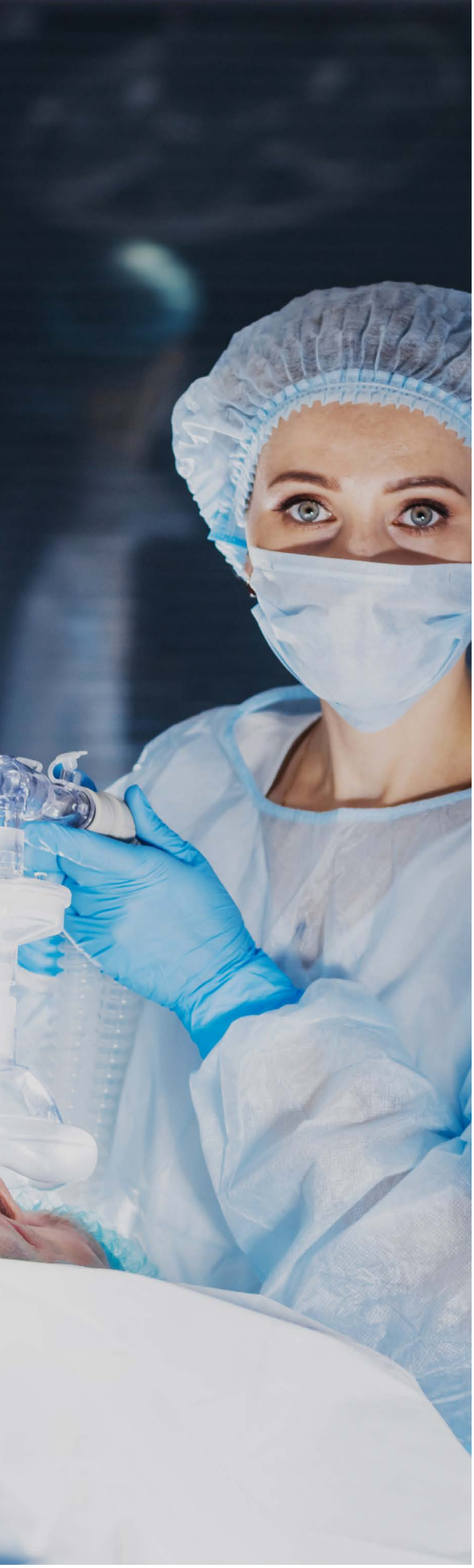

Benefits of Simulation Education

MARC MCGAFFIC, MS, CER.A.T.T.
WAYNE COUNTY COMMUNITY COLLEGE DISTRICT

The process of learning has evolved over the years to introduce a more profound element of training that benefits both the student and subject matter; in this case – patient care. There is no common medical curriculum in acute and emergency care, and deficiencies in knowledge are common among graduates from medical programs[1]. With a current urgent need to assist with relieving pressure on overworked anesthesia technologists, registered nurses, surgical technologists, pharmacy technicians, and dental assistants and hygienists – improving the education for the learner may better prepare those involved to help address the shortage of skilled staff[2].

History of Medical Simulation

Throughout each medical specialty – you could find the originality and how teaching moments were often conducted on live patients – within an operating room theater. Teaching moments like those mentioned are still used today – the main element that is different – the professional's practice on simulators before entering the patient care arena is widely used.

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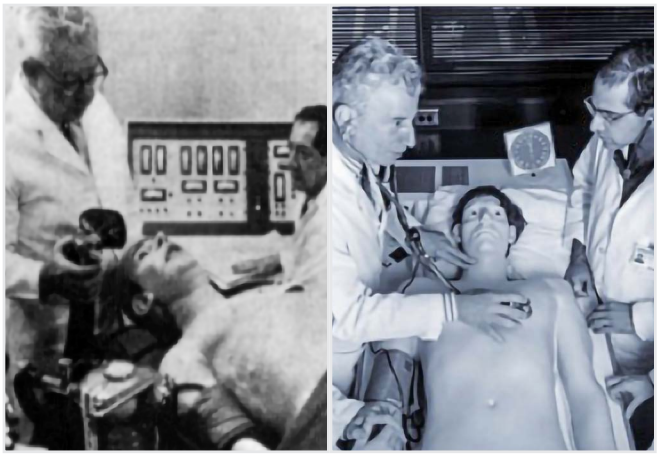
Medical simulators are dated back to the early 18th century, amazing, right? Angelique Marguerite Le Boursier du Coudray (1712-1794) used a cloth birthing simulator to teach her techniques to midwives and surgeons[3]. Dr. Giovanni Antonio Galli (1708-1782) developed a birthing simulator for training students and midwives in Bologna, Italy[3].

Currently, birthing simulators are utilized within simulation centers across the United States and the world. SimMom is an advanced full-body birthing simulator with accurate anatomy and functionality to accelerate multi-disciplinary obstetric simulation (pictures at the end). Simulations can be developed to provide the learner an experience with both manual and automatic delivery methods. SimMom can also deliver her baby through a cesarean section – which can be completed within our technologically advanced operating room at Wayne County Community College District, Northwest Campus.

SimBaby *SimMom*

During the early 1960s, another pioneer of medicine, Dr. Peter Safar (1924-2003, introduced cardiopulmonary resuscitation to the medical landscape. The "Father of CPR" was an Austrian Anesthesiologist and is credited for discovering the efficacy of mouth-to-mouth cardiopulmonary resuscitation. Encouraged by his work, Ausmund Laerdal, a plastic toy manufacturer, designed a realistic simulator to teach mouth-to-mouth ventilation[4]. Dr. Safar named this mannequin Resusci-Anne.

Physician Dr. Judson Denson and his colleague Dr. Stephone Abrahamson, an engineer, designed Sim One. The Sim One mannequin was pioneered as being the first true computer-controlled simulator. The mannequin was controlled by using a hybrid digital and analog computer[5]. A few years later, in 1968, Dr. Michael Gordon presented Harvey, the Cardiology Patient Simulator. This mannequin could produce almost any cardiac disease by varying blood pressure, heart sounds, heart murmurs, pulses, and breathing[5].



Presently, the simulation center located at Wayne County Community College District utilizes the LLEAP Laerdal Learning Application system created by Laerdal. The LLEAP software system allows the instructor to adjust physiological features like vital signs and patient sounds. The software enables the instructor to start, pause, or fast forward your simulation wirelessly from the Laerdal SimPad.

LLEAP allows the instructor to quickly and accurately set up each scenario with the following elements: Intensive care monitors (A-Line, CVP, PA), basic monitors (BP, Pulse Ox, ETCO2, and ECG), monitor defibrillator, and AED. The instructor and simulation technician can update patient vital signs in real-time while the simulation is taking place – using the Laerdal SimPad.

Improving Patient Safety using Simulation

Medication errors are the leading cause of adverse events in hospitals[6]. Patient safety problems of many kinds occur while

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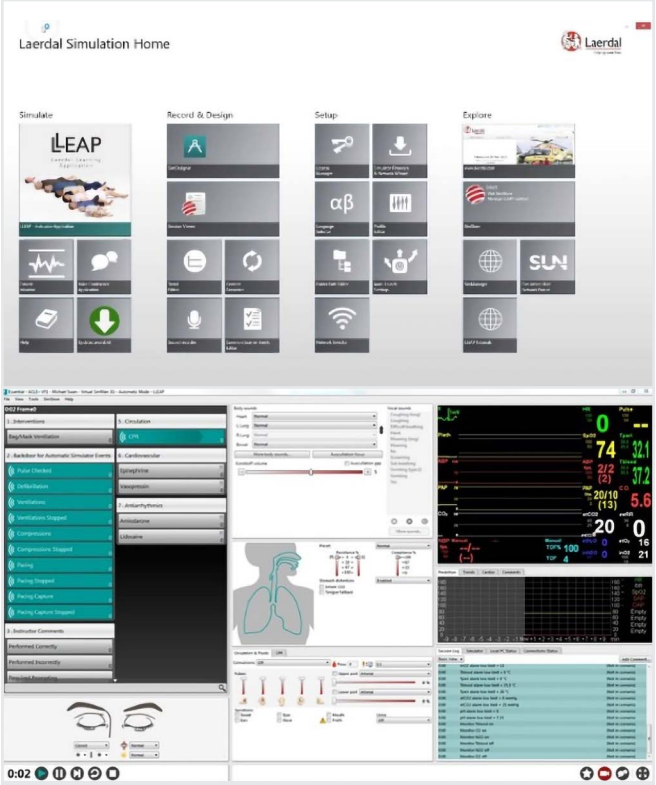

The LLEAP software system

attempting life-saving health care. These adverse effects include, but are not limited to, blood transfusion errors, wrong-site surgery, and surgical injuries, or hospital-acquired infections[7]. To limit the occurrence of these adverse effects from taking place – educational institutions and medical facilities incorporated simulation protocols for improved training.

People have a limited understanding of safety issues occurring within healthcare facilities. However, it is essential to discuss these safety concerns with patients – if needed. When surveyed, 20 percent of patients fear exposure to infection, 13 percent stated lack of patient care experience, and 11 percent cited lack of qualifications of healthcare professionals[8]. Replicating, often never seen procedures can help maintain adequate skills within your department. There is a reason the American Heart Association requires recertification of basic life support skills every twenty-four months – to ensure you are maintaining your skills needed to help save a life.

Although simulation is not the end-all-be-all instructive approach to healthcare training – the concept of simulation methodologies certainly does enhance the learning outcomes.

Teaching and Learning Concepts in Simulation

In education, scaffolding is a method for instructors to provide exceptional encouragement while the learners (students) master their new objectives and competencies. This process is tiered and enhances the element of understanding. Envision scaffolding is attached to a tall building's side; you will climb this scaffolding with the learners together. Commencing this technique requires the educator to deliver a lot of assistance – that encouragement/ assistance will be eradicated as the learner climbs the scaffolding. Thus, developing self-confidence and expertise of the skills.

Responsibility for understanding and knowledge of course objectives must pass from the instructor to each learner (student) – all while the learner validates competence. Scaffolding could be seen as a foundation of evidence to which new materials can be secured. Any of the following examples could be used[9]:

- Anatomical models
- Cues
- Prompts
- Hints
- Partial solutions
- Direct instruction

Scaffolding also serves to[9]:

- Provide clear direction
- Reduce learners' confusion
- Clarify purpose
- Keep learner on task
- Incorporate assessment and feedback
- Reduce uncertainty, surprise, and disappointment

Creation and Assembly of Simulation:

Designing and assembling the ideal multi-disciplinary or individual simulation learning experience consists of several steps and the structure of the simulation program.

- Step 1: What is your purpose of the simulation?
  - Step 1 (A): Which assessments or metrics will be used?
- Step 2: Build the skeleton simulation – basic concepts

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- Step 3: Standardize your simulation – Ensure your simulation is close to as "real" as possible
- Step 4: Test your simulation before the learner attempts the learning concept
  - Step 4 (A): This step will ensure your simulation is flawless for the learner(s)
  - Step 4 (B): Ensure proper equipment is operational and available (if needed)
- Step 5: Perform the simulation – with the learner(s)
  - Step 5 (A): Video captures should be used (video, pictures, communication devices, etc.)
  - Step 5 (B): Share results with the learner(s) in an active debriefing session

Simulation in Healthcare Education

Wayne County Community College District, Health Science Center believes in a system that simulation encompasses four elements.

1. Education: Provide a safe and controlled environment that represents a wide range of skills from technical abilities (Psychomotor), comprehension of materials (Cognitive) to proper communication (Affective).

2. Simulation-based assessment: Students are afforded two assessments a pre-assessment before the simulation begins and a post-assessment when the simulation ends. The course instructor will review or compare the pre-and-post assessments ensuring the skill objective was effective throughout the simulation process.

3. Simulated-based research: Situating pupils into a simulation centered on real-life medical emergencies allows the learner to expand their knowledge and skills. The learner has an opportunity to think and adhere to correct algorithms ensuring patient safety critically.

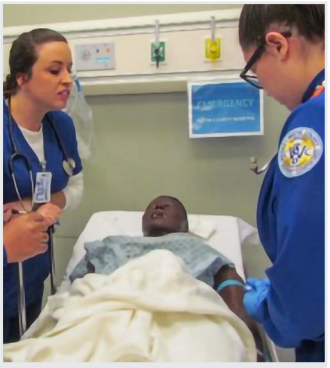
4. Debriefing: The most important aspect of the simulation is how a debriefing occurs. Illustrating the high and low points of the skills displayed will increase the student's confidence and vital patient care skills. During the debriefing, the learner is shown a video of their competency or skill assessment.

Live Simulation Event (Pre-COVID)

Simulation development involves a multitude of experiences from healthcare leaders. Early 2020, before the pandemic ravaged our global and local communities, Wayne County Community College District Northwest Campus - Health Science Center conducted a multi-disciplinary simulation event. Each healthcare program is involved with creating and launching the simulated learning experience. The programs involved are Anesthesia Technology, Surgical Technology, Central Service Technicians, Surgical First Assistant, Nursing, Pharmacy Technicians, Dental Assistants, and Dental Hygienists.

Simulations normally involve the patient entering our Dental Clinic and is seen for a routine dental cleaning, which encompasses dental assistants and hygienists. The patient would exhibit a life-altering moment where EMS needs to be contacted. The patient (simulator) is then transported to our Emergency Department (Nursing) for consult and evaluation. Pharmacy Technicians are available for medication delivery, especially when simulated narcotics are ordered.

Patient in Dental Clinic



Transferred to ER for Nurse Evaluation

Once the patient has been thoroughly evaluated and appropriately assessed, the nursing department will call surgery and anesthesia for consults. The patient will be transferred to the operating room and then transferred to post-op (ICU) at the conclusion of the surgical intervention. Before the transport happens – communication is sent to our central service technicians, surgical technologists, and anesthesia technologists, alerting the team of a potential level 1 trauma.

Once surgery and anesthesia are typically contacted, the students will begin setting up the operating room with the operating case cart, surgical supplies, and anesthesia equipment. This simulation presented differently than previous simulations. This surgical case requested the use of an endo-bronchial double-lumen tube – due to the complexity of the aortic aneurysm – that was diagnosed in the emergency room.

The simulation created in early 2020 witnessed a patient with an enlarged aortic aneurysm that was on the verge

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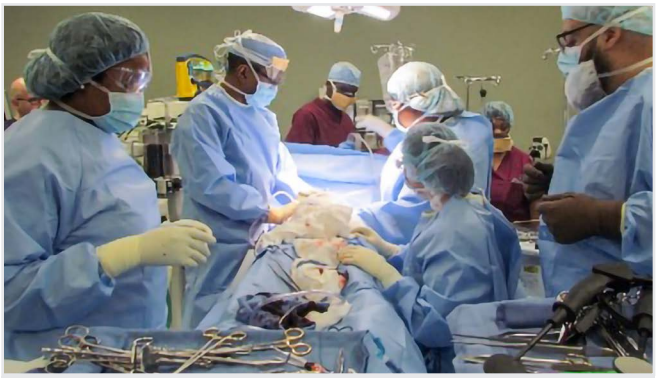
Anesthesia and Surgical Consult

Anesthesia Technologists operating the Belmont FMS

Pharmacy Technicians preparing medications for patient transport



Surgical Technologists saving a life

of rupture. The aneurysm was created using a simple latex balloon, Belmont FMS, and simulated vessels. This approach was decided upon as the latex balloon closely resembled a pulsating aorta before rupture. This simulation event was a fast-moving – well-oiled machine. The instructors and faculty involved wanted to ensure controlled chaos took place. Think of this simulation as a cardiac stress test for our students.

Throughout the surgical intervention, surgical technology instructors are actively engaging their surgery students with the identification of anatomical landmarks, organ and vessel identification, and of course, surgical instrument recognition. Anesthesia technology students participate as they would within an active level one procedure. Arterial blood gases would be analyzed/interpreted, AGM troubleshooting, cell salvage, Belmont, and assistance with pharmaceutical management – where appropriate.

In closing, when preparing your simulation regardless of simplicity or advancement – ensure your team will benefit from the scenario generated for understanding. Creating a simulation event that is outside the scope of practice or relevance of our profession can be dangerous. Ensure the simulation will benefit your department and, most importantly – patient care.

Double-Lumen Endobronchial Tube Intubation

Transporting the patient to ICU

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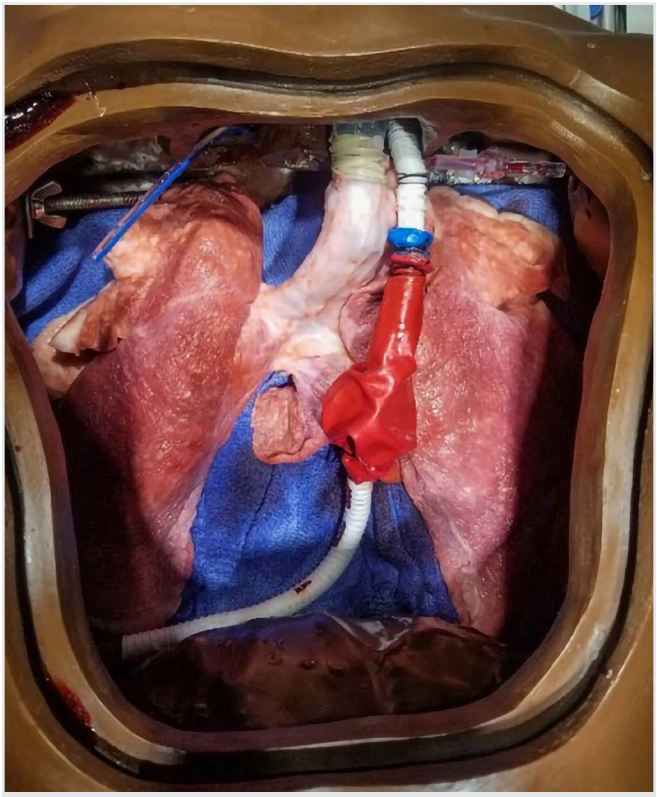
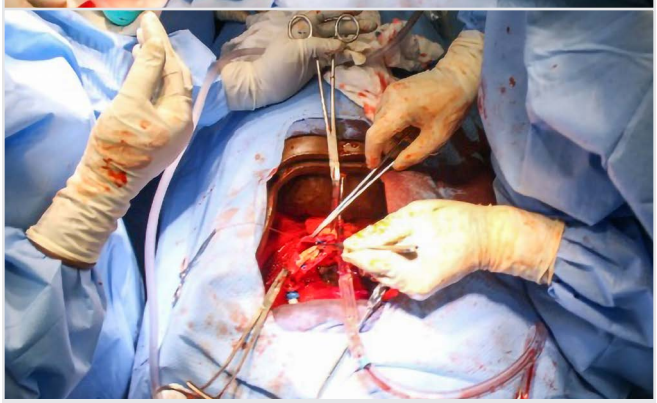
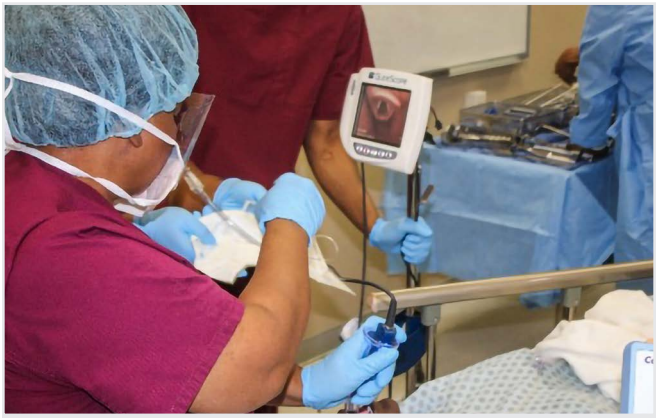


Transporting the patient to ICU



Middle: Surgery suctioning our simulated blood from patient.
Bottom: Exposure of ruptured aneurysm



Glidescope intubation practice by Anesthesia Technologist

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Take the QUIZ On The Next Page

Continuing Education Quiz

To test your knowledge on this issue's article, provide correct answers to the following questions on the form below. Follow the instructions carefully.

1. The leading cause of adverse events to patient care, within a hospital facility is:
a. Wrong surgical site identification.
b. Medication errors.
c. Blood transfusion errors.
d. Nosocomial infection.

2. The most important aspect of any simulation is the _____.
a. Medical procedure being practiced
b. Education
c. Assessments
d. Debriefing

3. The following patient monitors can be utilized throughout your simulation, using LLEAP, except:
a. Pulse oximetry
b. Invasive blood pressure
c. Cerebral oximetry
d. Non-Invasive Blood Pressure

4. Dr. Judson and his colleague Dr. Abrahamson designed the _____ simulator.
a. LLEAP
b. Sim Mom
c. Sim One
d. Sim Baby

5. Which of the following physicians is credited for developing the birthing simulator used for training students and midwives in Italy?
a. Dr. Peter Safar
b. Dr. Abrahamson
c. Dr. Denson
d. Dr. Galli

6. There is no common medical curriculum in acute and emergency care?
a. True
b. False

7. While teaching midwives and surgeons, Ms. Coudray would use which device?
a. Cloth birthing simulator
b. Sim Mom
c. Sim Baby
d. Sim One

8. The "Father of CPR" created this health care training simulator known as:
a. Sim One
b. Resusci-Anne
c. Harvey
d. Sim Man 3G

9. The _____ mannequin was pioneered as being the first true computer-controlled simulator.
a. Harvey
b. Sim Mom
c. Sim Baby
d. Sim One

10. The Cardiology Patient Simulator, also known as _____ was created in 1968, by Dr. Gordon.
a. Resusci-Anne
b. LLEAP
c. Harvey
d. Harold

To apply for Continuing Education/ Contact Hours:

1) Provide all the information requested on this form.
2) Provide correct answers to this issue's quiz in this box > > >
3) Mail this form along with $10.00 Member $20 Non-Member *(check or money order, payable to ASATT) to:*
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The answers to the Summer 2021 "Simulation Education" Quiz are: *(circle answers)*

1:	A B C D		**6:**	A B	
2:	A B C D		**7:**	A B C D	
3:	A B C D		**8:**	A B C D	
4:	A B C D		**9:**	A B C D	
5:	A B C D		**10:**	A B C D	

Quiz 1 of 2

Name: _____ ASATT Number: _____
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SUBMISSIONS FOR THIS ISSUE'S QUIZ EXPIRE **DECEMBER 31, 2022.**
ACHIEVE 80% IN THIS QUIZ TO EARN ONE (1) CONTINUING EDUCATION CREDIT.