Simulation is an essential tool in academic and clinical settings, but technology changes quickly, and faculty, students, and clinicians need to know how to respond. Understanding simulation scenarios and environments is critical when designing and implementing effective programs for interdisciplinary learners.

In this fully revised second edition of *Mastering Simulation*, nationally known experts Janice Palaganas, Beth Ulrich, and Beth Mancini guide students and practitioners in developing clinical competencies and provide a solid foundation for improving patient outcomes. Coverage includes:

- **NEW:** Using simulation as a continuous learning system
- **NEW:** Understanding the new levels of fidelity
- **NEW:** Implementing new debriefing styles and methods and establishing safe learning environments
- Creating simulation scenarios and improving learner performance
- Designing program evaluations and managing risk and quality improvement
- Developing interprofessional programs and designing research using simulation

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Sigma Theta Tau International Honor Society of Nursing (Sigma) is a nonprofit organization whose mission is developing nurse leaders anywhere to improve healthcare everywhere. Founded in 1922, Sigma has more than 135,000 active members in over 100 countries and territories. Members include practicing nurses, instructors, researchers, policymakers, entrepreneurs, and others. Sigma’s more than 540 chapters are located at more than 700 institutions of higher education throughout Armenia, Australia, Botswana, Brazil, Canada, Colombia, England, Eswatini, Ghana, Hong Kong, Ireland, Israel, Jamaica, Japan, Jordan, Kenya, Lebanon, Malawi, Mexico, the Netherlands, Nigeria, Pakistan, Philippines, Portugal, Puerto Rico, Scotland, Singapore, South Africa, South Korea, Sweden, Taiwan, Tanzania, Thailand, the United States, and Wales. Learn more at www.sigmanursing.org.
About the Authors

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Janice C. Palaganas is the Director of Educational Innovation and Development for the Center for Medical Simulation in Boston, Massachusetts, Department of Anesthesia and Critical Pain Management, Harvard Medical School. She is also Associate Professor in Interprofessional Studies and Associate Director of the PhD Health Profession Programs at the Massachusetts General Hospital (MGH) Institute of Health Professions. Palaganas received her bachelor of science in nursing and two master’s degrees—adult nurse practitioner and geriatric nurse practitioner—from the University of Pennsylvania. She earned her PhD in nursing from Loma Linda University, where she explored healthcare simulation as a platform for interprofessional education.

Palaganas has developed a passion for teamwork from her background as an emergency nurse, trauma nurse practitioner, director of emergency and critical care services, and faculty for schools of medicine, nursing, allied health, management, a physician assistant program, and emergency medicine. As a behavioral scientist and former clinical nurse and hospital administrator, Palaganas focuses on using healthcare simulation as a platform for interprofessional education (IPE). She has served as a committee member for the publication of the National Academy of Medicine (formerly the Institute of Medicine) report on measuring the impact of IPE on practice. Palaganas’s primary role is to develop health profession educators in an IPE setting. She previously led the Center for Medical Simulation instructor course, which teaches simulation to educators all over the world. She developed the Center for Medical Simulation Interprofessional Virtual Campus as the principal investigator of a board grant awarded by the Josiah Macy Jr. Foundation. She is currently the chair of the Credentialing Commission for the Society for Simulation in Healthcare (SSH), overseeing the Accreditation, Certification, and Fellows Academy.

Palaganas has shaped the field of simulation, leading the development of the SSH’s accreditation and certification programs; served as Editor-in-Chief for the SSH’s first textbook, *Defining Excellence in Simulation Programs*; authored seminal articles; and coauthored field-changing research, including the National League for Nursing (NLN) study for high-stakes assessment using simulation. As the Associate Director of PhD Programs for Health Professions Education at MGH Institute of Health Professions, she has led the development and the launch of the first PhD Program in Simulation and in IPE. She has been invited as a keynote speaker for numerous national and international conferences.

Beth Tamplet Ulrich, EdD, RN, FACHE, FAONL, FAAN

Beth Tamplet Ulrich is a nationally recognized thought leader known for her research in nursing work environments and the experiences of new graduate nurses as they transition from nursing school into the workforce. Ulrich is also recognized for her leadership in developing the roles of nephrology nurses and improving the care of nephrology patients. Ulrich has extensive experience as a healthcare executive, educator, and researcher. She currently serves as Professor at the Cizik School of Nursing at the University of Texas Health Science Center in Houston, where she teaches in the
doctoral program, and as Editor-in-Chief of the *Nephrology Nursing Journal*, the official journal of the American Nephrology Nurses’ Association (ANNA). Ulrich previously served as the Vice President of Hospital Services for CAE Healthcare; has extensive senior executive experience in CNO, COO, and Senior Vice President positions in both hospitals and large healthcare systems; and has held graduate and undergraduate faculty positions. She has been a co-investigator on a series of national nursing workforce and work environment studies and on four studies of critical care nurse work environments conducted for the American Association of Critical-Care Nurses, and the primary investigator on two ANNA national studies on nephrology patient and nurse safety.

Ulrich received her bachelor’s degree from the Medical University of South Carolina, her master’s degree from the University of Texas Health Science Center at Houston, and her doctorate from the University of Houston in a collaborative program with Baylor College of Medicine. She is a Past President of the American Nephrology Nurses’ Association, a Fellow in the American College of Healthcare Executives, a Fellow in the American Organization for Nursing Leadership, and a Fellow in the American Academy of Nursing. She was recognized as the Outstanding Nursing Alumnus of the Medical University of South Carolina in 1989 and as a distinguished alumnus of the University of Texas Health Science Center at Houston School of Nursing in 2002, and she received the Outstanding Contribution to the American Nephrology Nurses’ Association award in 2008. In 2018, she received the Marguerite Rodgers Kinney Award for a Distinguished Career from the American Association of Critical-Care Nurses. She has numerous publications and presentations to her credit on topics including nephrology nursing, nurses’ work environments, and how new graduate nurses transition into professional nurses. Both the first and the second editions of her landmark book *Mastering Precepting* received *American Journal of Nursing* Book of the Year Award recognitions in two different categories. In 2014, Ulrich and Beth Mancini collaborated to publish the first edition of *Mastering Simulation: A Handbook for Success*, which was also honored with an AJN Book of the Year award.

**Mary Elizabeth (Beth) Mancini, PhD, RN, NE-BC, FAHA, FSSH, ANEF, FAAN**

Mary (Beth) Mancini is Professor and Senior Associate Dean for Education Innovation at The University of Texas at Arlington College of Nursing and Health Innovation, where she holds the Baylor Professorship for Healthcare Research. Before moving to an academic role in 2004, Mancini was Senior Vice President for Nursing Administration and Chief Nursing Officer at Parkland Health & Hospital System in Dallas, Texas, a position she held for 18 years.

Mancini received an ADN from Rhode Island Junior College, a BSN from Rhode Island College, a master’s in nursing administration from the University of Rhode Island, and a PhD in public and urban affairs from the University of Texas at Arlington. She completed a Johnson & Johnson Wharton Nurse Executive Fellowship at the Wharton School of Business of the University of Pennsylvania and a National Association of Public Hospitals Management Fellowship program through the Robert F. Wagner Graduate School of Public Service at New York University.
Mancini is internationally recognized for her groundbreaking work in simulation and in high-quality, high-volume, accelerated online education. Her work in this area resulted in UTA's College of Nursing becoming the country's largest college of nursing in a public university and led to the College of Nursing receiving the Texas Higher Education Coordinating Board's prestigious Star Award in 2012. In recognition for her many contributions to the fields, Mancini was inducted as a Fellow in the American Academy of Nursing, the National League for Nursing's Academy of Nurse Educators, the American Heart Association, and the Society for Simulation in Healthcare. In 2013, she was recognized with a Regent's Outstanding Teaching Award from the University of Texas system and was appointed a visiting scholar in innovation and simulation at the University of Pennsylvania School of Nursing. In 2014, she was reappointed as a visiting scholar in simulation and curriculum.

Mancini is an active volunteer with numerous professional organizations. She currently serves as a member of the National Academies of Science Global Task Force on Innovations in Health Professions Education and a member of the American Heart Association's Educational Science and Program committee, as well as its Get With The Guidelines–Resuscitation work group. She is also co-chair of the Basic Life Support Task Force for the International Liaison Committee on Resuscitation. She has served as President of the Society for Simulation in Healthcare and is a member of the Royal College of Physicians and Surgeons of Canada's Simulation Task Force and the World Health Organization's Initiative on Training, Simulation, and Patient Safety.

Mancini's research interests include innovations in education, interprofessional collaborative practice, and the development of high-performing healthcare teams through the use of simulation. She has received more than $6.5 million in competitive grants, has more than 100 publications to her credit, and is a sought-after speaker at local, national, and international conferences on topics such as simulation in health professions education; innovations in online education; development of high-volume, high-quality educational programs; patient safety; outcomes related to basic and advanced life support education; and work redesign.
Contributing Authors

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Eric B. Bauman, PhD, RN, FSSH, an award-winning educational designer and author, is a proven innovation leader who promotes the integration and evaluation of emerging technology for health professions education. He is founder and managing member of Clinical Playground LLC, a consulting service focusing on the nexus of academic and industry collaboration with demonstrated success and extensive experience leveraging simulation, mobile technology, game-based learning, and virtual environments to support paradigm shifts in the educational processes. Bauman received his PhD from University of Wisconsin-Madison School of Education, where he studied with renowned scholars at the forefront of the game-based learning movement. Bauman is a sought-after collaborator and speaker. He has authored and coauthored numerous academic articles, books, and chapters on simulation and game-based teaching and learning. Bauman is a Society for Simulation in Healthcare Fellow (FSSN) and a member of Sigma Theta Tau International Honor Society of Nursing (Sigma) and of the International Nursing Association for Clinical Simulation and Nursing.

Deborah Becker, PhD, RN, ACNP, BC, CHSE, FAAN, is a Practice Professor of Nursing at the University of Pennsylvania. Becker served as Director of the Helene Fuld Pavilion for Innovative Learning and Simulation from 2013 to 2018. There, she oversaw the integration of simulation into both undergraduate and graduate curricula in collaboration with course and program faculty. Becker has taught simulation for more than 25 years in hospital and academic settings and consults nationally and internationally on the meaningful use of simulation for teaching and evaluation. Recently she has focused on developing interprofessional education and collaborative programs using simulated scenarios as the vehicle to test approaches to tackling global problems.

Stephanie D. Boyd, PhD, is a Research Associate in the Division of Emergency Medicine and the Center for Simulation and Research at Cincinnati Children's Hospital, where she has worked for the past three years. Since arriving at Cincinnati Children's, her primary focus has been on the development of effective outcomes measures in simulation education. Previously, she was a Research Associate at the Center for Evaluation and Program Improvement at Vanderbilt University, where she contributed to the development and evaluation of communication trainings using standardized patients in novel scenarios.
Teresa Britt, MSN, RN, CHSE, is the Director of Education at the Center for Healthcare Improvement and Patient Simulation (CHIPS) at the University of Tennessee Health Science Center. In her current role, she serves as a simulation mentor to faculty from six different colleges and assists community clinical partners with their simulation courses. She was one of the founding board members for the Tennessee Simulation Alliance and is currently President of that organization. In 2016, Britt was selected by the National League for Nursing as a Simulation Leader and continues to work on projects with this group. She served as team leader at the Interprofessional Education Collaborative Institute and is one of the founding members of the Mid-South Interprofessional Health Education Collaborative. She serves actively on committees for the International Nursing Association for Clinical Simulation and Learning, the Association of Standardized Patient Educators, and the Society for Simulation in Healthcare. Britt's interests are in faculty development, patient safety, and simulation for replacement of traditional clinical training.

Sandra Caballero, MSN, RN, CHSE, is the Director of Simulation at the F. Marie Hall SimLife Center at the Texas Tech University Health Sciences Center (TTUHSC), Assistant Professor at the TTUHSC School of Nursing, and a site coordinator for the TTUHSC School of Nursing's accelerated program. Caballero has obtained her certification in simulation education and contributes in online as well as on-site modules relating to all aspects of simulation pedagogy. She also serves as a debriefing coach for the National League for Nursing. Caballero has presented at local, state, and international conferences. She is a sim leader alumni of the National League for Nursing. Caballero received both her bachelor's and master's degrees from the TTUHSC School of Nursing.

Carol Noe Cheney, MS, CCC-SLP, began her career in 1995 as an acute medical speech-language pathologist for Banner Health, a large nonprofit healthcare system. In 2005, she assumed the position of Operations Director of the Simulation Education and Training Center (SimET) at Banner Good Samaritan Medical Center in Phoenix, Arizona, while it was still in the conceptual and development stage. Cheney led the planning, design, and development of a 55,000-square-foot simulation medical center at Banner Mesa. In 2011, Cheney became the Senior Director of Clinical Education and Simulation for Banner Health, responsible for simulation education and nursing, physician, and multidisciplinary clinical education, including electronic medical record training. Cheney is now the Vice President of staffing and staff recruiting for Banner Health.

Jane Crofut, RN, MAOM, is a Healthcare Planning and Medical Education Specialist at GSBS Consulting. With more than 25 years of experience in healthcare and medical education, Crofut is a respected developer and leader of simulation lab designs that support rapidly evolving, experiential learning pedagogies. Crofut's expertise in business analytics, curriculum delivery requirements, and quality patient care give her a unique perspective that enables her to combine operational optimization with future-forward, flexible space design. It's a perspective gained through a varied career that began as a trauma flight nurse and spans advocacy for patient safety and outcomes, roles in academia and healthcare administration, and architectural planning. In the past 15 years, Crofut has helped more than 40 institutions implement innovative health and educational programs with visioning, business planning, funding, space design, specialty equipment selection, curriculum development, program implementation, and faculty education.
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Chad A. Epps, MD, FSSH, is the Executive Director of the Center for Healthcare Improvement and Patient Simulation (CHIPS). CHIPS is a 45,000-square-foot, stand-alone simulation building at the University of Tennessee Health Science Center, where he is also a Professor in the departments of anesthesiology and interprofessional education. Epps trained in anesthesiology and completed a fellowship in healthcare simulation at the Mount Sinai Medical Center in New York City. As a fellow, faculty, and director of simulation, he has been active in simulation education, research, assessment, and center management for the past 15 years. He is a Past President of the Society for Simulation in Healthcare and a past chair of the Council on Accreditation of Healthcare Simulation Programs. Epps has published in the areas of simulation-enhanced interprofessional education and co-edited the textbook *Defining Excellence in Simulation Programs*.

Crystel L. Farina, MSN, RN, CNE, CHSE, is the Director of Simulation and Experiential Learning at the George Washington University School of Nursing (GWSON), where she leads simulation experiences for graduate and undergraduate nursing students. Farina studies and creates new simulation and debriefing models that serve as substitutes for traditional clinical experiences to better prepare nurses for today’s increasingly complex healthcare environment. Before joining GWSON, Farina was the Director of Simulation for Health Professions at Chesapeake College in Wye Mills, Maryland. There, she launched the Chesapeake Institute for Medical Simulation (CIMS) in the Health Professions and Athletic Center. The CIMS provides simulation-learning activities for nursing, EMS, surgical technology, and radiologic technology professionals. She leveraged CIMS to increase revenue by developing professional development programs with Compass Regional Hospice, hosting the Mid-Atlantic Regional Human Patient Simulator Network with CAE Healthcare, and collaborating with the Maryland Film Office to film *Investigative Discoveries*. Farina has presented at international and regional meetings on debriefing, failure to rescue, and core concepts in simulation. Farina serves on the faculty of the Maryland Clinical Simulation Resource Consortium (MCSRC) and is a member of the MCSRC Steering Committee. She is also the Chief Financial Officer of SIMPL Simulation LLC.

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**Teresa N. Gore, PhD, DNP, FNP-BC, NP-C, CHSE-A, FAAN**, is an Associate Professor and Assistant Dean of Experiential Learning and Simulation at the University of South Florida College of Nursing in Tampa, Florida. She is a Past President of the International Nursing Association for Clinical Simulation and Learning (INACSL). Major themes of Gore's work are the dissemination of the INACSL “Standards of Best Practice: Simulation” and how to operationalize the standards. These have been demonstrated by her involvement in the establishment of the INACSL and its development of the first standards of best practice, which were incorporated into the National Council of State Boards of Nursing (NCSBN) National Simulation Study. Gore has combined her expertise in clinical skills and simulation to advance the science of nursing by authoring multiple book chapters and journal articles. She is one of 35 Certified Healthcare Simulation Educators-Advanced (CHSE-A) worldwide. A recognized simulation expert, she has been invited to speak throughout North America, Europe, and China. Her unique knowledge base has enabled her to teach educators how to operationalize high-fidelity simulation templates using INACSL standards for baccalaureate and advanced practice nursing students.

**Katie Anne Haerling, PhD, RN**, is an Associate Professor at the University of Washington Tacoma in the Nursing and Healthcare Leadership Program. She earned her PhD in nursing from Washington State University in Spokane, Washington. Her current research includes the use of simulation to examine the effects of incivility on emotional status, team behavior, and performance, and a cost-utility analysis comparing virtual and mannequin-based simulation activities. Haerling's mission is to help identify the most effective and efficient ways to prepare the next generation of healthcare professionals and to contribute to the evidence base supporting better healthcare education. She believes improving healthcare providers' education will support improved healthcare and a healthier nation and world. Her clinical expertise includes maternal-child and medical-surgical nursing.

**Valerie M. Howard, EdD, MSN, RN, CNE, FAAN**, is the Associate Dean for Academic Affairs at Duke University School of Nursing. She has more than 21 years of experience in higher education, with the past 14 years dedicated to researching, developing, implementing, and evaluating innovative teaching methods as well as leadership and team-building experiences across the curriculum. Before joining the faculty at Duke, Howard served as Dean of the School of Nursing and Health Sciences and Assistant Dean for External Affairs at Robert Morris University (RMU). Howard created the Society for Simulation in Healthcare-accredited RMU Regional Research and Innovation in Simulation Education (RISE) Center and served as its founding director. She was President of the International Nursing Association of Clinical Simulation and Learning (INACSL) from 2011 to 2013 and received the INACSL Excellence Award in Research in 2010. Howard worked with a team to develop the inaugural Elsevier Simulation Learning System, a curricular support system to assist with the implementation of simulation experiences that is now used at more than 400 schools of nursing. She also developed the STRIVE Model to guide educators in designing and planning simulation programs at their institutions. She created the RMU Leadership in Simulation Instruction and Management Certificate Program to prepare faculty to implement simulation in their curricula. Howard earned her EdD in higher
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**Karen Josey, MEd, BSN, RN, CHSE,** is the Simulation Senior Director for Banner Health. She has more than 41 years in nursing, with a background in leadership, simulation, ICU, medical imaging, and training center operations. Josey has worked in simulation since 2007, when Banner opened its first simulation center. Her scope includes leadership and operations of four simulation centers that cover six states. Josey has been integral in standardizing simulation throughout the Banner system as well as achieving accreditations through the American College of Surgeons and the Society for Simulation in Healthcare in all five standards. Josey is passionate about delivering realistic innovative products, from complex critical care mega-simulations for 500-plus learners, to in-situ simulations, to collaborating in the development of OB and trauma 360 virtual reality simulation videos for just-in-time education anywhere. She has been a Certified Healthcare Simulation Educator (CHSE) since 2012 and participated in the initial CHSE pilot. Josey has numerous publications, including work on in-situ mock codes at a system level that produced positive patient outcomes.

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**Steve Kopp, AIA, ACHA,** is an Associate Vice President and Senior Designer at CannonDesign, an innovative architecture-engineering firm that specializes in healthcare, education, and research. As an interior architect with 20 years of experience in healthcare and medical education, Kopp believes that evidence-based design can be integrated with beautiful interior architecture to create functional and cost-effective solutions for institutional clients. He has completed large healthcare building projects for Kaiser Permanente and Texas Children's Hospital, as well as medical simulation projects for Houston Methodist and the Cizik School of Nursing at UTH Health. Kopp is a registered architect in California and Texas.
Thomas E. LeMaster, MSN, MEd, RN, CHSE, FSSH, is responsible for the operation of the simulation program at the University of Florida Center for Experiential Learning and Simulations. This includes the development, implementation, and evaluation of simulation educational program policies and procedures. He is also responsible for administrative tasks related to the simulation program. He assists teams to determine gaps in skills, care delivery, and critical thinking. With the assistance of content experts, LeMaster conducts formative evaluations, assesses clinical competencies, and coordinates and directs in-situ simulations in the hospital setting, including multidisciplinary team training.

Previously, LeMaster served as Manager of Simulation at St. Jude Children's Research Hospital, National Manager of SIMCARE Operations at Chamberlain College of Nursing, and Director of Operations for the Cincinnati Children's Hospital simulation program. This work included operations manual development, facilitation of education, and scenario development. In addition, LeMaster developed, implemented, and directed healthcare simulation education, and focused on teamwork, communication, and patient safety. He has participated and played a key role in operationalizing research activities including several federal AHRQ grants. LeMaster is a registered nurse with experience in pediatric and adult care.

Joseph O. Lopreiato, MD, MPH, CHSE-A, was commissioned as an ensign in the United States Navy Medical Corps in 1977 and received his MD degree from Georgetown University in 1981 under the Health Professions Scholarship Program. He completed his pediatric internship and residency at the National Naval Medical Center in Bethesda, Maryland, in 1984. He was then assigned as staff pediatrician and general medical officer at several locations before being assigned to the Uniformed Services University (USU) of the Health Sciences in Bethesda, Maryland. There, he became an Assistant Professor of pediatrics and clerkship coordinator. He completed a fellowship in faculty development at Michigan State University. He then completed a two-year fellowship in academic general pediatrics and earned a master's of public health at the University of Texas. In 1999, Lopreiato was named Program Director of the National Capital Consortium pediatric residency program. In 2003, he became the medical director of the Val G. Hemming Simulation Center at USU—a 30,000-square-foot facility that uses standardized patients, human patient simulators, task trainers, and virtual reality simulations to train 170 medical students, 45 advanced practice nurses, and several residency and fellowship programs in the Washington, DC, area. In 2009, he completed a 31-year career in the United States Navy Medical Corps and became a civilian employee of the Department of Defense, directing programs at the simulation center. He is currently the Associate Dean for Simulation Education and Professor of Pediatrics, Medicine and Nursing at USU.

Jody R. Lori, PhD, CNM, FACNM, FAAN, is Professor and Associate Dean for Global Affairs at the University of Michigan School of Nursing, where she also serves as Director of the PAHO/WHO Collaborating Center for Nursing and Midwifery. A Fellow in the American College of Nurse Midwives and the American Academy of Nursing, Lori's work uses community-based participatory research to develop and test new models of care to address the high rates of maternal and newborn mortality in sub-Saharan Africa. Her research has examined the impact of maternity waiting homes as a system-based intervention to increase access to quality intrapartum and postpartum care for women and newborns in Liberia and Zambia living far from a health facility. Lori conducted the first trial of group
antenatal care in sub-Saharan Africa and is currently conducting a cluster randomized controlled trial in Ghana to test the efficacy of group antenatal care.

Jennifer L. Manos, MBA, MSN, RN, is the Executive Director for the Society for Simulation in Healthcare (SSH). Prior to her employment with SSH, she was a critical care nurse and simulation education specialist at Cincinnati Children's Hospital Medical Center (CCHMC). She received her bachelor of science in nursing, master of science in nursing, and master of business administration degrees from Indiana Wesleyan University. Manos has been involved in nonprofit management for 10 years. She has directly managed the development and implementation of the SSH accreditation program, the International Meeting on Simulation in Healthcare, the Asia Pacific Meeting on Simulation in Healthcare, the Regional SimOps conference, SSH general operations, and financial oversight for the organization. Manos was a pediatric critical care and trauma resuscitation nurse for 10 years and an education specialist with the Center for Simulation and Research at CCHMC for seven years. She developed and implemented various programs at CCHMC, including the Pediatric Emergency Management Simulation course, the Cardiac Intensive Care and Pediatric Intensive Care Serious Safety Event Reduction courses, an institution-wide simulation mock code program, and simulation curriculum for testing new spaces and healthcare teams.

David Marzano, MD, has a strong background in the field of medical education. He serves as an educator for medical students at all levels of learning and for residents as the OBGYN Residency Program Director at Michigan Medicine. His area of research interest includes the use of simulation for educational purposes and the development of interprofessional team training to improve patient safety. As a member of the American College of Obstetrics and Gynecology Simulation Working Group, he has been active in developing simulated-based curricula for the care of pregnant patients. He has also developed curricula addressing multidisciplinary care of pregnant patients as well as training modules for gynecologic surgical procedures.

Juli C. Maxworthy, DNP, MSN, MBA, RN, CNL, CPHQ, CPPS, CHSE, FNAP, FSSH, has been a nurse for more than 30 years. She began her career working in an open heart and trauma unit. After her last clinical position as VP of Quality and Risk at a district hospital, she moved into academia full time and is currently a tenured Associate Professor at the University of San Francisco (USF). Her roles at USF have included teaching in the doctor of nursing practice (DNP)/executive leadership DNP program and the healthcare simulation program, working as Director of the Healthcare Simulation Program, and serving as chair of the Healthcare Leadership and Innovations Department. For more than a decade, Maxworthy has been involved in healthcare simulation. She served as the Secretary on the International Board of Directors for the Society for Simulation in Healthcare (SSH) from 2017 to 2019 and is currently a Director at Large. She has led the revision of accreditation standards; is an accreditation program reviewer; is an Editor of the leading healthcare simulation textbook, Defining Excellence in Simulation Programs; and has written multiple articles, chapters, and textbooks on a variety of subjects. In 2017, she was inducted into the inaugural class of the SSH Fellows Academy. Maxworthy also served as Vice President on the International Board of Directors of Sigma Theta Tau International. In 2008, she founded a successful consulting firm called WithMax Consulting Inc. to provide healthcare consulting and medical writing services for the clinical development of experimental drugs.
Chris McClanahan, DNP, RN, CHSE, is the Director of Simulation and Interprofessional Education at St. David’s School of Nursing, Texas State University. McClanahan is a highly motivated, focused, outcomes-oriented educator with experience operating and managing multiple interprofessional simulation centers within large universities in Central and West Texas. A dynamic and aggressive path has led McClanahan to progressive leadership development, equitable systems management, and successful educator and management roles. McClanahan received his BSN and MSN from Lubbock Christian University in 2009 and 2010, respectively, and his DNP from Texas Tech University in 2014. McClanahan's doctoral research took a deep dive into the operational and management practices of clinical simulation centers in the US. He received his Certified Healthcare Simulation Educator (CHSE) certification in 2017. McClanahan holds membership in numerous professional organizations, has served as a reviewer for the Society for Simulation in Healthcare's annual conference poster and podium presentations, and has served as chair of the Directors of SIM Centers SIG.

Gerald R. Moses, PhD, FSSH, is the Director of Medical Simulation Training at the Anne Arundel Medical Center. He has more than 20 years of pioneering experience in advanced telesurgical and simulation training. He has demonstrated expertise in developing, directing, and leading simulation training of healthcare providers in academic medical centers and government facilities. Moses is a proven developer of medical simulation training and certification, helping to establish the technology as a viable education tool at more than 400 centers. He is skilled at coordinating and directing medical simulation training for medical residents, students, and healthcare providers in academic, medical, and research environments.

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Shelly J. Reed, PhD, DNP, APRN, CNE, is an Associate Teaching Professor at Brigham Young University. She teaches in the area of maternal, child, and global health. She is the coordinator of an obstetric and pediatric simulation course. Reed began researching aspects of simulation debriefing in 2007. Both her DNP thesis and her PhD dissertation investigated this topic. Reed developed a tool called the Debriefing Experience Scale that evaluates the participant's debriefing experience and has shared this tool with researchers in the US and internationally. Recently, she developed a second debriefing evaluation tool that evaluates learning and engagement behaviors during debriefing. Clinically, Reed works as a nurse practitioner in OB emergency services. She has experience as a nurse
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Foreword

By Suzan Kardong-Edgren, PhD, RN, ANEF, CHSE, FSSH, FAAN

I am writing this foreword as the extended fallout from the COVID-19 pandemic continues to affect education and healthcare in nations around the world, in ways we are all still trying to understand. Thank goodness simulation educators have been honing their craft for the past 20 years and were ready to step into the breach and take up the slack at an unprecedented time in modern history.

No one expected a “black swan” event that would force so many health professions students out of their clinical practice environments. The same is true for many of their clinical educators, who may have been aware of simulation but never practiced it. Countless educators are suddenly being thrust into the simulation arena with little or no preparation. Many are literally one step ahead of their students. Thus, the timing for a second edition of Mastering Simulation: A Handbook for Success couldn’t be better!

This book is a one-stop shop for both novice and experienced simulation educators to gain or refresh foundational simulation knowledge. This text is edited by three of our most experienced educators and leaders in healthcare and simulation: Janice Palaganas, Beth Ulrich, and Beth Mancini. The editors have assembled some of the best simulationists in the field to provide updated chapters that seamlessly take the reader through simulation history, basic theory and practice, various uses of simulation, increased professionalization of the discipline through certification, and careers in simulation. They end with a glimpse into the future of simulation—a future that experienced simulationists knew would eventually come but maybe not in this way. It is a future made all the brighter because simulation was well positioned to provide an alternative to traditional educational methods in this unprecedented time.

–Suzan Kardong-Edgren, PhD, RN, ANEF, CHSE, FSSH, FAAN
Nurse Scientist, Texas Health Harris Methodist Hospital Ft. Worth and Frisco, Texas
Senior Fellow, Center for Medical Simulation, Boston, Massachusetts
Foreword

By David Marshall, JD, DNP, RN, FAAN, FAONL

My earliest introduction to caring for others was when I was an 11-year-old Boy Scout earning my very first merit badge—the first aid badge. I remember the first time I pinched a bandage between my fingers and carefully rolled it around an ankle. I learned to splint a fracture, apply pressure to stop bleeding, and use lifesaving resuscitation techniques.

Even after 35 years as a licensed professional, I trace my desire to become a nurse to this first spark of knowledge that I could help alleviate someone's pain and suffering—maybe even save a life—with those basic skills I practiced on my fellow Scouts using supplies our leader wrangled from a local hospital. This feeling has sustained my nursing career at the bedside and as an executive.

Another important lesson of that first merit badge is the crucial role simulation plays in acquiring skills. Instead of practicing on my fellow Scouts, though, I work at an institution that has a state-of-the-art center with computer-controlled virtual patients that can breathe, bleed, and blink. We can practice high-fidelity simulations—everything from delivering a baby to performing an emergency intubation. Well beyond the basics I approached in boyhood, we re-create realistic scenarios for every imaginable aspect of acute care, ambulatory care, critical care, procedures, and surgeries.

Rapid innovations and advances in technology make this an incredible time to work in patient care. At the same time, our patients are increasingly sophisticated. Even the simplest online search turns up in-depth information about patient outcomes and safety. Nurses have never been asked to do more, and the expectations placed on them have never been higher. Simulation is our best training tool, allowing an interdisciplinary team to practice as a cohesive unit. It's also a powerful tool for achieving what every caregiver ultimately wants most: better outcomes for our patients.

This compassionate drive to be the best we can be for our patients fuels the culture of learning in nursing. We are never done training. We are never done acquiring and honing our skills. Day after day, I see nurses balance efficiency, effectiveness, and technical proficiency with personal caring to meet the diverse needs of their patients. Every day that nurses report to their unit, round on a patient, or scrub in for surgery, they encounter something new. The only prescription for handling the unexpected is again borrowed from my Boy Scout past: Be prepared.

Janice Palaganas, Beth Ulrich, and Beth Mancini recruited the finest interprofessional simulation experts to contribute to this volume. It serves as a practical guide for practitioners and students alike to translate the potential of simulation as a training tool into a powerful instrument that improves the outcomes of patients at their own institutions.

–David Marshall, JD, DNP, RN, FAAN, FAONL
Senior Vice President & Chief Nursing Executive
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**Introduction**

“Simulation is the key to patient safety and medical quality.”

—John Nance, author of
Why Hospitals Should Fly

One of the biggest challenges we face in healthcare is how to educate and train healthcare professionals without endangering patients—especially when we are teaching the management of high-stakes situations such as codes, trauma care, chest pain, or anaphylactic shock, in which any delay in treatment threatens the outcome. Often, new healthcare practitioners enter their profession without ever having seen—much less gotten experience with—many high-risk/low-volume patient conditions.

The use of simulation is growing exponentially in academic and service settings. Simulation can enable students, new graduates, and experienced clinicians to develop clinical competence and confidence in caring for patients in a learning environment that is cognitively and emotionally realistic and safe for the learner—and does not compromise patient safety or outcomes. Simulation can be applied to many clinical situations—far more than a learner can be exposed to in a live clinical environment. Simulation activities need not be bound by one profession, time, or place. Simulation can be expanded to include the systems dynamics of care, interprofessional teamwork, and considerations for hospital technology and equipment at any point in the healthcare continuum.

In a clinical setting, simulation can be used to onboard new graduates and experienced staff. Simulation also offers the ability to objectively assess the performance of healthcare professionals based on a well-defined standard of practice. Many organizations carefully assess the competency and performance of new staff, but—other than perhaps yearly skills fairs—do little to ensure that existing staff continue to meet standards of practice and follow evidence-based and best practice processes and protocols. Renewing nursing or medical licenses generally requires only paying a fee and completing continuing education programs—not demonstrating continued competence. Simulation can be developed for continued development of staff and educators. Although we know much more about healthcare education today than we did 20 years ago, much has yet to be discovered. Research is changing healthcare practice on an almost daily basis. To assume that all professionals who renew their licenses are competent in the knowledge and skills needed to practice in the current environment is naïve at best and dangerous at worst—something Florence Nightingale knew and was passionate about more than 100 years ago. It often surprises people to learn that Nightingale opposed the registration of nurses. The reason was that she thought you could not know whether a nurse was competent based on just the fact that the nurse had finished nursing school or passed a written examination. In an 1888 letter to the probationer nurses at St. Thomas Hospital, Nightingale wrote:

> She [the nurse] may have gone to a first rate course—plenty of examinations. And we may find nothing inside. It may be the difference between a nurse nursing and a nurse reading a book on nursing. Unless it bear fruit, it is all gilding and veneering; the reality is not there, growing, growing every year. Every nurse must grow. No nurse can stand still, she must go forward, or she will go backward, every year. And how can a certificate or public register show this?

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Simulation can be used to improve an organization’s ability to ensure that all its clinicians maintain competence. Knowing is not doing. Simulation can demonstrate the successful application of knowledge.

There is also growing evidence that simulation is effective in developing, assessing, and improving the performance of healthcare teams. Much as the aviation industry first used flight simulators to teach the “hard” skills of piloting airplanes, such as takeoffs, landings, and handling mechanical emergencies, healthcare began using simulators to teach the “hard” skills of caring for patients—diagnosing and using medications and other interventions in response to a patient’s physiological changes. A series of high-fatality plane crashes caused the aviation industry to look beyond the hard-skill training solutions to improve how their people worked together and communicated with each other. This led to the development of what is now called crew resource management (CRM). CRM redefined roles and expectations; created a culture of transparency; encouraged people to learn from errors; and pushed for the development of training, processes, and standards to enable leaders to quickly create highly functional teams from a group of crew members who very often have never worked together. All these practices have been integrated into the aviation industry’s simulation experiences. As a result, air travel is safer than ever. Like the aviation industry, the healthcare industry has come to understand that how healthcare professionals work together can have a major impact on patient safety and improving patient outcomes. Just as aviation uses simulation to teach CRM to its professionals, healthcare can use simulation to develop highly functional teams.

Simulation can contribute to risk management and quality improvement activities. It can be used to identify latent threats to patient and clinician safety, allow clinicians to test “what if” scenarios (e.g., what if we used another drug? Or, what if we did intervention B before intervention A?), and perform trial runs of new techniques, equipment, and patient-care areas.

Who Should Read This Book?

The primary audience for this book is healthcare professionals in both academic and service settings who are currently using or anticipate using simulation, including schools of nursing and medicine, EMT training programs, the military, and hospitals and healthcare systems. The availability of education for simulation professionals and others involved peripherally with simulation has not kept up with the rapid growth of simulation use in academic and service settings. Many simulation professionals are receiving their education on simulation through on-the-job, just-in-time training.

This book is designed as a professional resource and as a support text for simulation courses. It is also a book for healthcare leaders who want to learn more about what simulation can offer their organizations, who are looking for ways to standardize how healthcare is delivered, and who understand that ensuring that competency is maintained is equally or more important than determining competency when healthcare professionals enter their professions.

This book is a handbook for individuals working in or preparing to work in simulation and for academic and service organizations that are using or are planning to use simulation. The book is both evidence-based and pragmatic. It is written in a style that can be easily read by busy healthcare professionals and provides strategies that can be immediately integrated into practice.

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Second Edition

Since the first edition of this book was published, healthcare simulation has taken the stage as the most innovative educational methodology due to its many advantages. Many academic and hospital organizations, researchers, and credentialing bodies have encouraged and promoted its use, holding simulation as a gold standard of healthcare education. Since we wrote the first edition of this book, there has been increasing and renewed interest in developing the field of healthcare simulation. This edition continues to draw on foundational thoughts and findings while integrating current evidence in healthcare, education, behavioral science, neuroscience, and related fields as we seek to provide a balance of theory, evidence, and practical approaches.

In this edition, all chapters have been updated with the most current information. We have also added a new chapter, Chapter 7, on the use of simulation along a continuous learning system. This chapter suggests ways in which we can expand our current activities to bridge gaps in education and practice and facilitate the longitudinal sustainment and improvement of knowledge. We hope that in future editions of this book, we will be able to include new evidence that you, our readers, develop as you apply what you read here to your practice.

Book Content

Whether you are looking for a primer on simulation or information to improve your existing knowledge and expertise in the simulation specialty, Mastering Simulation has content for you.

- The book begins with an overview of the foundations of simulation in Chapter 1, familiarizing the reader with simulation terminology, philosophic foundations, and educational principles and describing the range of simulator typology that is currently available.
- Chapter 2 discusses competence and confidence, the relationships between them, and how simulation can be used to develop both in clinical performance.
- Chapter 3 describes the necessity and means of creating effective simulation environments that encourage participants to suspend disbelief and fully engage in the simulation as if they were caring for a live patient.
- Developing and planning scenarios, including detailed scripts for simulations and simulation environments, are discussed in Chapter 4.
- Chapter 5 offers information on the debriefing component of the simulation experience—including how to guide simulation participants through reflecting on their experiences.
- In Chapter 6, strategies and techniques to evaluate simulation effectiveness are described.
- In Chapter 7, the use of simulation along a continuous learning system is discussed.
- Simulations with specific learner populations are discussed in Chapter 8.
- The importance of interprofessional education and practice is increasingly being recognized. Chapter 9 is dedicated to understanding how simulation can be used to develop and enhance high-functioning teamwork.
• Using simulation in academic environments is the topic of Chapter 10.
• A discussion on how to use simulation to improve outcomes in hospitals and healthcare systems is found in Chapter 11.
• Chapter 12 addresses using simulation for risk management and quality improvement, including identifying latent threats and improving processes.
• Chapter 13 provides information on designing and implementing simulation-based research.
• Chapter 14 is a resource for individuals who want to enter or expand their careers in the field of simulation, as well as for simulation programs, providing descriptions of simulation roles and positions.
• Credentialing of individuals and simulation programs is described in Chapter 15.
• Chapter 16 offers the information you need to develop and build a simulation center—from the initial planning and assessment process to space and design recommendations.
• The final chapter of the book, Chapter 17, looks to the future and describes the issues, challenges, and opportunities that are evolving around the use of simulation in healthcare.

Final Thoughts

We wrote this book with two goals in mind: to provide a comprehensive resource for simulation professionals and to raise awareness of the depth of knowledge and expertise required to use simulation strategies efficiently and effectively in healthcare. Although there are identified best practices related to the implementation of simulation methodologies, there is no single best way to integrate simulation into health profession education or healthcare practice. Simulation has many techniques, many places to be used, and many ways in which the impact can be measured.

Every week, we hear of new ways that simulation is improving patient care and enhancing patient safety. At this point in the life cycle of simulation, we need to stay nimble and innovative, being careful not to become too rigid or tied to any one method or way to do things. We also need to actively look outside the domain of healthcare for guidance; the lessons learned by aviation, military science, and others who use simulation successfully are applicable to healthcare.

The use of simulation in healthcare is limited only by our creativity and imagination.

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“No industry in which human lives depend on the skilled performance of responsible operators has waited for unequivocal proof of the benefits of simulation before embracing it.”

—David M. Gaba, MD

Foundations of Simulation
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Introduction to Simulation

Today’s dynamic and complex healthcare environment requires healthcare providers to demonstrate evidence-based clinical judgment while providing safe, reliable, and effective care as a collaborative member of a healthcare team (Frankel, Haraden, Federico, & Lenoci-Edwards, 2017; Institute of Medicine [IOM], 2004a, 2011). National leaders, organizations, and accreditation agencies have challenged nurse educators to transform the current educational process to a learner-centered, active pedagogy.

In 2004, the IOM—renamed the National Academy of Medicine (NAM) in 2015—provided recommendations for evidence-based revisions in the clinical education of healthcare professionals. Multiple IOM/NAM reports (IOM, 2001, 2003, 2004a, 2011, 2015) have stressed the need for research in order to:

- Understand how to apply adult learning principles to clinical education
- Obtain empirical evidence to support the integration of new technologies, including simulation, into curricula
- Explore the outcomes achieved by different types of teaching technologies
- Understand the process of translating knowledge to clinical practice
- Perfect the science of team-based care

Simulation combined with other technologies facilitates the development of skills, competencies, and clinical judgment needed to provide safe, quality patient care (Benner, Sutphen, Leonard, & Day, 2010; Gaba, 2004; IOM, 2004a, 2004b, 2011). For example, the IOM (2004b) report *Keeping Patients Safe* states that simulation is the most useful approach for developing skills related...
to unpredictable situations and crises. Similarly, Benner et al. (2010) support the development of clinical reasoning and interprofessional communication through new technologies such as simulation. Additionally, learning in a simulated environment is transferable to the clinical setting but enables educators to monitor learner progress without risk to patients (IOM, 2011). Simulation is a complement to—rather than a substitute for—actual patient care. It promotes a learner’s ability to integrate theory into a patient-care situation in a safe and controlled environment (International Nursing Association for Clinical Simulation and Learning [INACSL] Standards Committee, 2016b).

**Definition of Simulation**

The definition of simulation has evolved over time:

- In 2004, Gaba described simulation as “a ‘technique,’ not a technology, to replace or amplify real experiences with guided experiences, often immersive in nature, that evoke or replicate substantial aspects of the real world in a fully interactive fashion” (p. i2).

- Jeffries (2005) described simulation as an educational process in which learning experiences are simulated to imitate the working environment. The learner is required to integrate skills (both technical and nontechnical) into a patient-care scenario and thus demonstrate clinical judgment. Jeffries and Rogers (2012) more recently described the simulation experience as “an environment that is experiential, interactive, collaborative, and learner centered” (p. 41).

- The INACSL Standards Committee (2016a), citing the work of Gaba (2004), defines simulation as “an educational strategy in which a particular set of conditions are created or replicated to resemble authentic situations that are possible in real life. Simulation can incorporate one or more modalities to promote, improve, or validate a participant’s performance” (p. S44).

- The Society for Simulation in Healthcare (SSH), in its *Healthcare Simulation Dictionary*, defines simulation as “a technique that creates a situation or environment to allow persons to experience a representation of a real event for the purpose of practice, learning, evaluation, testing, or to gain understanding of systems or human actions” (Lioce et al., 2020, p. 44).

Comparing these definitions reveals similarities—specifically, that simulation is a pedagogy that uses multiple tools (such as simulators, partial trainers, and standardized patients) to promote and assess learning.

### Simulation Definitions: Resources

**SSH Definitions:** https://www.ssih.org/Dictionary  
**INACSL Definitions:** https://www.nursingsimulation.org/article/S1876-1399(16)30133-5/fulltext  
**NLN Definitions:** http://sirc.nln.org/mod/glossary/view.php?id=183

### History of Simulation

The history of simulation has been well-documented (Aebersold, 2016; Gaba, 2004; Jones, Passos-Neto, & Braghiroli, 2015). Simulation has been used in the aviation, military, and medical fields. One common goal has driven its adoption in all these areas: increased safety. In the healthcare industry, there is increasing evidence
of a link between simulation and patient safety. As a result, simulation continues to be a method of medical training to enhance vital skills for healthcare providers, including critical behaviors, communication, and teamwork (Aebersold, 2016).

Mannequins have been used since the early 16th century (Aebersold, 2016; Gaba, 2004; Jones et al., 2015). In 1911, the Chase Hospital Doll, more commonly called Mrs. Chase, became the first commercially available training mannequin. Mrs. Chase was used primarily for nursing education (Aebersold, 2016). In the 1960s, a Norwegian toymaker named Åsmund S. Lærdal further advanced clinical simulation with the development of the Resusci Anne mannequin. Resusci Anne was the first realistic and effective mouth-to-mouth resuscitation training aid (Cooper & Taqueti, 2004).

The next leap forward came from the University of Southern California in the late 1960s, with the development of SimOne, a computer-controlled, electronic mannequin capable of simulating vital signs, palpable pulses, inspiratory chest rise, eye blinking, and more (Bradley, 2006; Cooper & Taqueti, 2004). In 1968, Dr. Michael Gordon introduced Harvey, an anatomy-specific cardiopulmonary simulator that simulated 27 different cardiac pathologies (Rodgers, 2007). The Next Generation Harvey, used today, includes a total of 50 conditions and 10 standardized patient scenarios used in advanced patient assessment (Michael S. Gordon Center for Simulation and Innovation in Medical Education, n.d.).

In the late 1970s, the National Aeronautics and Space Administration developed a team training method called cockpit resource management with the goal of correcting communication deficiencies to decrease airline disasters. This method was later expanded to include the entire flight crew, error management, human factors, teamwork, and reporting systems for safety concerns and incidents. It was renamed crew resource management (CRM; Aebersold, 2016). Dr. David Gaba later applied CRM in the healthcare setting—developing a simulation-based program to help anesthesiologists manage crises (Aebersold, 2016). In the 1980s, the medical industry began using high-fidelity simulators for anesthesia training (Aebersold, 2016).

High-fidelity human patient simulators can simulate many functions of the human body, its physiological variables, and its responses to pharmacological and other care interventions. However, high-fidelity human patient simulators are not the only means of simulated learning used today. Standardized patients are also being utilized. A standardized patient is an actor who portrays the role of a real patient. In addition, the increased use of ultrasound technology in both the diagnostic and procedural arenas has led to the development of ultrasound-able human patient simulators that can reproduce multiple pathologies or simulate human anatomy. With the increased availability and affordability of technology, the use of augmented and virtual reality is becoming more common in the healthcare education industry. In the future, virtual simulations could be able to teach skills that nurses have historically learned by using task trainers. These new innovative technologies are expected to improve quality of care by increasing patient safety (Aebersold, 2018).

Influential Factors in the Use of Simulation

Clinical simulation is dynamic and ever-changing—constantly morphing as new technologies are developed, clinical knowledge increases, and new evidence-based practices are implemented. New patient safety requirements
and the need for innovative modalities to educate clinicians drive clinical simulation forward. As noted by Benner et al. (2010), "New nurses [healthcare providers] need to be prepared to practice safely, accurately, and compassionately, in varied settings, where knowledge and innovation increase at an astonishing rate" (p. i).

**Standards and Guidelines for Simulation-Based Activities**

As the use of simulation has increased, standards and guidelines have been developed for simulation-based activities. Recognizing that simulation-based activities accelerate the learning process, providing learners and professionals with opportunities to develop skills competency, the World Health Organization published a recommendation related to the use of simulation methods in 2013: “Health professionals’ education and training institutions should use simulation methods in 2013: “Health professionals’ education and training institutions should use simulation methods (high fidelity methods in settings with appropriate resources and lower fidelity methods in resource limited settings) in the education of health professionals” (p. 6).

The National Council of State Boards of Nursing (NCSBN) conducted a landmark national, longitudinal, multisite simulation study that concluded that simulation-based activities can be substituted for up to 50% of clinical experiences without impact on the learners’ knowledge acquisition and clinical performance when specific guidelines are followed. These guidelines stress that:

Simulation is a pedagogy that may be integrated across the prelicensure curriculum, provided that faculty are adequately trained, committed and in sufficient numbers; when there is a dedicated simulation lab which has appropriate resources; when the vignettes are realistically and appropriately designed; and when debriefing is based on a theoretical model. (Hayden, Smiley, Alexander, Kardong-Edgren, & Jeffries, 2014, p. 5)

INACSL and the Association of Standardized Patient Educators (ASPE) have published standards of best practice for simulation. The INACSL standards emphasize that simulation-based activities should be based on the following (2016b):

- Expected outcomes of the experience
- Learner’s knowledge and skills level
- Simulation modality being used
- Feedback and/or debrief method used
- Outcome assessment selected

The ASPE standards apply to activities that integrate standardized patients (Lewis et al., 2017). A standardized patient (SP) is “an individual who is trained to portray a real patient in order to simulate a set of symptoms or problems used for healthcare education, evaluation, and research” (Lioce et al., 2020, p. 49). The ASPE standards note that when trained appropriately, SPs can provide learner feedback and complete assessment instruments (Lewis et al., 2017; Lewis, Strachan, & Smith, 2012).

**Patient Safety and Quality**

Healthcare professionals need to become more astute and to critically analyze situations while providing evidence-based care. “Healthcare organizations have an absolute responsibility to deliver safe, reliable, and effective care to patients” (Frankel et al., 2017, p. 6) while also ensuring the engagement of patients and their families.
In the early 2000s, evidence-based research suggested that lack of communication and collaboration within interprofessional healthcare teams had a negative effect on the delivery of safe, quality care (IOM, 2003; Leonard, Graham, & Bonacum, 2004). The landmark IOM reports *To Err Is Human* (2000) and *Crossing the Quality Chasm* (2001) called for improvement in healthcare quality and safety by using strategies that prepared clinicians to:

- Work in interprofessional teams
- Use informatics
- Maintain an improved understanding of disease processes
- Provide leadership
- Provide safe, timely, efficient, and effective patient-centered care

*Core Competencies for Interprofessional Collaborative Practice*, a document initially published by the Interprofessional Education Collaborative (IPEC) in 2011 and updated in 2016, identified four domains of interprofessional competencies (IPEC, 2011, 2016):

- Values/ethics
- Roles/responsibilities
- Communication practices
- Teamwork and team-based practice

Providing realistic, interactive, simulation-based experiences that integrate the core competencies for interprofessional collaborative practice addresses the identified gaps in communication and collaboration between healthcare teams (D’Alimonte, McLaney, & Di Prospero, 2019). For example, research has demonstrated that using simulation to teach teamwork skills has improved team dynamics, communication, and patient care (Black, 2018; Iverson et al., 2018; Parsons et al., 2018).

**Technology**

Changes in technology, safety issues, learner attitudes, and accreditation requirements have forced changes in educational strategies and delivery. Simulation as a pedagogy includes the use of a variety of technologies, from low-fidelity task trainers to mid-fidelity ultrasound-compatible mannequins to augmented reality. The pioneering development of virtual reality computer-based environments, haptic devices, and augmented reality provides realistic experiences in a risk-free environment with immediate feedback for the learner (Jenson & Forsyth, 2012).

With simulation, learners engage in reproducible clinical environments, interacting with virtual patients and interprofessional teams (Jenson & Forsyth, 2012). New integrated three-dimensional (3D) technologies, virtual reality, and augmented reality immerse the learner in realistic and clinically accurate anatomy models and environments. These change how concepts, skills, and clinical reasoning are developed. For example, ultrasound-compatible partial trainers and mannequins offer realistic representations of anatomical structures, facilitating proficiency in advanced skills such as central line insertion. The continued combination of low-fidelity task trainers and SPs creates hybrid scenarios, marrying true human interaction with skills acquisition and task performance. Advances in simulator technology augment opportunities for interprofessional learning experiences, improving patient safety and patient outcomes.

**Transformation in Education**

A decade ago, Benner and colleagues, noting the profound changes in nursing practice, called for
a radical transformation in nursing education (Benner et al., 2010). The need for transformation in education has become even more critical with the shortage of experienced nurses and physicians. In addition, the growing lack of clinical placement availability has created many dilemmas in ensuring the competencies needed for graduating nurses (Jeffries, 2012; National League for Nursing [NLN], 2015).

The US Bureau of Labor Statistics (2019) has projected that RN jobs will increase 12% between 2018 and 2028—faster than the average for all occupations—due to growth and the need for replacements as older nurses phase into retirement. The Association of American Medical Colleges (2019) predicts a shortage of up to 112,000 physicians by 2032, largely due to a growing aging population. This critical shortage of qualified nurses and physicians amplifies the need to produce qualified, competent, and safe clinicians. At the same time, an increase in medical errors has revealed the need for additional patient safety education.

Regardless of the reasons for nursing shortages, developing innovative means of educating new nurses is paramount to combating the shortages. For almost two decades, the NLN has promoted simulation as an innovative strategy for transforming the education of nurses. Emphasis toward engaging students and preparing them for the increasing complexity of patient care by creating a realistic learning environment is key. This would address the growing lack of clinical placement availability (NLN, 2015).

Healthcare education has embraced the importance of simulation and the multiple simulation modalities. In its early days, simulation was seen as an “add-on” activity in nursing curricula—done to help relieve the shortage of clinical space. Today, nursing schools realize the importance of integrating simulation—including computerized mannequins, role-play, SPs, virtual and augmented reality, and virtual human and animal anatomy—throughout the entire curriculum. Simulation now assists nursing students not only in gaining skills competency but also in developing clinical reasoning abilities that lead to increased patient safety (Aebersold, 2018). Creating a realistic learning environment in simulation that engages students can help prepare them for the increasing complexity of patient care.

Studies on the effect of using high-fidelity simulation in undergraduate nursing curricula have found simulation to be effective in creating safer patient environments and care. Studies have validated that simulation can be used to effectively teach skill-based behaviors (including handwashing and medication safety) as well as communication and the acquisition and transfer of knowledge (Doolen et al., 2016). A review by Cant and Cooper (2017) revealed that students were able to reconcile theory with practice while using simulation. The most significant research to date was a two-part study conducted by the NCSBN. This study demonstrated that up to 50% of clinical hours can be effectively replaced by simulation (Hayden et al., 2014).

With the increased shortage of clinical sites and some of the restrictions students have in the clinical setting, simulation has become a well-accepted form of learning for students. However, simulation requires a thoughtful approach to ensure the success of both educators and learners. Simulation must be integrated into the curriculum and performed correctly. The goals and objectives in a simulated environment are different from those in the clinical setting. Educators must receive appropriate training to design, facilitate, and debrief after simulation-based experiences to meet these goals and objectives.
Foundations of Simulation

The most common question with simulation used to be, “Does it work?” Now, the more common question is, “Under what conditions is simulation most effective?” (Walsh et al., 2018). For example, at the novice level, learners can use task trainers and role-play to develop basic technical and non-technical skills. After competencies in these skills are attained, educators should use scaffolding to shift the focus of the learners from producing replicable and predictable outcomes to developing the clinical reasoning required for competency by integrating unexpected issues into simulation-based scenarios. Educators can then provide students with opportunities to exercise and implement flexible clinical judgment and ethical comportment, and gain additional expertise in actual patient care situations (Benner et al., 2010).

Simulation Typology

Simulation typology varies in complexity and fidelity. Fidelity is defined as the “physical, psychological, and environmental elements” (Lioce et al., 2020, p. 18):

- **Low-fidelity mannequins** are static tools that may or may not provide isolated specific feedback to the learner. Low-fidelity mannequins include partial and full-body tasks trainers such as airway-management trainers. They are used mainly to develop and assess technical skills (Lioce et al., 2020).

- **Mid-fidelity mannequins/simulators** provide learners with isolated specific feedback. An example of a mid-fidelity trainer is a simulator used to generate heart and lung sounds without chest movement (Lioce et al., 2020).

- **High-fidelity simulators** provide realistic responses that can be modifiable to react to the situation and to learner input. High-fidelity simulators mimic human body functions at a very high level and provide realistic responses such as heart.
and lung sounds, chest movement, and palpable pulses. They are integrated into patient scenarios that require learners to demonstrate skill attainment while engaged in situations requiring clinical judgment (Jeffries & Rogers, 2012; Lioce et al., 2020).

The spectrum of simulation typologies is shown in Table 1.1. The appropriate use of the spectrum requires strategic planning. The type of simulation used must address identified learning needs and be suited to the expertise of the practitioner (Issenberg, McGaghie, Petrusa, Lee Gordon, & Scalese, 2005; Lioce et al., 2020).

<table>
<thead>
<tr>
<th>Simulation Typology/Modality</th>
<th>Other Names/Abbreviations</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>Task trainer</td>
<td>Part-task trainer</td>
<td>Anatomical model or mannequin used to obtain competency in a specific skill or procedure</td>
</tr>
<tr>
<td>Peer-to-peer</td>
<td>Collaboration between peers used to learn and/or master specific skills</td>
<td></td>
</tr>
<tr>
<td>Computer-based training</td>
<td>Computer-based simulation</td>
<td>Computer applications (software or web-based) to teach, provide feedback, and assess knowledge and clinical judgment</td>
</tr>
<tr>
<td>Gaming</td>
<td>Serious gaming</td>
<td>A simulation or program (board or computer-assisted game) that enables learners to interact, solve problems, and make decisions</td>
</tr>
<tr>
<td>Virtual reality</td>
<td>Virtual environment</td>
<td>An artificial projected environment that provides spatial dimensions and sensory stimuli through special glasses and sensors to promote authenticity</td>
</tr>
<tr>
<td>Augmented reality</td>
<td>Mixed reality</td>
<td>The overlay of computer-generated information or images within the real-world environment</td>
</tr>
<tr>
<td>Haptic systems</td>
<td></td>
<td>A computer-generated environment that provides tactile and visual sensations as procedures are conducted</td>
</tr>
<tr>
<td>Standardized patient/participant</td>
<td>SP</td>
<td>A volunteer or paid individual who portrays a patient in a case scenario in a realistic and consistent manner</td>
</tr>
<tr>
<td>Gynecological/genitourinary teaching associate</td>
<td>GTA, Muta, GUTA</td>
<td>A paid individual who teaches gender-specific physical examinations using his or her own body for demonstration</td>
</tr>
<tr>
<td>Objective Structured Clinical Examination</td>
<td>OSCE</td>
<td>Structured assessment of clinical or professional competence and skill with objectivity as a focus</td>
</tr>
<tr>
<td>Advanced patient simulators</td>
<td>High-fidelity simulator</td>
<td>Computerized full-body mannequins that provide realistic physiologic responses</td>
</tr>
</tbody>
</table>

Source: Lioce et al., 2020

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Simulation can be used to support lifelong learning at all levels—from novice learners to expert practitioners. In addition to assisting the practitioner in developing and maintaining competency in technical skills, simulation can help learners develop nontechnical skills such as communication and clinical reasoning, acquire new knowledge, and understand conceptual relationships (Cato, 2012; Gaba, 2004; INACSL, 2016b).

The IOM has recognized simulation as an effective strategy for healthcare learners and professionals to enhance their technical skills (IOM, 2001, 2011) and to acquire knowledge on an ongoing basis (IOM, 2004b). More advanced simulation technologies such as augmented and virtual reality are seen as ways to address the vexing problem of limited availability of clinical sites (Pappano, 2018).

The next sections discuss simulation typologies in more detail.

**Task Trainers**

Task trainers represent a specific body part or body system. They are used to acquire and assess technical skills. Task trainers facilitate the mastery of complex skills by subdividing the skills into segments—for example, the steps involved in inserting an intravenous catheter. Task trainers vary in complexity from static models to trainers that provide realistic heart, lung, and bowel sounds (Issenberg et al., 2005; Lioce et al., 2020).

**Computer-Based Programs**

Computer-based programs provide a computerized system or discovery learning in which the learner can interact with a situation and receive feedback on performed actions. These programs are relatively inexpensive and allow learners to work independently or in groups. Navigation options allow practitioners to tailor the learning to each learner’s needs. The competencies of practitioners can be validated through case scenarios that require the integration of procedural and critical-thinking skills. Various levels of monitoring are integrated into the software to provide educators with written documentation of the learner’s performance, including multiple choice test results and performance summaries (Issenberg et al., 2005; Lioce et al., 2020).

**Virtual Reality**

Virtual reality, developed as an offshoot of videogame technology, integrates interactive computer simulation with psychomotor and cognitive learning to immerse the learner in a simulated experience. Virtual reality provides cues through sensory stimulation (hearing, touch, and sight) to evoke feelings of reality. The practitioner engaged in virtual reality is required to integrate knowledge of anatomy and physiology while performing and validating clinical competency in specific procedures, such as intravenous catheter insertion, airway management, amniocentesis, endoscopy, and bronchoscopy (Kardong-Edgren, Farra, Alinier, & Young, 2019; Lioce et al., 2020).

**Augmented Reality**

A variant of virtual reality, augmented reality superimposes computer-generated or synthetic images (such as avatars) or data within the natural environment through devices such as glasses, goggles, or even a tablet. Where virtual reality re-creates the entire simulated environment, augmented reality projects 3D images into a real environment, so all human senses are engaged (Kardong-Edgren et al., 2019; Lioce et al., 2020).
Haptic Systems
Haptic (touch) systems integrate a feeling of resistance when the learner uses them, creating the illusion of direct contact with the patient's organs. Haptic systems are used primarily within surgical training programs and aid learners in laparoscopic and endoscopic procedures (Lioce et al., 2020).

Standardized Patients
An SP program integrates realistic case studies into role-play. Individuals (paid or volunteer) are taught to portray a “patient” in a realistic and consistent manner. The learner interacting with an SP is expected to demonstrate appropriate communication skills, behaviors, and attitudes while conducting interviews, performing physical examinations, and developing a plan of care (Lewis et al., 2017; Lioce et al., 2020). SPs have been successfully integrated into formative and summative assessments in both graduate and undergraduate nursing programs and provide a tool to validate the learner’s knowledge, skills, and clinical judgment (Rutherford-Hemming, Alfes, & Breymer, 2019). SPs have been a component of the competency assessment component of the US Medical Licensing Examination (USMLE) since 2004. The clinical skills component of the USMLE requires the examinee to communicate effectively with an SP while developing a rapport, obtaining a health history, completing a focused assessment, and documenting the results (USMLE, 2012). SPs enhance learning by providing both verbal and nonverbal communication within an appropriate scenario. However, Holtzscheider (2017) notes that there are some limitations in critical-care scenarios. For example, SPs cannot provide the realism needed to simulate an intravenous site, Foley catheter insertion, or tracheostomy suctionsing. Wearable technology has been added to address this issue and enhance realism. The most common type is a chest piece known as a tracheostomy teaching device that interacts with the SP without the learner’s knowledge. The SP receives a buzz, prompting the patient to respond when being suctioned too deep. Other wearable devices include intravenous sleeves and wearable genitalia. Diversity is another feature being developed for wearable technology.

Advanced Patient Simulators
Advanced patient simulators (also sometimes called human patient simulators) are full-body mannequins of various levels of complexity that can be programmed to respond in real time to pharmacological and other treatment modalities. Advanced patient simulators have palpable pulses, audible blood pressures, and chest movements with respirations; simulate various heart, lung, and bowel sounds; and provide verbal cues to the learner. Recent advances in patient simulator technology have increased the fidelity of these mannequins with the addition of augmented reality, muscle motion, eye tracking, skin pigmentation, and even hair. Such features—supplemented with monitors programmed to provide electrocardiogram waveforms, cardiac output, and pulse oximeter readings—add realism to clinical teaching scenarios. Additionally, the technology allows for objective measurement of the knowledge, technical skill level, and critical-thinking abilities of the learner (Lioce et al., 2020).
Simulated Learning Experience Requirements

Simulated learning experiences should:

- Be designed to replicate a realistic situation
- Have objectives that are learner-dependent and state the expected outcome of the experience
- Be based on current evidence and practice guidelines
- Be a complement to (not a substitute for) actual patient care to promote an individual's ability to develop competencies and clinical judgment
- Be conducted in a controlled, nonthreatening environment without risks to patients
- Be developed and conducted by trained simulationists
- Include a debriefing conversation focused on the learning objectives

Philosophical/Theoretical Foundation of Simulation

“Of the many cues that influence behavior, at any point in time, none is more common than the actions of others.”

–Albert Bandura

The substructure for the pedagogy of simulation is grounded in the works of multiple philosophers such as Socrates (Johnson, 2012) and Dewey (1910, 1916, 1933). Various theoretical frameworks can be used in tangent to assist educators in supporting learning through simulation. For example, mastery of learning (Bloom, 1971, 1974), experiential learning (Kolb, 1984), reflective thinking (Schön, 1983, 1987), cognitive load (Sweller, 1988), social cognitive theory (Bandura, 1977, 2001), deliberate practice (Ericsson, 2004), and others. These theorists emphasize the synergistic relationship between the learning environment, the learner, the educator/facilitator, and a period of reflection to the development and transfer of new knowledge. The INACSL Standards of Best Practice and the NCSBN Guidelines highlight the importance of formulating a simulation-based activity on a theoretical and/or conceptual framework (Alexander et al., 2015; INACSL, 2016b).

The Socratic methodology or questioning fosters critical thinking by posing questions to the learner (Johnson, 2012). The NCSBN Guidelines stress the importance of integrating Socratic questioning in debriefing, specifically recommending the use of “a standardized method of debriefing observed simulation using a Socratic methodology” (Hayden et al., 2014, p. 8). It is also recommended that the Socratic method be researched prior to use since health profession educators may have a flawed concept of the method (e.g., digging by using the learner's answer as a question is not Socratic method).

Dewey (1910) defined learning as “not learning things, but the meanings of things” (p. 176). According to Dewey (1933), the development of meaning or insight requires interaction, reflection, and time for personal discovery. Dewey (1933) described reflection as an active, emotional interaction that helps learners construct new knowledge based on past experiences and indicated that it is the responsibility of educators to facilitate this process.
Posed by Bloom (1971, 1974), mastery learning is an approach to competency-based learning based on the belief that most learners—regardless of their learning styles and rates—achieve the expected competency if provided time and appropriate learning conditions, which include giving the learner corrective feedback and opportunities to address identified learning gaps. If the learner does not demonstrate the predetermined level of mastery (competency) during a summative assessment, supplemental instruction is provided using alternative learning approaches and additional opportunities for practice (Bloom, 1971). The principles of mastery have been used successfully in teaching skills such as thoracentesis, nasogastric tube insertion, central line dressing changes, and basic life support (Braun et al., 2015; Cason et al., 2015; Dahlen, Finch, & Lambton, 2019) and have demonstrated translational outcomes—outcomes at the patient level (McGaghie, Issenberg, Barsuk, & Wayne, 2014).

Bandura (1977, 2001) discussed the relationship between an individual's behavior and attitudes and the environment to skills acquisition. According to Bandura, the environment includes the physical setting and interactions with others. Bandura's social learning (cognitive) theory (1977, 2001) proposes that behavior is learned through observation and imitation and is influenced by the observed consequences of the behavior. For example, if one observes positive outcomes from a behavior, one is more likely to emulate that behavior. Bandura stressed that optimal learning requires the individual to be proactive and goal-directed and to self-regulate. The self-regulated learner has an intrinsic motivation for learning, participates actively, sets personal learning goals, and engages in reflection. Additionally, the self-regulated learner uses learning outcomes to construct new knowledge. The process of engagement and self-regulation improves as the learner's self-confidence grows. According to Bandura (1977), the educator functions primarily as a role model or facilitator and is responsible for creating an environment conducive to learning.

According to Kolb (1984), the cycle of experiential learning represents the mandatory components for learning and requires a synergistic relationship between the learner and the environment. The cycle includes:

- **The integration of concrete experience:** Real-life experiences
- **Reflective observation:** Reflection or internalization of the experience
- **Abstract conceptualization:** Looking for patterns and meaning
- **Active experimentation:** Assimilation of thoughts in an effort to develop new understanding

Kolb (1984) stressed that learning occurs best in environments that replicate real-life situations that require the learner to seek patterns and meaning to promote insight. Kolb (1984) challenged educators to use various and multiple active strategies to support different learning styles. On a related note, the INACSL standard for simulation design (2016b) discusses the importance of using the appropriate fidelity to create the required perception of realism. This standard addresses the importance of physical, conceptual, and psychological considerations in simulation-based activities to “create the required perception of realism that will allow participants to engage in a relevant manner” (p. s7).
Schön (1987) proposed the use of a “reflective practicum” (p. 18)—an active learning experience based on a realistic event and completed in a realistic environment. Schön (1983) identified two specific types of reflection—reflection-in-action and reflection-on-action:

- **Reflection-in-action (self-monitoring)** occurs when one is engaged in an experience (thinking about an action while doing it). Schön (1987) describes reflection-in-action as the artistry displayed when a practitioner integrates knowledge from past experiences into new situations.

- **Reflection-on-action (cognitive postmortem)** is a conscious review after the experience. The goal of reflection-on-action is to “think back on what we have done” and uncover new understandings with the goal of applying this knowledge to future practice (Schön, 1987, p. 26).

When transferred and applied, reflection-in-action and reflection-on-action become knowing-in-action or knowing-in-practice (Schön, 1987). Knowing-in-action (constructions) is the knowing how or the spontaneous, skillful execution of tasks and/or procedures; it requires anticipation and “on the spot” adjustments. When we recognize knowing-in-action, the action can be converted to knowledge-in-action and yields to further thinking. When embedded into a profession, knowing-in-action can be referred to as knowing-in-practice (Schön, 1987).

According to Schön (1987), educators function as coaches to facilitate active learning and promote learning transfer. A simulation-based activity fulfills the requirements of a “reflective practicum” as discussed by Schön. Using the principles of a reflective practicum, educators can plan the learning experience to encourage reflection-in-action through the use of the Socratic method. The simulation-based environment allows learners to take risks and discover consequences while implementing patient care in a safe environment. Educators can facilitate reflection-on-action during debriefing, which can then be transferred to the patient care setting and be demonstrated as knowing-in-action or knowing-in-practice.

Deliberate practice, posed by Ericsson (2004), is a technique used to develop competence and confidence in clinical skills through purposeful, time-intensive, continued practice. The deliberate practice model (Ericsson, 2004, 2006) emphasizes the importance of time and intentional practice with immediate feedback to improve skill performance. Active learning experience requires problem solving. When engaged in deliberate practice, learners must be self-motivated. The goal of deliberate practice is for the learner to progress to an expert level of performance through constant improvement (Ericsson, 2004). Research has demonstrated that deliberate practice improves cognition, retention, and skills and promotes learning transfer (McGaghie et al., 2014).

Sweller (1988) posed the theory of cognitive load. It emphasizes the importance of effective sequencing. Cognitive load theory states that working memory has a limited capacity to process new information and that learning is impaired when this capacity is overloaded. However, when time is allowed, new knowledge and skills can be acquired, as they can be organized and placed in long-term memory. Therefore, with cognitive theory, an integrated sequencing approach that builds upon previously acquired knowledge and skills should be applied (Fraser, Ayres, & Sweller, 2015; Naismith & Cavalcanti, 2015; Reedy, 2015).
These theories emphasize the synergistic relationship between the learning environment, the learner, the educator/facilitator, and a period of reflection for the development and transfer of new knowledge. The INACSL Standards of Best Practice and the NCSBN Guidelines highlight the importance of formulating a simulation-based activity on a theoretical and/or conceptual framework (Alexander et al., 2015; INACSL, 2016b).

The pedagogy of simulation is grounded in the works of theorists who highlight the dynamic relationships of the learner, the educator, and the environment. Benner, Hooper-Kyriakidis, and Stannard (1999) emphasized this dynamic relationship and discussed the importance of time for reflection when they incorporated the Dreyfus model of skills acquisition into the learning process. The Dreyfus model states that the learner progresses through five levels of learning when acquiring and developing proficiency (Dreyfus & Dreyfus, 1980):

1. Novice
2. Advanced beginner
3. Competent
4. Proficient
5. Expert

However, they stress that experience is not obtained through the mere passage of time but should include the refinement of preconceived ideas through actual clinical practice. According to Dreyfus and Dreyfus (1980), experience facilitates progression through the stages.

Benner et al. (1999) define experiential learning as “clinical learning that is accomplished by being open to having one’s expectations refined, challenged, or disconfirmed by the unfolding situation” (p. 568). As stressed by Benner (2000), nursing is a complex practice requiring continuous clinical knowledge development through experiential learning. Therefore, according to Benner and colleagues (1999), nurses who are learning to make good clinical judgments must become engaged in an ongoing process of experiential learning and reflection.

According to Knowles (1984) and Knowles, Holton, and Swanson (2011), adult learning principles that educators need to address when designing a learning experience include:

- Adults are internally motivated.
- Adults have past life experiences and expect these to be appreciated.
- Adults are goal directed.
- Adults expect to see relevancy of the learning.
- Adults want to be respected.

See Table 1.2 for details.

The ultimate goal for learning is the transfer of knowledge, skills, attitudes, and behaviors. Although limited research is available to demonstrate how and if simulation-based learning is transferred to the patient care setting, there are multiple ideas that can be integrated into healthcare. Table 1.3 presents some educational variables that affect the transfer of knowledge and strategies that educators can incorporate into simulated activities to promote this learning transfer.
### Table 1.2 Incorporating Adult Learning Principles Into Simulated Experiences

<table>
<thead>
<tr>
<th>Principle</th>
<th>Strategy</th>
</tr>
</thead>
<tbody>
<tr>
<td>Adults are internally motivated.</td>
<td>Challenge the learner appropriately. For example, scenarios should become progressively more challenging throughout the curriculum. Lead the learner to inquiry through Socratic questioning. Ask questions that require deep thinking—questions that begin with why, what if, and what were you thinking when...? Allow time for thought and actively listen to learners. Provide appropriate, regular, constructive feedback. Acknowledge goal attainment.</td>
</tr>
<tr>
<td>Adults have past life experiences and expect these to be appreciated.</td>
<td>Acknowledge life experiences and help learners connect these to the learning. Facilitate reflective thought using the Socratic method.</td>
</tr>
<tr>
<td>Adults are goal directed.</td>
<td>Link experiences to specific goals and expected outcomes. Base learning on realistic experiences (case scenarios).</td>
</tr>
<tr>
<td>Adults expect to see relevancy of the learning.</td>
<td>Allow learners to assist in designing learning experiences. Promote active learning and engagement by using multiple learning strategies.</td>
</tr>
<tr>
<td>Adults want to be respected.</td>
<td>Create a respectful, supportive environment. Establish an environment of trust to allow learners to express ideas. Allow learners to participate in self and peer feedback (peer debriefing). Foster active listening. Establish ground rules for the learning experience.</td>
</tr>
</tbody>
</table>

### Table 1.3 Strategies to Promote Learning Transfer

<table>
<thead>
<tr>
<th>Learner, Experience, and Environment Variables</th>
<th>Strategies to Promote Learning Transfer</th>
</tr>
</thead>
<tbody>
<tr>
<td>Characteristics of the learner</td>
<td>Allow the learner to have input into the training. Validate usefulness of learning to current healthcare environment. Incorporate strategies that promote self-efficacy. Use Socratic questioning.</td>
</tr>
<tr>
<td>• Intrinsic motivation</td>
<td>(There is a direct correlation between the listed learner characteristics and the demonstrated ability to transfer learning.)</td>
</tr>
<tr>
<td>• Intellectual/cognitive ability</td>
<td></td>
</tr>
<tr>
<td>• Self-efficacy</td>
<td></td>
</tr>
<tr>
<td>• Openness or readiness to learn</td>
<td></td>
</tr>
<tr>
<td>Specific stated behavioral objective and expected outcomes</td>
<td>Establish learning objectives and expected outcomes for the experience that are attainable yet challenging. Integrating ground rules helps maintain the integrity of the experience.</td>
</tr>
<tr>
<td>(Specific behavior objectives assist learners in directing effort and developing strategies for learning transfer.)</td>
<td></td>
</tr>
</tbody>
</table>

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In summary, the goal of experiential learning is for the learner to gain new ideas, knowledge, skills, and insight from experience. Under the principles of experiential learning, a simulated experience should be participant-centered, driven by appropriate objectives based on the learner’s knowledge, and require active participation and engagement in reflection (INACSL, 2016b). As stressed by the NCSBN, simulation is a pedagogy that requires faculty to be adequately trained, that an appropriate learning environment and resources be provided, that realistic vignettes be used, and that debriefing based on a theoretical model occurs (Alexander et al., 2015).

<table>
<thead>
<tr>
<th>Learner, Experience, and Environment Variables</th>
<th>Strategies to Promote Learning Transfer</th>
</tr>
</thead>
<tbody>
<tr>
<td>Multiple active-learning instructional methodologies (Integrating multiple active-learning instructional methodologies improves the ability to transfer learning.)</td>
<td>Incorporate active learning activities, such as group work or case scenarios. Use various simulation modalities. Segment learning into manageable chunks. Model and demonstrate the desired knowledge, skill, attitude, and behavior changes.</td>
</tr>
<tr>
<td>Perceived value and relevance of the experience (The objectives are relevant to the learners, and the activities are structured to facilitate meeting that objective throughout the experience.)</td>
<td>Assist the learner in identifying the relevance of the learning. Assist the learner in transferring the knowledge, skills, and attitude developed through simulation-based learning activities to patient-care situations during debrief by asking “What would you . . . ?” questions. Assist the learner in developing action steps to take to implement the learned knowledge, skills, and behaviors.</td>
</tr>
<tr>
<td>Degree of practice and feedback (Focused practice and the integration of appropriate, regular feedback promotes learning transfer.)</td>
<td>Include deliberate practice into the experience. Provide positive yet corrective feedback. Incorporate periodic one-on-one coaching. Incorporate peer coaching and feedback.</td>
</tr>
<tr>
<td>Opportunity to apply learning (Develop active application methods and skills to identify opportunities for practice before, during, or after the learning session.)</td>
<td>Integrate a mixture of skills and knowledge into simulation-based activities. Provide opportunities for learners to apply new knowledge and skills to a situation as soon as possible after the learning.</td>
</tr>
<tr>
<td>Supportive work environment and commitment of the organization (Individuals who work in an environment that acknowledges new knowledge and skills demonstrate greater learning transfer.)</td>
<td>Recognize learning and provide incentives for it. (These could be financial or job-related, such as clinical ladder recognition.) Allow individuals to provide in-service education to colleagues to highlight new learning. Assist learners in recognizing their importance to the work setting.</td>
</tr>
</tbody>
</table>
Legal and Ethical Issues

Healthcare providers face many challenges:

- They must constantly keep up with new advances in technology.
- They must care for patients who have complex diseases.
- They must make split-second critical decisions with incomplete or inaccurate information.

These challenges are often the result of lack of communication and teamwork (IOM, 2011). A 2011 IOM report states that although progress had been noted on these challenges, the emphasis of interprofessional collaboration and communication to meet the complex needs of the population must continue. Nurses must continue to develop skills and competencies both in leadership and innovation, which requires collaboration with other healthcare professionals (IOM, 2015).

Communication and teamwork are addressed in many of The Joint Commission’s 2020 National Patient Safety Goals (TJC, 2020). Improving the accuracy of patient identification is Goal 1 of all programs. In addition, the 2020 National Patient Safety Goals for hospital programs, ambulatory care programs, and office-based surgical programs all include improving the safety of using medications, reducing the risk of healthcare-associated infections, and the universal protocol for preventing wrong site, wrong procedure, and wrong person surgery.

An unforgettable IOM report published in 2000 called *To Err Is Human* stated that at least 44,000 people—and perhaps as many as 98,000—die in hospitals each year because of preventable mistakes by healthcare providers. That report revealed just how unsafe our healthcare system was. As noted by the report:

> The Quality of Health Care in America Committee of the Institute of Medicine (IOM) concluded that it is not acceptable for patients to be harmed by the healthcare system that is supposed to offer healing and comfort—a system that promises “First, do no harm.” (IOM, 2000, p. 2)

This problem prompted healthcare regulatory and standards organizations to investigate its causes as well as what needed to be done to solve it. One answer was to change how healthcare professionals were trained. The times of didactic lectures to teach healthcare professionals how to deal with crises or rare situations are long gone. Active learning is needed to promote patient safety. Simulation introduces interesting and ethical education without the use of real patients, and with every bit of safety. Simulation has also improved risk management among healthcare providers (Sarfati et al., 2018).

The American Nurses Association (ANA) Code of Ethics for Nurses (ANA, 2015) guides nurses in pursuing ethical behavior and decision-making. Nurses must respect human dignity and are held accountable and responsible for nursing judgment and actions. Above all, they are responsible for providing the most compassionate and competent care to meet all the health needs and concerns of their patients (ANA, 2015). The Code of Ethics for Nurses also stresses that nurse educators are directly responsible for ensuring that nursing students have achieved basic competencies prior to entry into practice (ANA, 2015).
This raises an important question: Is it ethical and legal to place healthcare providers into the clinical setting if they lack the training and experience to handle uncertainty and contingencies of practice for which they can prepare but never wholly predict? “Perhaps simulation’s greatest value lies in providing access to the realities of a profession while providing protection from the consequences of error” (Strevens, Grimes, & Phillips, 2016, p. xvi). The simulated clinical setting allows learners to practice skills and experience different healthcare scenarios as many times as needed to achieve a level of comfort and competence to safely perform care in an actual clinical setting.

Benner et al. (2010) state that an adequate and credible process for assessing a nurse’s skills and competencies is needed to prevent incidents that can lead to patient harm. The NLN (2019) defines competence as “the application of knowledge and interpersonal, decision-making and psychomotor skills in the performance of a task or implementation of a role” (p. 1) and stresses the importance of using reliable and valid instruments to assess these competencies. The Quality and Safety Education for Nurses (QSEN) project identifies patient-centered care, teamwork and collaboration, evidence-based practice, quality improvement, safety, and informatics as quality and safety competencies (QSEN Institute, 2012).

Simulation training helps identify ethical issues that can arise for healthcare providers (Carlson, 2011). These include the following:

- **Beneficence** is the moral obligation to respond in manners of benefit to others (Beauchamp & Childress, 2016). Pinar and Peksoy (2016) stress that beneficence is a moral obligation based in patient advocacy. Educators are challenged to ensure all providers have access to simulation-based activities to develop the competence needed to provide safe, reliable, and effective care as a collaborative member of a healthcare team (Pinar & Peksoy, 2016).

- **Nonmaleficence** means doing no harm to others, whether it be emotional, physical, or financial (Beauchamp & Childress, 2016). Educators should provide simulation-based activities providing learners opportunities to engage in challenging realistic experiences prior to experience in actual patient care settings (Pinar & Peksoy, 2016).

- **Autonomy** means respecting the right of individuals to make their own decisions. Pertaining to health, this means ensuring that patients are given and understand all the information necessary to make the best possible decision (Beauchamp & Childress, 2016). Simulation-based activities could be designed to require learners to seek approval from the “patient” and protect the patient’s freedom to choose and act voluntarily (Pinar & Peksoy, 2016).

- **Justice** is offering equal, fair, and proper treatment to patients (Beauchamp & Childress, 2016). Pinar and Peksoy (2016) state that individuals have a right to the equal and fair distribution of resources. Therefore, the principle of justice should be highlighted when proposals are submitted and in developing policy. A question to consider: Is it the simulation community’s obligation to investigate innovative methods to provide sustainability and services?

Just as nurses are confronted with ethical dilemmas, simulationists face ethical challenges of their own. Research has indicated that educators and learners enjoy using simulation and develop increased confidence and ethical comportment. However, very little is known about simulation’s
role in transferring clinical judgment and ethical values to the patient care setting (Pinar & Peksoy, 2016). The Healthcare Simulationist Code of Ethics from SSH has begun to address this challenge (Park & Murphy, 2018). This code of ethics promotes and strengthens the ethical culture of individuals and organizations engaging in simulation. It recommends that all educational activities using simulation as a learning strategy be upheld to the highest ethical standards. The six values included in the Healthcare Simulationist Code of Ethics are as follows (Park & Murphy, 2018):

- Integrity
- Transparency
- Mutual respect
- Professionalism
- Accountability
- Results orientation

Conclusion

Clinical judgment and mastery of skills (technical and nontechnical) are necessary to provide safe, competent patient care. Educators are challenged to use evidence-based teaching strategies to promote the learner’s clinical judgment. An experiential learning strategy, simulation provides a unique tool to promote clinical judgment. Simulation-based learning is consistent with experiential learning theory in that it requires interactivity, builds on prior knowledge, implements an ethical culture, and ensures knowledge transfer to provide safe, reliable, and effective care as a collaborative member of a healthcare team.

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