HUMAN SIMULATION FOR NURSING AND HEALTH PROFESSIONS

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EDITORS

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Human Simulation for Nursing and Health Professions
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This book is dedicated to all my family, friends, and colleagues who have helped me through this simulation called life. To Dr. Gloria F. Donnelly and Dr. Mary Ellen Glasgow, thank you for all your inspiration, support, encouragement, patience, and opportunities. To H. Lynn Kane, Helen "Momma" Kane, and Linda Webb, thank you for your amazing friendship and for being my family. To my friend and colleague Rocky Rockstraw, thanks for everything. To Fabien Pampaloni, thank you for your endless help and support. To Hector Bones, thank you for keeping me healthy and strong. To Lou Smith, Evan Babcock, and Steve Johnson, thanks for your friendship and support. To all the contributors in this book, thanks for helping make a dream a reality. To our wonderful standardized patients who make the simulation experience unforgettable, you all deserve an Oscar. And last, but not least, to the memory of Dr. Kathleen Kinney Falkenstein, a treasured colleague and a good friend.

Linda Wilson, PhD, RN, CPAN, CAPA, BC, CNE

This book is dedicated to all who have made this exciting and laborious task of writing/editing "real"; to my family—my partner Jorge, my daughter Savannah, my sister Jodi, and my father—without their support, I would not be who I am today; to my colleague and friend Linda Wilson, a friend in every sense of the word; to my niece, Melissa Baker, for her editorial and writing style; to all the chapter authors, wow, what a group of like-minded individuals can accomplish (both within this book as well as individually across the world); to the actors who bring "life" and "real" patient experiences to our future health care givers; to our students who trust us to guide them through this difficult path we call an education; and to you, the reader—it is my hope that you digest this information, make it better, and add to the body of knowledge of this exciting "arm" of health care education I call simulation.

Leland “Rocky” Rockstraw, PhD, RN
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Foreword

When I was eight years old, someone gave me a small oak roll top desk with cubbies and two secret hiding places. My parents placed it in my room where I pretended for hours that I was a teacher preparing my lessons or entering grades in my students’ report cards; I was Beatrix Potter writing a new children’s book; I was the school principal counseling a student who had misbehaved. When I was a doctoral student pursuing a PhD in Child and Adolescent Development, I studied children’s play and noted the power that pretending has to transform language and action. Fast forward four decades and all of my pretend scenarios have come true—I am a teacher, an author, and an academic administrator. Without that roll top desk as the prop to fuel my imagination, who knows where I would be?

Today there is an explosion in the use of simulation in nursing and health professions education. The contributors to this text are experts in this format of teaching. They are the designers of the learning spaces, the authors of simulation cases and evaluation methods, and the experts who program the human patient simulators and who teach the patient actors to enact the clinical scenarios. They are the faculty who give students feedback and who glean feedback from the aggregate simulation reports so that teaching can be improved. They are faculty who are preparing undergraduates to enter the health workforce and the graduates who are diagnosing, prescribing, and implementing care. Simulation is changing the format and quality of clinical education, and students who have experienced this form of learning will tell you that it builds confidence, knowledge, and skill that contribute to safe and excellent patient care.

Medical education has used objective, structured clinical experiences (OSCEs) to teach diagnosis and treatment skills to physician students for at least 30 years. Patient actors called “standardized patients” were trained to evaluate the skill level of physician students in physical examination, communication, and patient teaching scenarios. In 2002, the nursing faculty of Drexel University elected to include, as a permanent part of all curricula, simulation with standardized patients. The results were so compelling that the college soon built its own digital-video standardized patient laboratory and recently completed outfitting an additional 2,200 square feet for all types of simulation exercises, including the use of computerized mannequins programmed for serious illness parameters or birthing scenarios; the use of a simulation board room to teach group and family therapy, leadership, and to simulate ethics boards. Every clinical program in Drexel’s College of Nursing and Health Professions has incorporated simulation experiences into the curriculum, including nursing, physician assistants, physical therapists, nurse anesthetists, and mental health therapists. Most recently, the faculty have incorporated assistive personnel into scenarios to promote team building.
and effective communication. We are also working with students from the theater and scriptwriting departments for scenario construction, effective prop room management, and creating film clips that can raise the level of distraction during simulations.

I consider this as a “handbook” on the design, evaluation, and practice of simulation for clinical education. If you are a faculty member with concerns about how your students will make the transition from student to professional, use simulation in your curriculum and learn for yourself that pretending is simulation for life but simulation is pretending for the delivery of exquisite clinical care.

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SECTION I: THE HUMAN SIMULATION LABORATORY

CHAPTER 1

Building a Human Simulation Laboratory

Leland J. Rockstraw

INTRODUCTION

Lights, camera, action! This battle cry has its history in filming, and I remember wanting to call this out to alert our standardized patients (SPs) or actors as we began to film our health professional students. However, careful planning in the building of a human simulation laboratory (SP simulation) is needed to ensure efficient use, proper professional and actor flow, and clinical education and assessment of participants; then you will be ready to call out “lights, camera, action.” In addition to planning the physical layout, understanding the recording software and hardware as presented in chapter 2 will give the reader great insight. This chapter will outline a practical approach in understanding the following key factors to consider in designing a human patient simulation (HPS)/SP laboratory: forming a design team; function and utilization; work flow as it relates to participants, actors, and professional staff; simulation-specific considerations; utilities; and a virtual walkthrough of any future human simulation laboratory. For the ease of the reader, this author uses the following definitions:

- SP—denotes the focus of human simulation specifically to SPs or standardized actors who have historically been used for the education and assessment of clinical competence of the health care provider.
- Participant—a person participating as the customer in the SP experience; this customer can be a health care student, a bedside provider, and in some cases a non–health care professional.
- Encounter—refers to a single participant scenario (simulated experience) that includes not only the actual simulated encounter but also the pre-encounter and post-encounter work.

FORMING A DESIGN TEAM

In building a human simulation/SP laboratory, development and organization of the design team will help provide a deeper and fuller understanding of all considerations of planning and result in building a high-quality and efficient simulation center. The
qualifications and experience of the design team members should include prior simulation experience in the areas of SP simulation and health science examination room layout construction and/or use. They should also understand the intended use in the areas of (a) skills practice, (b) education, and (c) assessment, the ability to translate ideas and visions into a functional image and floor plan, the ability to capture audiovisual of the participant’s experience in both general filming and skill specific, and the general construction (electric, plumbing, and finishing) of any construction project.

Design team members should include you (the customer with a dream), an SP simulation consultant, a project manager, an architect, a general contractor, a plumbing and electric contractor (if the general contractor does not have the expertise), an audiovisual consultant, and an information technology consultant. Individual traits for each team member should include the following:

- **Customer with a dream**—instrumental in understanding the vision of the stakeholders of the SP laboratory; that is, its administrators, faculty, future participants (students), and flow.
- **SP simulation consultant**—understands the programmatic use of SPs in the area of participant instruction, assessment, and workload, which will aid in educating other design team members.
- **Project manager**—responsible for planning, executing, and closing the simulation laboratory project. The key to ensuring the collaboration of all team members in the areas of design, construction, networking, and telecommunication considerations such as scheduling and meeting deadlines and purchasing, receiving, and storing equipment and hardware.
- **Architect**—trained and licensed in planning and designing buildings, as well as in supervising the construction, electric, and plumbing specifications. This role will assist the project manager in closing the project.
- **General contractor**—works with the project manager and is responsible for the overall construction, renovation, and demolition of a space or building. They lend their expertise to the planning and implementation phase and the responsibility of following up on the customer’s “punch list” to ensure the project is completed to the specifications within the building plans.
- **Electric and plumbing contractor**—lends expertise in the areas of electric and plumbing work.
- **Audiovisual consultant**—creates a design as it relates to audiovisual capturing, which includes camera, microphone, and speaker placements; cabling requirements, rack elevations and wiring; and computer-aided drafting. He or she also provides technical assistance to all members of the design.
- **Information technology consultant**—a specialist in the use of computers, telecommunications, and storing, retrieval, and transmitting information. Experience in networking is strongly suggested.

This team is generally organized by the project manager; however, the customer may need to inform the project manager of their desire to be an active member of the design team. From design and through building, weekly or bimonthly meetings are held to discuss issues, provide clarifications, and ensure all team members are “on the same page” of the design and building. It is during these meetings that the dream begins to transform into a reality, and the customer gains valuable insight that will aid well into the future daily management and operations of the simulation laboratory.
CHAPTER 1. BUILDING A HUMAN SIMULATION LABORATORY

FUNCTION AND UTILIZATION

There are three main methods of health care simulation. SPs (the use of actors to simulate patients in a standardized manner) promote practice and assessment of individual skills such as interpersonal communication, verbal and physical assessment of the patient, and diagnostics reasoning, which is the focus of this chapter and book. Other simulation methods include HPS, or use of full body-length computerized mannequins to promote teamwork; communication between team members; crisis resources management; and task trainers, which are focused, skill-specific simulations such as central line placement, surgery, and other types of invasive high-risk procedures. Many simulation centers are also providing hybrid simulations that will blend any combination of the three methods previously mentioned.

Functionality of simulation laboratories refers to the ability to use the space in certain modalities. Early and frequent discussion with end users (administration, faculty, and future participants) will assist in the design of a simulation center’s functionality that will last into the foreseeable future. Some simulation centers serve a single discipline, such as nursing, physician assistant, or medicine, and others serve multiple disciplines; it is important to understand participant disciplines, population sizes, and proposed percentage of use during the planning for annual projection (calendar or academic), and projected growth within the given discipline(s) and participants is vital. Planned use of simulation or examination rooms in educational and assessment can include (a) encounters with SPs (patient–provider interaction and communication skills), (b) task trainers (procedures such as central lines), (c) hybrid encounters (SP and task trainer), and (d) nonsimulation uses (such as skills training or educational practice). Functionality also refers to access and egress of participants, actors, and professional staff, and access to support areas such as offices, observation areas, classrooms, debriefing rooms, break rooms, storage, and bathrooms. Further discussion of space functionality will be provided with room diagrams in the following sections of space and work flow, and detailed room diagrams will be presented in chapter 2.

Space utilization refers to the use or traffic of participants, many times demonstrated as a percentage. Generally, a use rate of 75% is considered to be at capacity (Seropian, 2008). Utilization planning by discipline and population size will aid in the design phase to ensure adequate space of the simulation examination rooms as well as support space (such as classroom and debriefing space). For example, if you were to run a 1-hour encounter for 40 participants, you would be able to accomplish this in 4 hours with 10 examination rooms versus 10 hours with 4 examination rooms. Scheduling of simulation rooms and additional space will become complex, and time spent in understanding and projecting space utilization will ensure adequate space is created for simulation and clinical.

The following space and work flow sections and figures are added to aid the reader in understanding the concept of designing an HPS center. The floor plan presented is one of many possible configurations and may not fit into your current plan for simulation centers; nonetheless, the figures are included to aid in understanding work flow for participants, actors, and professional staff. Any design plans for an HPS center should include a deliberate approach to participant, actor, and professional staff work flow.
SPACE AND WORK FLOW FOR PARTICIPANTS

The typical SP simulation laboratory mimics a provider’s office with examination rooms, a reception room, and hallway work stations with patient charts and computers. Space design and participant access to patients should also mimic “real-life” providers’ offices, which have both a professional and a medical feel. Generally, participants would be brought into the reception room and stationed in front of a preassigned examination room to familiarize themselves with a pre-encounter case study that will assist them as they prepare to conduct a patient interview and physical examination.

On entering the room, the participant should see and have access to the patient, the medical supplies, and the equipment, as well as the typical examination tables found in a provider’s office. The size of examination rooms may dictate placement of furniture and recording equipment and collaborative discussions with the simulation, and the health care construction consultant will be instrumental in the design of examination rooms. Strategic placement of mirrors will assist with providing multiple recording angles in any given room; collaborative discussion between the simulation and the audiovisual consultants is vital to ensure proper placement while providing the professional environment of examination rooms.

During the post-encounter period, participants may be required to complete exercises such as patient care notes, electronic medical records access, surveys, or assessment examinations at stations outside each examination room. The reception area allows for staging a proctor as a receptionist to monitor activity, as well as offering a relaxing seating area if the participant is participating in multiple encounters. The goal of participant flow is twofold: to provide the typical direction that participants would enter and leave patient examination rooms, and to ensure that the flow does not cross or come in

![Figure 1.1 Participant Flow.](image-url)
contact with actor flow. See Figure 1.1 for a graphical representation of participant flow into and out of the simulated patient examination rooms.

**SPACE AND WORK FLOW FOR ACTORS**

The human simulation center should provide the actor with (a) a backdoor access to patient examination rooms, (b) an area to change into patient gowns, and (c) an area to relax between encounters and during breaks. Space design for actor access should allow entry and egress to or from the simulated patient examination rooms without crossing the flow of participants, thus enabling the actor to travel to and from examination rooms and changing rooms, to prepare rooms with health care supplies and equipment, and to gain access to faculty observers. This back door access allows for the free flow work of the actors while protecting the integrity and feel of a “real provider’s office” for the participant. Generally, patients (actors) would never be viewed by providers performing room preparation or faculty consultation, and neither would health care students have faculty standing directly outside examination rooms observing student patient interactions, thus having the separate space for actors and faculty will aid in providing for a “real feel.”

On entering the room, the actor should have access to medical supplies and equipment from cabinets within the examination room for participant use during the simulation encounter. Easily removable instructional charts and case studies can be posted on the examination room door as called for by the case encounter forms. Restocking of examination gloves, medical linen, and medical supplies and equipment can be easily accomplished between cases and during breaks via the actors’ work flow without interrupting the participants’ encounter.

![Actor Flow Diagram](image-url)
During the post-encounter period, actors would document participants’ performance using a computer-generated checklist, which is typically completed immediately after the participant leaves the room; the immediate completion of this checklist allows for the actors’ immediate recall of observed performance and offers the participant a respite before returning to the examination room for feedback. Additional information regarding participant evaluation can be found in chapter 4. An actor “office drawer or cabinet” will allow storage of the actors’ personal belongings, as well as copies of the case encounter for referencing between encounters. See Figure 1.2 for a graphical representation of actor flow into and out of the simulated patient examination rooms.

**SPACE AND WORK FLOW FOR PROFESSIONAL STAFF**

The work flow of professional staff will differ as they support and come in contact with participants, patient actors, and faculty. Space design should allow for professional staff access to and from patient examination rooms the same as participants and patient actors. During the pre-encounter period, professional staff may be called on to assist participants in finding appropriate examination room assignment, interpretation of case studies outside the patient examination room, and in calming the nerves of the participant before entrance. In addition, professional staff may be called on to assist actors in room preparation, obtaining the needed case-specific medical supplies or equipment, or answering case-specific questions. The multidimensional work flow allows the greatest access to both participants and actors while protecting the integrity of the simulation experience.
During and after the simulation encounter, the professional staff will need access to the reception area (to assist the proctor or participants), the control room (to monitor filming), the observation room (to assist faculty and other observers), and the office space. The multidimensional aspect of work assistance that professional staff offers both participants and actors could have the professional staff in many rooms of the human simulation center. Proper planning will assist in the effective and efficient use of the space, and professional staffing needs may decrease the actual required full-time equivalents. Space design can also allow for assisting more than one group of participants; that is, appropriate professional staff can work with participants within the simulation suite reception room and then exit and attend to a participant in the classroom or observation area(s). See Figure 1.3 for a graphical representation of professional staff flow into and out of the simulated patient examination rooms.

SIMULATION-SPECIFIC CONSIDERATIONS

The SP experience is one of the three methods of simulation. Planning for effective use of simulation centers may require designs that create multiple methods simulation laboratories, combining SPs, HPSs, and task trainers. Individual specifications such as creation of a new simulation center building versus renovation of the current space, physical size and participant population (current and projected), and funds will affect the size, the level of audiovisual recording installation, and the types of capital equipment used. Familiarization with textbooks, networking, visiting existing simulation centers, and attending health care simulation conferences will greatly assist in the planning and creation of a simulation center that will meet the current and future simulation needs of any institution.

UTILITIES

Understanding utilities such as lighting, electric, plumbing, medical gases, and suction; how sound will affect recording; and security, server, and storage space is important in the design of any simulation center. With construction of an SP simulation center, decisions may be made as a cost-saving measure; because one of the outcomes of construction is to offer a “real-feel” environment, careful considerations should be made to construction costs. Lighting and plumbing and medical gases are expensive line items in any simulation budget. Lighting and plumbing are important in designing the SP laboratory; however, for simulation centers exclusively built for SP simulation, medical gases (such as oxygen and medical air) are typically not required, thus eliminating one expensive line item from the construction budget. Care should be taken in any line item deletions in the planning phase to ensure that no future use plans would change the focus of the simulation laboratories, thereby creating a need for expensive remodeling. Lighting and soundproofing rooms should be explored from the patient examination view as well as audiovisual. The ability to alter lighting and to turn off lights greatly aids the provider in eye examination; however, the ability to provide quality filming is diminished with decreased lighting. Training the SP on what a safe and competent eye examination should feel like will decrease the effects of poor quality recording during eye examination. Installation of sinks in examination rooms with hot and cold water is
an additional expense but a great investment toward the creation of a real environment and instruction and the reinforcement of infection control techniques. The adequate soundproofing of examination rooms proves beneficial for both patient assessment and recording of audio. The use of soundproof wall material from the floor, past drop ceilings, to meet the flooring structure of the ceiling assists greatly in preventing sound and noise from traveling between examination rooms and altering the quality of the recorded sound. The deliberate placement of microphones directed toward patient sitting and lying areas and away from noisy air ducts and speakers is suggested.

In the design of space, the storage space should be centrally located to aid with quick and easy access before and between encounters, and while restocking the simulation center at the end of the day. Multiple wide doors will allow for the easy storage of large medical equipment, such as examination tables, if you desire to transform an examination room into a simulated office or community waiting room. Examination rooms should contain space to allow storage of routine medical supplies, and bulk storage of medical supplies can be provided in the storeroom.

In the age of digital media, the placement of the control room and server space is not critical to the proximity of the simulation examination rooms for recording and monitoring of simulation encounters; however, care should be given to the distance of the control room if the expectation of the professional staff working in the control room includes providing assistance to other areas within the simulation center.

Security of space, computers and servers, medical equipment, and audiovisual data requires careful consideration during space planning. Door locks, electronic door card swipes, and electric monitoring of space may be determined by current institutional capabilities and policies. The recording of confidential data (audiovisual) may require additional security measures for students (Family Educational Rights and Privacy Act) as well as planned research activities (Institutional Review Boards and Health Insurance Portability and Accountability Act). The review of all applicable guidelines will help with the understanding and required measures in providing the appropriate level of security for space, equipment, and recorded encounters.

A VIRTUAL WALK-THROUGH

Envision it as a health care professional student. You are scheduled to participate in an SP encounter to measure your competence and skill obtainment in patient interview and assessment techniques. You arrive 15 minutes before the schedule at the simulation center’s classroom dressed in your finest professional attire and crisply pressed white laboratory coat, with your tools of practice (a pen light, a stethoscope, a tuning fork, a reflex hammer, and an iPod with electronic references). Your professor greets you warmly and spends 20 minutes providing a prepatient briefing and objectives of today’s visit to the simulation center. Approximately 5 minutes before your scheduled start time, you are escorted to the reception room and find your assigned examination room: 7. You take note of the door sign, which provides an introduction to your case, information about the patient you are scheduled to meet, a reminder of the objectives for the simulation experience (you make a note to thank your professor for this reminder), and a note on the time allowed. At the work station just to the left of the door sign, you note that there is a wall computer with access to your patient’s electronic medical record; you spend a few minutes looking up laboratory values and results of earlier
performed medical tests. There is an announcement overhead, which states “attention in the simulation center, you may now begin your encounter.”

It’s time. You confidently knock and enter the patient’s examination room. You encounter a 55-year-old patient lying on his left side in a fetal position, moaning in pain, asking for your help to make him feel better; something in the back of your mind says, “Take note of this, I think this might be important.” You introduce yourself to your patient, and while you are washing your hands, you ask the patient to share with you the reason behind his visit today to the provider’s office. You sit down and begin to implement the interview skills and techniques of interpersonal communication, obtaining the current information related to the chief complaint and pertinent past medical history, and a focused physical examination. You find yourself growing alarmed with the patient’s chief complaint of severe left flank pain and plan your assessment skills and diagnostic reasoning accordingly. Suddenly, there is an announcement that you have 5 minutes remaining to complete your encounter; you are surprised how quickly 35 minutes have passed and are confident that you have determined that your patient’s chief complaint is related to possible pancreatitis. You finish your patient encounter by educating him with the additional laboratory tests you would like to accomplish and a possible hospital stay, and ask again if he has any questions. You shake his hand and explain that you will return shortly; as you exit the room, an overhead announcement states, “Attention, the encounter is now over; please exit the examination rooms.” You nailed this one perfectly. You sit on one of the couches in the reception room and talk excitedly with one of your fellow students, being careful not to share any confidential patient information. Approximately 5 minutes later, you are invited back into examination room 7 and immediately notice that your patient is smiling and stands and shakes your hand as you enter the room. The feedback begins as you close the door and sit down across from an SP actor trained to provide targeted advice on your verbal and physical assessment skills. The 5 minutes allotted for feedback passes quickly. When the overhead announcement is made to exit the simulation center, you smile as you recall your answer to the actor’s quire, “What led you to focus your assessment on possible pancreatitis?” and you reply that it was his position on the examination table as you entered that began your targeted assessment.

CONCLUSIONS

The creation of an HPS center may begin with a dream; however, it ends with deliberate planning and designing. You begin to share this dream with a group of professionals trained and experienced in designing, planning, and constructing simulation centers is critical in ensuring effective and efficient space utilization. Designing a space that promotes the practice and objective assessment of a functional SP simulation center with state-of-the-art audiovisual capturing apparatus, medical equipment, and furniture will aid in the transformation of your dream into a reality. The creation of a learning laboratory that is clinically safe not only allows the participant to practice to the edge of her comfort zone, but also offers a sort of safety net in taking calculated risks in that your patients are not patients, but only actors playing patients, and your decisions (right or wrong) will not harm them. Your experience in the simulation laboratory will aid in your learning, practice at patient interview and physical assessment skills, and diagnostic reasoning.
REFERENCES


SUGGESTED READING