Implementation Guide

Using a Simulation Clinical Teaching Model to Increase Faculty Capacity in an Undergraduate Nursing Education Program[i]

Primary Authors: Hila Richardson, DrPH, and Pamela Jeffries, PhD

Introduction

This implementation guide will provide an overview of the implementation of the New York University College of Nursing (NYU) clinical simulation teaching model as Part 2 of the final report of the evaluation. Part 1 of the evaluation provided the findings from the quantitative and qualitative data collected over a nearly two-year period at both NYU and the Johns Hopkins University School of Nursing (JHU), the comparison school. It found that the new NYU clinical teaching model, using simulation to replace 50 percent of the clinical hours in the core medical-surgical courses, increases faculty capacity by 60 percent, and thus has the potential to be an option to address the national nurse faculty shortage. In comparison, the simulation model at JHU, which uses limited simulation hours as a supplement to, not a substitute for, hospital clinical experiences had no impact on faculty capacity. The evaluation also found that faculty quality of life at both schools is most strongly influenced by factors such as student learning and patient safety, salary, benefits, office space and other issues typically associated with job satisfaction among faculty members in many disciplines. Data also showed that student confidence and abilities do not differ as a result of the "dose" of simulation clinical education provided in the two programs.

The following discussion will focus on the successes and challenges faced by implementation of the NYU model and identify the strategies used to overcome the challenges encountered. The discussion will also include a review of the implementation of the simulation model used at JHU and identify the common themes in the implementation of both models.

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The NYU Simulation Clinical Teaching Model

Starting in 2005, the College of Nursing was confronted with increasing difficulty in finding qualified faculty and quality clinical sites for its growing student enrollment. Although in a city with many hospitals and health agencies, the College was competing with ten other nursing programs, plus medical and other health professional schools for clinical space at the top-ranked hospitals. There was growing concern about the quality of clinical teaching as it became necessary to expand the search for both faculty and sites to meet the need. In an effort to achieve a more efficient use of faculty and clinical sites and maintain the quality of the teaching program, the College began exploring options of how to re-design the clinical teaching model. The process of finding a new model will be described under the implementation section. Over the course of 3 years, the NYU College of Nursing gradually introduced a model using high-fidelity simulation as a substitute for half of the traditional hospital-based clinical hours in the

four core undergraduate medical–surgical courses in the fall of 2009. This model breaks from both the traditional clinical education model, characterized by all clinical hours spent in the hospital, as well as the commonly used model of simulation as a supplement to the traditional clinical hours with varying number of hours in the simulation lab. On alternating weeks, NYU undergraduate students have three hours (five hours in the first medical-surgical course where skills are taught) of structured simulated clinical experience of increased complexity to substitute for a seven hour hospital-based clinical day. For example, a clinical group of students would be in simulation on week 1 of the semester and in a hospital setting on week 2, rotating back to the simulation laboratory on week 3, and so on. Students must follow the same policies for uniform, attendance, preparation, and professional behavior in the simulation lab as they do in the hospital clinical experiences. The simulation session is designed to provide clinical scenarios that incorporate common health conditions and situations students would encounter on a clinical day depending on their academic level.

Simulation is currently used in all clinical courses at NYU, including the specialty areas. At this time, only the four medical–surgical courses use simulation to substitute for half of the clinical hours. In the Pediatrics course, for example, students have two simulation sessions in addition to the days in a pediatric clinical setting. In the Acute Psychiatric Nursing course, students have two sessions of role-playing, a form of low-fidelity simulation, where they interview faculty who are acting as patients with common mental health disorders. In the specialty courses, these sessions substitute for 25 percent of the total clinical hours.

The NYU model addressed the shortage of qualified clinical faculty and clinical sites that the College faced by increasing the ratio of students to faculty during the semester, but, importantly, this change also reduces the number of students faculty members supervise each

session on a hospital unit or in a simulation lab. Using groups of 24 students as the unit of comparison, Table 1 shows in the new simulation model, clinical instructors will have six students that alternate weeks in the hospital and in the simulation center for a total of 12 students during the semester. The six students who are not in the hospital are in the simulation center with six students from another faculty's group. The simulation faculty supervise a different group of 12 students each week, for a total of 24 students per semester or a ratio of 1 faculty for 8 students for the semester. In addition to decreasing the need for faculty, this model has also decreased the need for clinical sites by 50 percent because each clinical site can accommodate two clinical groups per semester.

In the previous model, 3 clinical instructors and hospital units were needed to provide a weekly clinical day with 8 students in each clinical group. It also required 1.5 lab instructors to provide a half-day lab session each week to 16 students per session. A total of 4.5 instructors and 3 hospital units were needed for 24 students in the old model for a ratio of 1 faculty: 5.3 students.

Table 1: Faculty to Student Ratios in the New versus Old Clinical Teaching Model

Simulation Clinical Teaching Model	**Traditional Clinical Teaching Model**
Faculty Requirement for 24 Students: 1 laboratory instructor (12 students/week)* + 2 hospital instructors (6 students/week)* 3 faculty for 24 students = **1:8 student faculty ratio**	Faculty Requirement for 24 Students: 1.5 laboratory instructors (16 students/week)** +3.0 hospital instructors (8 students/week)** 4.5 instructors for 24 students= **1:5.3 student faculty ratio**
**student groups alternate simulation and hospital clinicals each week so that each laboratory instructor supervises 12 students and each hospital instructor supervises 6 students each week of the semester*	** **students attend both laboratory and hospital sessions each week; one laboratory instructor supervises 16 students and one hospital instructor supervises 8 students each week of the semester*

The Simulation Sessions

In the new clinical teaching model, the simulation sessions last 3 hours, although in the first medical-surgical course simulation, sessions last 5 hours to provide skill practice in addition to the simulated experience. Therefore, the simulation session is half the time spent in a typical clinical day. This ratio of 1 simulation hour to 2 clinical hours is based on the intensity of the simulation session. In a typical simulation session, there is a preconference session (30 minutes), a simulation session (90 minutes), a debriefing session, and guided reflection (60 minutes). There are no interruptions or breaks in the session and all students participate in an unfolding scenario so they must be ready to continue the scenario at any point. Consequently, the simulation session is a very intense learning experience where students are immersed in clinical thinking, communication and skill practice for a continuous three hours. All simulation sessions are organized as follows:

Pre-conference. The purpose is to prepare students for the simulation scenario by reviewing pathophysiology, expected nursing management of the patient, and the treatment plan, including medications. The instructor gives the students the change-of-shift report and informs them of the available resources (e.g., nurse practitioner, respiratory therapist, physician) to meet the patient care goals of the scenario.

Simulation. The session is one continuous, evolving scenario. Students are assigned in pairs, with each pair caring for the patient for up to 15 minutes. The next pair of students picks up the scenario and this rotation continues until all students have had a turn providing nursing care. Students are expected to chart their interventions, medications, and assessments in the electronic health record. When students report to physicians or other health team members, they are expected to use a standardized reporting format. Each simulation session is videotaped, and on-campus clinical instructors are responsible for manipulating the mannequin's responses, advancing the electronic health record screens, and observing students' performance. Since there are multiple sessions at the same time, additional staff members are available to troubleshoot the equipment or bring supplies to the simulation rooms for the instructors.

Debriefing and Guided Reflection. The purpose of the debriefing is to help students think about what they did, how they did it, and how they can improve. The first stage is to listen to students' general reactions to the scenario, which is followed by asking probing questions that help the students reflect on their performance as they review the video. The summary stage is to help student identify what they have learned and how they may perform differently in the future. The debriefing sessions use a peer-review and feedback method in which the instructor asks broad questions about performance in the scenario and the students provide structured feedback to each other.

The Implementation Process

This section will highlight the key steps taken by the faculty and administration at NYU over 3 years to implement the NYU model and will include a discussion of the three key steps: 1) obtaining support from faculty, students and clinical partners; 2) obtaining resources for space, equipment and faculty development; 3) integrating the new clinical teaching model into the curriculum.

1**. Obtaining support from faculty, students and clinical partners:** Starting in 2006, through the use of consultation, in-services from vendors and professional conferences to learn about simulation and its use in nursing education, the NYU faculty began to adopt simulation as a valuable enhancement to clinical learning in the laboratory setting. To encourage the use of simulation across all courses, a Simulation Committee was formed consisting of faculty members, the laboratory director, administration and master's student who were versed in the use of simulation. This committee made recommendations to the faculty and administration about needed resources, faculty development and teaching methods. Some faculty adopted the new technology right away and became champions of use of simulation for skills practice and during laboratory sessions. Simulation was not seen as an option for addressing the faculty shortage at this point but as an important new pedagogy for clinical learning.

As the pressure from a shortage of clinical faculty and sites continued to grow and student enrollment increased, the discussion among administrators and faculty began to shift to simulation as a potential resolution to the shortages. The possible use of simulation as a substitute for the clinical hours in the hospital, however, raised concerns about the effect on clinical learning, which the faculty saw as a strength of the undergraduate program. The faculty

agreed that before fully implementing the new model there should be a review of the curriculum to ensure that the change in the clinical teaching model was not just an "add-on" to address a current problem. Using the Association of American Colleges of Nursing's 2008 *Essentials of Baccalaureate Education for Professional Nursing Practice* and other resources the faculty held several retreats, organized into different committees and brought in nursing education experts to provide a conceptual framework for using simulation as a new way of clinical learning. The result was a revision of the BS program outcomes, reconfiguration of the current programs including deleting some existing courses, adding content and changing course order. In addition, the role of simulation was defined and integrated into all courses at appropriate levels of complexity.

One of the important curricular changes that faculty agreed would support the new clinical teaching model was the addition of a one credit Integrative Seminar to the first, second and third terms of the four-term sequence of nursing courses. The purpose of the seminars was to help students integrate the lecture content with clinical learning in simulation and hospital settings. This course was seen as another opportunity for "immersion" into clinical thinking and integrating the didactic, simulation and clinical experiences as students advance through the program. With faculty facilitation, case studies are discussed and students are encouraged to draw on their clinical experiences in simulation and the hospital to the clinical situations in the case studies. An additional advantage to the seminars is that they are groups of 24 students, which are composed of two simulation groups, so students have an opportunity to discuss lecture and clinical content in smaller groups. Despite the large class size resulting from a student body of close to 1000 students, student experiences were broken down into groups of 6 for hospital clinical, 12 for simulation sessions and 24 for integrative seminars. This not only provided

students the ability to interact in small groups but allowed faculty to more closely observe students on an individual basis.

In summary, faculty acceptance of the new clinical teaching model was clearly advanced through the curriculum revision process. Curriculum revision provided the educational context for faculty to influence the curriculum and to participate in making the changes that ensure simulation is part of a curriculum that meets the highest educational standards.

Achieving the student buy-in to the model required less consensus building than the faculty process and focused mainly on providing information that would address the students' concern about the loss of time in the hospital and a sense of being "cheated" out of the experience they expected at NYU. Information was provided to students explaining the educational basis for the curriculum change and the substitution of clinical hours with simulation sessions. At first, students clearly expressed their dissatisfaction with the new direction. In response, open "town hall" meetings were held where the administration and faculty responded to student concerns and assured students there would be continued dialog about the changes. Over time, the student dissatisfaction dissipated, particularly as the faculty sent a consistent positive message. Students were reassured that faculty they knew and trusted were supportive of the model. As the new curriculum unfolded, students gained an appreciation for the smaller groups in the integrative seminars and clinical settings. As it became apparent that the administration and faculty were trying to minimize the negative impact on students, student acceptance grew. Also, students began to see during the next year that the new model had not negatively affected the employment or entry into practice of recent graduates.

Obtaining support from the clinical partners was a more straightforward process. The nursing educators in hospitals used for clinical teaching had also realized that the traditional

clinical teaching model would place more stress on their resources, particularly nursing staff. It was more difficult each semester for the nurse educators at the hospitals to find sufficient number of nursing managers willing to accept students on the units from NYU and the other ten schools in the area. The administration started breakfast meetings with the nurse educators as a way to inform them about the advantages the model offered for relieving their placement problems. The nurse educators began to see the advantage of the model from their perspective including reducing the number of students on the unit at one time. They understood this would be helpful in getting the agreement of the nurse managers to accept students. As experience with the model has continued, the nurse educators have become proponents of the model and suggested it to other schools.

2. **Integrating simulation into the curriculum:** After gaining consensus on the revised curriculum the faculty began the work of changing their courses to incorporate the new clinical teaching model and the integrative seminar into their courses and align them with the rest of the curriculum.

*Revising scenarios***:** A core team of undergraduate program faculty who teach these courses revised the scenarios purchased from the vendors of Sim-man™ and Meti-man™ to either increase the clinical complexity of the scenario or to align the scenario content with course content, local clinical practice patterns and evidence-based practices. This was a time consuming process requiring several meetings for the first semester in which these changes were instituted, but in subsequent semesters the faculty met once or only when changes were needed.

*Integration into curriculum***:** The faculty reviewed the scenarios for consistency with course and program outcomes. After gaining consensus that the simulation scenarios helped the students meet the different course objectives, the course syllabi were revised to show the

correspondence of simulation scenarios with the lecture and the integrative seminar content each week. In addition, faculty coordinators reviewed the syllabi at the beginning of each semester and sent weekly emails to instructors in the clinical setting and simulation lab so they would know the classroom discussion and content each week. The clinical instructors were asked to find scenarios and improve the alignment of lecture content, the integrative seminars, the simulation and the clinical site experiences. Students are asked to discuss the application of the simulation to their own clinical setting during the debriefing session and to relate the simulation to their clinical experience during the clinical post-conference sessions. The progress of this integration into the curriculum was monitored by both the Simulation Committee and through discussion at the Undergraduate Faculty meetings. To further ensure collaboration and consistency, the faculty met with the Director of Simulation Learning to review the scenarios and improve the alignment of lecture content and the on-campus and off-campus clinical experiences.

*Ensuring Standardization***:** The NYU faculty had agreed that to ensure students were getting common learning opportunities considered important for progress in the program, the simulation scenario experience needed to be standardized. In an effort to standardize the clinical learning experience across instructors and to reduce individual faculty preparation time associated with each on-campus clinical teaching session, supplemental teaching materials were created for each simulation scenario. The supplemental teaching materials include:

- learning objectives and suggested debriefing points;
- beginning- of-shift reports used to set up the scenario for the students;
- an Excel® spreadsheet that serves as the template for the electronic health record, with order sets for each phase of the scenario, medication orders,

care plans, and a free text box for recording Data-Action-Recommendation (DAR) notes;

- the medication management regimens for the clinical condition presented in the simulation scenario;
- a student performance observation template;
- a list of the required supplies and equipment to enact the scenario.

Once the new model was underway, it became clear that students also needed to be prepared with a clinical knowledge base about the scenario so they could maximize their learning from the scenarios. Faculty, therefore, developed a standard set of materials to prepare for the simulation learning experience. The student materials for each simulation session include:

- the simulation scenario with information about the client's history, presenting condition;
- learning objectives and preparatory questions;
- a hand-off report worksheet;
- a medication list;
- a simulation observation sheet for use during the debriefing segment of the simulation;
- clinical assessment tools or evidence- based practice guidelines relevant to the scenario.

In preparation for each simulation session, students were expected to:

- read the client scenario;
- complete a written set of questions to demonstrate their mastery of the key concepts and skills associated with the clinical scenario;
- complete a worksheet for each medication listed on the client's order set;
- review clinical topics and psychomotor skills associated with the scenario.

The preparatory questions and medication worksheets were reviewed by the clinical instructor, and students received feedback on their work

3. Obtaining resources: The essential requirement for implementing simulation into clinical teaching was obtaining the required resources. At NYU, the College's leadership and a few faculty members relied on the model to address an impending crisis in the shortage of faculty and clinical sites at a time when the need to increase student enrollment was also a high priority. School leadership recognized that incorporating simulation into the clinical component was needed in order to keep its undergraduate program future-oriented in its pedagogy. Both of these factors influenced the decision to commit the College's resources to proceed with the model.

*Space and equipment***:** As part of upgrading the laboratory, simulation hardware and software were purchased in the summer of 2006 and began to be used as part of the enhancement to laboratory teaching described previously.

By 2008 when the faculty had agreed to adopt using simulation for 50 percent of the clinical hours in the medical-surgical courses, an area had been designated for renovation and creation of two, state-of-the-art hospital rooms for hi-fidelity simulation with adjunct computer control rooms. These were constructed and ready for the full implementation of the model in fall 2009

Currently, the College's Clinical Simulation and Learning Center is a 6,394 square foot area that includes two rooms equipped with low and medium fidelity simulation equipment used mainly for undergraduate and graduate health assessment courses; two rooms each arranged in a 16 bed hospital ward layout with mid-fidelity mannequins used for the first medical-surgical course that focuses on psychomotor skill development; and the two high-fidelity simulation rooms each with one bed used for the core medical-surgical courses after the fundamentals course . The high fidelity rooms are equipped with a wireless internet system, a wall-mounted flat screen TV and a control room with the simulator computer and a one-way glass partition. To

accommodate the need for simulation time in this model, the simulation center is open 7 days a week with sessions scheduled from 7:30 a.m. to 10:00 p.m. Monday through Friday, and sometimes on Saturday morning. In addition, there are Open Labs 3-4 times a week, including weekends. These are faculty-supervised sessions where students can practice skills and scenarios from any course. With two high-fidelity simulation rooms, 24 students can be in a simulation session at one time. Each faculty member can supervise as many as two simulation sessions each day.

By fully scheduling Monday through Friday the two mid-fidelity rooms and two high-fidelity rooms, the Simulation Learning Center can accommodate a range of simulation experiences for approximately 700 undergraduate students during a semester. The efficiency achieved depends on having 3 hour simulation sessions for the second, third and fourth medical-surgical courses and a 5 hour simulation session for the first level course where teaching skills is emphasized. If there were a 1:1 substitution of simulation for clinical hours rather than a 1:2, then the ability to accommodate large numbers of students would be reduced.

Staffing: Equally important to having resources for the appropriate space and equipment necessary for the simulation model to be successful, was obtaining resources for staffing. The early planning and introduction of simulation was led by the director of the laboratory. However, the expansion of simulation use created a need for a designated person to work with faculty in designing scenarios, advising faculty on simulation teaching and on the logistics of the simulations. A Director of Simulation was hired and with further expansion faculty requested a full-time, experienced person to be present during the time that simulation labs are operating to help problem-solve the computer glitches and other in-session problems. There also needs to be

oversight of the frequent turnover of the lab space to maintain the simulation schedule. By fall 2012, the Simulation Learning Center staff was composed of a Director of Simulation, an Assistant Director of Undergraduate Simulation, an Assistant Director of Graduate Simulation, a Simulation Technology Administrator, and a Simulation Center Manager.

Faculty development: Funds for faculty development was another key resource that was included in the budget for implementation of simulation. At the beginning, the faculty development was ad hoc with faculty who were interested going to trainings and professional conferences using their professional funds to do so. Once the commitment to full integration of the simulation model was made, faculty development became mandatory. It was not only for those teaching in the simulation lab but was needed for all course coordinators, particularly in the core medical-surgical courses and part-time faculty who taught in the hospital or health agency setting. It's an initial investment of a minimum of 20 hours per faculty over the course of the first year, depending on their role. Faculty who are teaching simulation or leading courses where there is extensive simulation used will need the maximum number of hours. Faculty who participate in orientation to simulation learning methods, and discussions about the curriculum, and do not spend time with hands-on practice, will require fewer hours. The faculty development topics covered during the introduction of the simulation model at NYU included an introduction to the technology, how to conduct a preconference, the teaching methods for simulation learning and how to conduct a post-conference. Simulation teaching is now a part of the faculty development program.

Successes and Challenges of Implementation

The following section presents the combined successes and challenges of implementing the NYU and JHU models from the perspective of administration, faculty, students and clinical partners. They are based on the quantitative and qualitative data obtained during the evaluation.

1. Administrative successes and challenges.

Successes:

Increased Faculty Capacity and Student Enrollment: Adopting the model achieved the main goal the faculty and administration at NYU were seeking: alleviating the shortage of faculty and clinical sites while increasing the student enrollment and maintaining the quality standards of the undergraduate program. As shown above in the description of the implementation, the new model increased the student-to-faculty ratio from 1:5.3 to 1:8 thus increasing the faculty capacity by over 50 percent, significantly reducing the need for clinical and simulation faculty and clinical sites. Simultaneously, the College of Nursing was able to expand its total student enrollment from 613 in fall 2007 to 990 in fall 2012. Finding faculty and clinical sites continues to require constant effort, but the model has allowed the College to consistently meet the required clinical teaching need each semester in a timely way with a core group of qualified faculty using the highest quality clinical sites.

The fall 2012 data is an example of the efficiencies achieved for faculty and clinical sites in the new model. In that semester, the three core medical–surgical courses had a total enrollment of 700 undergraduate students. The college needed to hire 58 clinical instructors to supervise 12 students (6 per week) on 58 hospital units. The college needed to hire 29 simulation instructors to supervise 24 students (12 per week) for a total need for 87 faculty for clinical teaching in that fall semester. Under the previous model without the simulation

substitution, NYU would have needed to hire 87 clinical instructors for 8 students each week of the semester and to hire 44 lab instructors for 16 students each week for a total of 130 faculty for clinical teaching, 43 more faculty than needed under the new model[*].)

Challenges:

The administrative leadership of the school had two main challenges in implementing the new model: finding the resources to implement the model and obtaining faculty buy-in to trying the model. As described earlier, the implementation of the model evolved over two-three years with gradually building the simulation software and hardware and other equipment while trying different approaches to using simulation as an adjunct or supplement to the traditional clinical teaching model. Once simulation was accepted as a substitution for clinical hours in a hospital, substantial investment was required to create a real-life hospital environment in the simulation setting. Without building the space to duplicate the hospital room with the state-of-the-art equipment, it would have been more difficult for faculty or students to accept simulation as a substitute for the hospital setting. These infrastructure resources are essential to getting both student and faculty buy-in as well as making implementation of the model successful.

Obtaining faculty support was also an administrative challenge. This was addressed through the process of curriculum revision, a lengthy and expensive process, as discussed earlier in the implementation section. Although the faculty were divided in their level of acceptance and enthusiasm for the changes, they saw that alternatives to addressing the faculty shortage at NYU were limited. The substitution approach offered the best potential for alleviating problems of the last minute search for clinical instructors and clinical sites that led to compromising the

[*] It should be noted, that this example refers to clinical and simulation sessions that need to be supervised as an indication of demand for faculty. Often, one full- or part-time faculty member can supervise more than one session.

quality of both. Also, faculty were reassured through the curriculum revision process that curricular changes would reinforce and better integrate clinical knowledge and experiences. Although administrative challenges have lessened, not all faculty are fully convinced it is the best model and maintain concerns about its impact on student outcomes including the impact from increased enrollment.

2. Faculty Perspectives on Successes and Challenges

Faculty Successes

Improved quality of clinical teaching: With implementation of the new model, the faculty, staff and administration were significantly relieved of the pressure to find sufficient numbers of clinical instructors to cover all clinical placements and laboratory sessions each semester. This provided the opportunity to be more selective in the qualifications of instructors and build a core of instructors who had excellent clinical skills and demonstrated teaching performance.

The other major improvement the faculty identified achieved by the new model was the reduction in the number of students in each clinical group and laboratory session with groups of 6 for hospital-based clinicals and groups of 12 for simulation laboratory sessions. The fewer number of students on the hospital units allowed clinical instructors to more closely supervise students and provide students with more opportunities during a clinical day. With fewer students in a simulation session, faculty had more opportunity to observe a student' ability to think through clinical situations rather than only doing tasks, which is often a limitation in a hospital setting.

Safer patient care: Faculty felt that the new model had potential to make patient care safer in two ways. First, clinical instructors in hospital-based teaching had fewer students to supervise and felt more secure in preventing student errors in settings with acutely ill patients. In the simulation setting, faculty recognized that students were able to gain experience in their clinical thinking necessary to manage more medically complex patients who are commonly seen in today's inpatient settings.

Positive impact on career and work life: Faculty teaching simulation identified a positive impact on their careers in learning the new simulation technology as a cutting edge teaching strategy. They felt that this method of clinical teaching was the wave of the future and expertise in its use would be an advantage to their careers. In addition, they reported that clinical teaching in the simulation laboratory was less pressure than in the hospital units. They have less stress about student errors and they have more opportunity to teach from their own experience during the debriefing sessions. These debriefings are focused on one patient scenario which all students have participated in rather than discussing 6 patient care issues at a post-conference in the hospital. This allows faculty to help students gain a deeper understanding by drawing from their own experience with the patient situation and answer student questions more fully than is possible during a clinical day.

Faculty Challenges

Concerns about substitution: Faculty had concerns that the implementation of substituting 50 percent of the hospital clinical hours with simulation hours was without sufficient evidence to know the impact on students' clinical learning. Most faculty found the change both stressful, because it was embarking into unknown territory, and exciting because it was a new

clinical teaching paradigm. Although there was consensus that the traditional model had to be changed to accommodate the growing number of students, there were faculty who would have preferred to continue exploring other options. The differences and disagreements among faculty and administrators were frequently discussed in faculty meetings as well as in 1:1 meetings but it has only been the experience with the model over time that led to more acceptance.

Concerns about student enrollment: The concerns about adopting the new model were to some extent related to the concern about the model as a means to increase student enrollments. As stated earlier, student enrollments were growing 20-25 percent each year. The average class size ranged from 100-150. Faculty were managing larger number of students in the classrooms, had larger number of assignments to grade and a larger number students to advise as the new model was implemented. Therefore, some faculty viewed the model as a primarily a strategy to enroll more students which they felt made it more difficult to maintain the culture of the College and the highest academic standards. Increased student enrollment was felt by the College leadership to be a responsibility in face of the future nursing shortage and it was needed for tuition planning. To address these differences, new procedures for managing large classes were put into place. For example, classes were divided into two sections when they reached 100 students, faculty course coordinators were given assistance by graduate students or part-time faculty and new procedures for scheduling and documenting advising appointments were established.

Standardization of simulation teaching: The laboratory faculty also had concerns about the model and teaching simulation for several hours. When the substitution of clinical hours was first introduced, it was assumed that there would be a 1:1 substitution of hours. This was partially necessary to off-set the concerns of faculty who were opposed to reducing clinical

hours. Within one semester, experience showed that simulation hours and clinical hours were very different. It was very difficult for faculty to engage students in meaningful simulation learning for 6 hours. Students felt the simulation sessions were redundant and their focus drifted after a few hours. Faculty felt the stress of filling time when students were not interested. An additional issue was that a 6 hour simulation day forced scheduling of simulation labs to go late into the night and into weekends. After consultation with other schools using simulation and a review of the literature, the decision was made to change to a 1:2 ratio of simulation clinical hours to hospital-based clinical hours. The simulation session was re-designed to "frontload" skills in the first medical-surgical course using task trainers as needed and, the more advanced courses use intensive simulation scenarios for students to apply their learning. To accomplish this, it was necessary that each simulation session be tightly timed and strictly focused on the same content. This led to the standardization of the simulation scenarios as described previously.

For faculty who had been accustomed to laboratory teaching where the instructor was the main focus for learning through teaching and demonstration, it was challenging to modify the teaching method to student-focused learning where instructors let students complete the scenarios as planned without interruption and teaching during the simulation itself. Faculty felt this inhibited them from sharing with students their own clinical knowledge and practice. This concern was addressed through faculty development sessions and has gradually been alleviated as the advantages of the student-focused approach has become more apparent and students have grown to expect standardized experiences.

It is important to note that although the new model increased the workload of faculty each semester, faculty did not identify that as having a major impact on their work life after the initial start-up of the model. The faculty teaching in the hospitals had an additional 4 students

per semester for whom they had to review nursing care plans and conduct evaluations. The simulation faculty had an additional 8 students for the semester for whom they had to perform evaluations. For both types of faculty, the smaller number of students per session offset the additional total number of students for the semester. This reinforces the finding from the interviews in which faculty quality of work life was most influenced by how successful faculty thought they were in teaching students. The smaller groups of students were an important influence on faculty's satisfaction with their clinical teaching.

3. Student perspectives on successes and challenges

Successes

Based on the trend in NCLEX scores, observations of faculty, and reports from clinical partners and employers, student outcomes have improved since the introduction of the simulation models. Although NYU's and JHU's graduates' first-time NCLEX pass rates are above the state and national averages, it is not possible to isolate the effects of the clinical teaching model on this important measure of student's competence for practice. In the time that the clinical teaching model was implemented, several other program changes were also implemented at both schools, including revisions of the curricula. However, it is important to note that all indicators of student success have remained constant or improved despite the dose of stimulation that students received.

Students expressed other positive outcomes from the new model when they were interviewed as part of the evaluation. These points are summarized below:

Safe environment in which to practice future role: Students appreciate that simulation provides them with a safe environment in which to practice the full nursing role, an opportunity

they do not always have in a hospital setting. Although still an essential part of their clinical learning, the hospital clinical day can be unpredictable and limit patient care depending on the patient's availability and timing of the clinical day. Students may not be allowed to give complete patient care or be in the hospital long enough to see a patient's condition change. A standardized program of simulation learning ensures students have experiences with managing common conditions that faculty agree all students should have before they graduate. For examples, students in simulation can practice being the patient's primary care nurse and feel what it is like to have decision-making responsibility for medications and notifying physicians and others on the health team without risk to the patient. As they advance through the program, students will practice delegation to unlicensed personnel and communication with families in stressful situations as just two examples of opportunities that rarely occur in clinical settings.

As hospital settings become more restrictive for student experiences due to confidentiality, closed hospital information systems and legal pressures, simulation experience will become key to ensure opportunities for students to prepare for safe practice as a new graduate. At the same time, the hospital setting provides the opportunity for communication, touch, and interactions on the hospital unit that is essential to student learning and cannot be fully duplicated in simulation. Students and faculty both reported that the clinical setting had the most important impact on student learning. Simulation was reported to be the second most important and the classroom as the third. Students did identify that simulation prepared them to be their best in the clinical setting.

Advantage to careers: As students become more aware of the practice world they are entering, they recognize that simulation will be part of that professional world. It becomes clear to them that familiarity and comfort with technology will give them an advantage in practice. As

more hospitals in particular rely on simulation for competency demonstration for hiring or performance review, students see that their experience with performing complex clinical scenarios will benefit them. Although simulation does not totally replicate the stress of the hospital setting and communication with physicians and other personnel, students report that their experience forgetting to give the patient's name or not having the lab results in front of them when they talk to the "physician" during simulation, is a lesson they will never forget.

Student Challenges

The biggest challenge to overcome with students has been addressing the reaction that they were not getting as much time in the hospital as they thought they needed. It was inevitable that students who were currently enrolled at the time the new model was introduced were disproportionately affected by the change during the middle of their education. They were the most vociferous in expressing their dissatisfaction of not having all of their clinical experience in the top flight medical centers in NYC and felt the simulations were a diminishment of their educational experience. To address the dissatisfaction, faculty and administration made themselves available in open meetings and in 1:1 meetings with students as described in an earlier section. Once students realized that losing hours in the hospital was not effecting how they performed in the hospital and even helping them be more prepared, they were much less critical of the changes. As new students enter the program with the new model fully implemented, they accept the model as part of the NYU program. Although they have less concern over reduced hospital hours, students reported in the interviews that they feel they learn the most from their time in the hospital.

A few students have felt and continue to feel high levels of performance anxiety during the simulations. They felt they were put on the spot and embarrassed in front of their peers when

they made a mistake. The anxiety was intensified by the video taping of the simulation and then the re-play of the video during debriefing so students would see their mistakes in front of the other students. This issue was lessened by changing the simulation to be an evolving scenario, rather than a repeated one so everyone was thinking on their feet. Also, in the beginning, the students first saw the scenario when they came to the simulation session, which increased their anxiety because they did not have time to prepare. Once the simulation was distributed before the session, the students came into the session with less anxiety. Gradually, the addition of questions for students to answer and other background materials have further reduced this issue.

Another early student concern about the introduction of simulation was the unevenness in the clinical instructors' ability to conduct the simulation. Students very quickly saw the differences in how clinical instructors carried out the simulation instructions. Some faculty continued to teach as if they were supervising students in a clinical setting and others did not intervene before students made a mistake. Students were unclear what the expectations were of them from instructor to instructor. Also, there is a steep learning curve for clinical instructors in simulation so some were more adept at using the computer and running a scenario than others. This also caused students to feel that their simulation learning was less than what they learned in clinical. These student concerns are almost unavoidable as simulation is introduced and the faculty are learning a new teaching method. However, investment in faculty development to learn the different way of teaching in simulation as well as standardizing the simulation session with clear script and procedure for the faculty can decrease the student frustration with this concern. Students reported in their interviews that the quality of faculty instruction was one of the most important factors determining their view of simulation experiences.

Clinical Partners Successes

The clinical partners welcomed the new model as they recognized that it would relieve the pressure to ask or persuade so many of the nurse managers at any one hospital to take students. The best hospitals and health agencies were under pressure to meet a greater demand for student placements creating a very competitive environment for the schools. NYU offered the hospitals relief on two fronts: the number of units needed and the number of students who would be on the unit at one time. In the units where there were acutely ill patients having fewer students was helpful to the nursing staff because it reduced the number of people on the unit, decreased the number of patients to be assigned to students and permitted the clinical instructor to more closely supervise the students. For nursing staff the major benefit was having fewer students and the same instructor each week.

Clinical Partners Challenges

The main concern of the clinical partners was the alternating schedule for the students. Nurse managers expressed the concern that students will forget the orientation to the unit and the unit policies when they are only on the unit every other week. Some clinical instructors and students also shared this concern. The clinical instructors are key to alleviating this concern because they can email students before clinical days remind each group of students of important policies and other information about the unit. Students have anxiety before clinical days as well as simulation days, so the pre-clinical communication by instructors is crucial for both settings. As the model continues, the clinical partners have less concern about this issue, largely as a result of the efforts of the clinical instructors.

The JHU Model

At Johns Hopkins, the simulation pedagogy was embraced by a few nursing faculty champions as an innovation in clinical teaching in 2008. JHU did not have the pressure of faculty and clinical site shortages as experienced at NYU. As a result, the JHU model evolved based on the interest and motivation of faculty. Through state funding and alumni contributions a few high fidelity patient simulators were purchased for faculty to use in simulation in 2008. Only a few simulations were incorporated in the courses, starting with fundamentals and clinical laboratory courses where the patient simulators were used to teach students basic skills. Simulation was also used in pediatrics and maternal health because of the faculty champions in those courses.

In 2009, simulations were still limited with only a few faculty champions mostly in pediatrics and maternal health. In contrast to the NYU approach of using a standard protocol for simulation sessions with support staff, the JHU model of conducting simulations was for faculty to set-up their own simulations, run them, and then take down the patient simulators. There were few laboratory resources with no infrastructure to support an efficient and effective simulation program. Simulations were conducted in the practice labs with open spaces, curtains for dividers and no high-tech control room or cameras.

One of the important steps in gaining support from the faculty and clinical partners at JHU was a one-day simulation conference in partnership with the JHU hospital leaders held in 2009, and organized by designated faculty. Over 125 participants came to the inaugural conference. After this event, a faculty Sim group was developed consisting of approximately 12-13 interested undergraduate and graduate faculty who were willing to learn more about simulations and how to develop and implement them into their teaching.

In the beginning of 2010, a student lounge was developed into two high-tech simulation spaces, two debrief rooms, and one control room with the state-of-the-art simulation cameras, microphones, and capacity to videotape live simulations and videostream live simulations to classrooms within the school. The renovated space for simulations was paid for by a state funded grant that helped to support the construction costs in addition to hiring a full-time lab manager and 40 percent time for a faculty simulation coordinator.

In the spring of 2010, Dr. Pam Jeffries, the Associate Dean for Faculty Affairs and a national expert in the use of simulation in nursing education, conducted several workshops for faculty development in simulations to instruct faculty on how to run a simulation and conduct debriefing. After the faculty development sessions, it was decided that faculty who were going to use simulations needed to go through training/development before conducting simulations. A 3-part required faculty training was developed that consisted of 1) developing a simulation; 2) conducting debriefing; and 3) managing and running the control room and the equipment. Lectures were media-sited for 24/7 use by faculty with the intent that faculty were to go through training before implementing simulations in their courses.

In 2011, the faculty completed a curriculum revision where more simulations were developed and conducted in the first semester courses, the patient-centered care courses and health assessment. According to student evaluations, faculty members were using various models of implementing simulations depending on what faculty members were running the simulations. During this time, very few simulations were incorporated in the core clinical courses at the undergraduate level, with only a few integrated in the pediatrics and maternal health courses, one or two in adult health II and a few in the patient-centered care course. All faculty members had not embraced the notion of simulations at this time.

By fall 2012, more faculty were embracing simulations, more faculty were requesting simulation space for their courses, and more were asking for certain resources and equipment. A faculty advisory council has been set-up for faculty to help inform the Simulation Coordinator and Lab manager of what equipment needs to be ordered for the simulation center, to assist with guideline development for the simulation center, and to help develop a strategic plan to outline the frequency and types of simulations to incorporate into the core clinical courses at JHUSON.

The effort to advance the role of simulation at JHU was given a major infusion of funds and visibility when, in the fall of 2011, more resources came to JHU to support the development of their simulation program. JHU was selected as one of the ten schools to participate in the national, multi-site simulation study funded and directed by the National Council State Board of Nursing (NCSBN). The student class entering the fall of 2011 were eligible to be in the study; after signing informed consents, the participating students were randomized into one of three groups of study participants: 1) control group that would have less than 10 percent simulations incorporated into their clinical; 2) a 25 percent group that had 25 percent of their clinical time substituted for simulation time; and 3) a 50 percent group where 50 percent of their clinical time was substituted for simulations. The study would last for 4 semesters with simulations being incorporated across seven core clinical courses. A study coordinator was selected along with faculty members who became the simulation team and who were all trained at training sessions sponsored by the NCSBN in the spring/summer months of 2011. With the involvement of being in the study, more faculty were developed to incorporate simulations into their courses; faculty gained more confidence with the training and with the expectations the study had. In addition, with the study going on, part-time (adjunct) faculty were including their students in the

simulations; therefore, part-time clinical faculty were also learning about simulations with some becoming strong advocates for the simulation pedagogy.

By spring 2012, the study was being conducted across two clinical courses, adult health I and psychiatric/mental health clinical courses. Simulations were being conducted on high fidelity patient simulators in addition to the use of patients. The model involved having the simulation team specialists (5 total) run all the simulations to ensure the quality of the simulations and debriefing, with the clinical faculty bringing the designated (25% and 50% clinical groups) to the simulation lab when they were scheduled. For the 50% group this meant 56 hours of simulation time and 56 hours of real clinical time in the designated areas. For the 25% group, this included 28 hours of simulation time and 84 hours of real clinical time for the course. It was during the spring months that there was much anticipation for the fall 2012 study group because during this time, there would be three clinical courses involved in the study: pediatrics, OB/maternal health, and adult health II. With the anticipation of more simulations being incorporated in the courses for fall, in addition to more faculty embracing simulations for their own courses (those not in the study), another classroom was renovated over the summer to include two more simulation spaces, two debrief rooms, and one control room. The two rooms within this simulation area were built to be very versatile so community health nursing, home visits and a clinic-set-up could be created. Two new simulators, SimMom™ and SimJunior™, were purchased with grant money to add to the JHU simulation family.

Since the NYU study, the JHU faculty members have embraced simulations more than they did in the earlier years and the training and confidence in delivering this type of pedagogy is increasing. Now graduate faculty are entertaining more simulations within their courses and planning ahead for interprofessional simulations within their required courses.

There will be continued development at JHU through strategic planning, formation of a faculty advising council and the hiring of a full-time simulation technology support person.

Lessons Learned

The implementation process at both schools followed a similar pattern with common successes and challenges despite the significant differences in their models. The lessons that can be drawn from the two experiences include:

1) investments in space and equipment, faculty development and new staffing were essential to having a positive start for implementing the simulation models;

2) simulation pedagogy is best introduced as part of, and aligned with, the larger educational mission of the undergraduate programs;

3) a change in traditional and entrenched teaching models will be disruptive and requires time for acceptance by faculty and students but open communication can keep the process moving forward;

4) clinical teaching models can be re-designed to break with the traditional models and still create the conditions for faculty to do their best teaching.

In conclusion, this guide has outlined the implementation of an innovative clinical teaching model at NYU that uses simulation to substitute for 50 percent of the clinical teaching hours in core courses. The significance of this model for nursing education is its potential as an option to gain more efficiency in the use of faculty and clinical site resources when shortages in these resources are limiting admissions to nursing schools. The model can be replicated with confidence, based on the NYU experience and the evaluation findings that substitution of clinical hours with structured simulation experiences can enhance clinical learning and contribute to giving students the strong clinical foundation needed in today's health care settings.