical practice assignment to address technology gaps in medication alert overrides	Participate in the development and implementation of creative strategies to address system medication alert overrides. Coordinates meetings with risk management and information technology (IT) teams.	Phase 6: Decision making and application according to complex system and professional standards, on-going personal effort Phase 7: Professional nurse able to lead in complex health care systems	Participate in the development and implementation of creative strategies to address system medication alert overrides. Coordinates meetings with risk management and IT teams.	Applies leadership principles to enhance knowledge and skills of information management and patient care technology for the delivery of quality nursing care across complex systems

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Table I. (Continued)

BSN Essential II preparation *	QSEN competency †	Teaching strategy	Assignment	Phase of Systems-level Awareness model phases	Proposed clinical outcomes	Student learning outcomes
11. Employ principles of quality improvement, health care policy, and cost-effectiveness to assist in the development and initiation of effective plans for the microsystem and/or system-wide practice improvement that will improve the quality of health care delivery.	4. QI 5. Safety	Clinical practice assignment to evaluate errors and sentinel events through quality improvement data.	Works with interprofessional teams to employ Deming's (2015) Plan, Do, Study, Act (PDSA) model using data to reduce errors and/or sentinel events resulting in cost savings to patients and the health care facility	Phase 6: Decision making and application according to complex system and professional standards, on-going personal effort Phase 7: Professional nurse able to lead in complex health care systems	Recommends cost-effective changes in unsafe practices using PDSA approach	Apply principles of leadership, quality improvement, and safety necessary to provide high-quality health care in complex systems Integrate current evidence using clinical reasoning in one's professional nursing practice
12. Participate in the development and implementation of imaginative and creative strategies to enable systems to change	5. Safety 6. Informatics	Clinical practice assignment to implement a student-created low/high fidelity or on-line simulation to increase error reporting and a culture of safety, using health care technology and inter-professional teams	Simulations are presented to peers and health care partners for consideration at the decision-making level.	Phase 6: Decision making and application according to complex system and professional standards, on-going personal effort Phase 7: Professional nurse able to lead in complex health care systems	Adoption of simulation scenarios by schools of nursing and/or health care facilities to use role-playing to make changes in practice at the decision-making level	Apply principles of leadership, QI, and safety necessary to provide high-quality health care in complex systems. Demonstrate effective communication skills through interprofessional collaboration to make changes in complex systems to promote safe, quality care.

* AACN (2009).

† Cronenwett et al. (2007).

coordination, and the oversight and accountability for care delivery in a variety of settings. The QSEN competencies 1–4 (patient-centered care, teamwork and collaboration, evidence-based practice, quality improvement, and safety) are integrated into the assignment using a number of teaching strategies. These strategies include a clinical practice assignment to survey of interprofessional staff knowledge and practice regarding congestive heart failure (CHF), discussion boards, and unfolding case studies. In the assignment, the students first examine self-knowledge, skills and feelings related to (CHF) patients. They then examine current practice and evidence for guidelines in treating CHF and investigate how the health care facility advocates for patients with CHF. The first three phases of the Systems-level Awareness Model are included in the assignment: phase 1: identifies self-knowledge, skills and feelings related to CHF; phase 2: system awareness of CHF care and discharge policies; phase 3: surveys team members about roles, responsibilities, and policies. In the fifth column of the first row, proposed patient outcomes are described, whereby students become (a) aware of current practice guidelines specific to CHF care, (b) aware of system variables, and (c) increasingly knowledgeable of gaps in the literature, barriers to evidence-based practice, and treatment policies related to CHF. In the final column are the actual student learning outcomes, which include (a) the ability to evaluate theories and concepts related to CHF, (b) determine team responsibilities in caring for CHF patients, and (c) propose improved care based on evidence including the entire health care team.

Intermediate-Level Assignments

In the classroom or online, RN-BSN students have the opportunity to work in teams (Benner et al., 2010), where they can benefit from peer learning. As seen in row 7, intermediate-level students can apply the *BSN Essential II*, preparation 7: promote factors that create a culture of safety and caring. The assignment integrates *BSN Essential II*, preparation 7 with the QSEN competencies 1–3: patient-centered care, teamwork and collaboration, and evidence-based practice with system synthesis (phase 4) and system level analysis (phase 5) of the Systems-level Awareness Model. The students have a clinical practice assignment whereby they work in teams to investigate how health care facilities manage isolation precautions and patient satisfaction. The teaching strategies include both a survey regarding isolation precautions and patient satisfaction, in addition to observations of patients, staff, interdisciplinary teams, and administration across multiple units and health care facilities. Clinical outcomes include (a) identifying knowledge gaps, skills, deficits, and interpretations related to isolation precautions and patient satisfactions; (b) presenting findings to multiple units, committees, team leaders and administrative personnel in a scholarly format; and (c) educating teams on how to increase patient satisfaction on the survey, Hospital Consumer Assessment of Healthcare Providers and Systems

(HCAHPS). The student learning outcome includes being able to analyze principles of cultural sensitivity to patients in contact isolation, providing safe, holistic, and individualized care.

Advanced-Level Assignments

Either face-to-face or online simulation environments provide interactive learning experiences for students to apply real-life situations in a safe environment. In row 12, an assignment allows students to work with their classmates or health care colleagues to create their own simulation by combining the BSN II preparation 12, participate in the development and implementation of imaginative and creative strategies to enable systems to change. It is combined with the QSEN competencies of safety (QSEN competency #5) and informatics (QSEN competency #6) to the Systems-level Awareness Model of decision making and application (phase 6), professional nurse is able to lead in complex health care systems. The assignment allows advanced students, based on their work experiences, to create their own simulations either in the simulation lab or online in software such as Second Life. The assignment would give them the opportunity to create a scenario whereby medication errors can be prevented through the use of the electronic health record. This project can be presented to the class (classroom or online) and/or health care facility to prevent medication errors through systematic use and application of informatics and the electronic health record. The end product would be a simulation that can be used in face-to-face academic or hospital simulation labs or online software, whereby role-playing occurs to make changes in practice at the decision-making level to make improvements in patient outcomes. The student learning outcomes show that they (a) apply principles of leadership, quality improvement, and safety necessary to provide high-quality health care in complex systems, and (b) integrate current evidence for preventing medication errors using the electronic health record, thus using clinical reasoning in one's professional nursing practice.

Evaluation of QSEN Competencies in the RN-BSN Curricula

A method of evaluating RN-BSN student's knowledge of system thinking can be accomplished through the use of the STS. Psychometric testing of the STS was conducted by Dolansky & Moore (2013), as described below. The STS consists of 20 items that measure health care provider's perception of system interdependencies. The questions in the STS have a 5-point Likert scale that ranges from *never* to *most of the time*. Reliability and validity of the instrument were established. Test-retest reliability assessment ($n = 36$) provided a correlation of .74, indicating stability of the STS and a strong positive trend. This correlation is reinforced by a reasonable period of greater than 2 weeks between testings (DeVon et al., 2007). The internal consistency testing ($n = 342$) using Cronbach's alpha had a coefficient of .89 indicating adequate reliability (Nunnally & Bernstein, 1994).

Discriminate validity was tested with three groups of health care professions students ($n = 102$) who received high, low, or no dose levels of systems thinking education related to process improvement. There were no differences in STS mean scores at pretest. At posttest, the high-dose systems thinking education group scored significantly higher on the STS than both the low- and no-dose groups ($P = .05$ and $.01$, respectively).

The STS manual and instrument is available as free domain for public use (Case Western Reserve University, 2013). The STS can be administered to RN-BSN students at the beginning and at the end of their RN-BSN program, to determine an increase in systems thinking as an essential component to high-quality and safe care.

Conclusion

This paper portrays that already-practicing RNs seeking BSN education are pivotal to the future of nursing and to leading a quality and safety-focused health care delivery system. The *BSN Essential II* and QSEN competencies linked with systems thinking in RN-BSN curricula can assist the RN student in identifying patient vulnerabilities in the health care system, thus enhancing RN-BSN education. The Systems-level Awareness Model can be used to guide faculty in student achievement of these competencies. Teaching strategies that combine the *BSN Essential II*, QSEN competencies, and systems thinking in the clinical, classroom, online, and simulation environments can improve the progression of systems thinking and leadership in quality and safety in health care by RN-BSN students and graduates. Evaluation of systems thinking may be conducted through the use of the STS.

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