THE ART OF:

IN SITU SIMULATION

DEVELOPMENT OF AN INTERDISCIPLINARY SIMULATION PROGRAM AT A LEVEL 1 TRAUMA CENTER

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AGENDA

- Definitions/Background
- SIM at OHSU
- Goals
- How/Logistics
- Barriers
- Outcomes/Achievements
- Future State
- Questions

WHAT IS SIM?

WHAT IS “IN SITU” SIM?

Simulation is derived from the Latin word “simulare” which means “to copy”

Simulation is the act of imitating a situation or process.

In medicine, simulation is a method of education that utilizes artificial representations of real scenarios. This can be achieved by using mannikins, virtual reality, task-trainers, and other methods to help increase the fidelity in the SIM setting.

“Bridges the gap between theoretical learning and real-life clinical experience.” - Society for Simulation in Healthcare

In situ SIM: Scenarios are rehearsed and practiced by actual members of the healthcare team in the clinical environment that they actually work in.

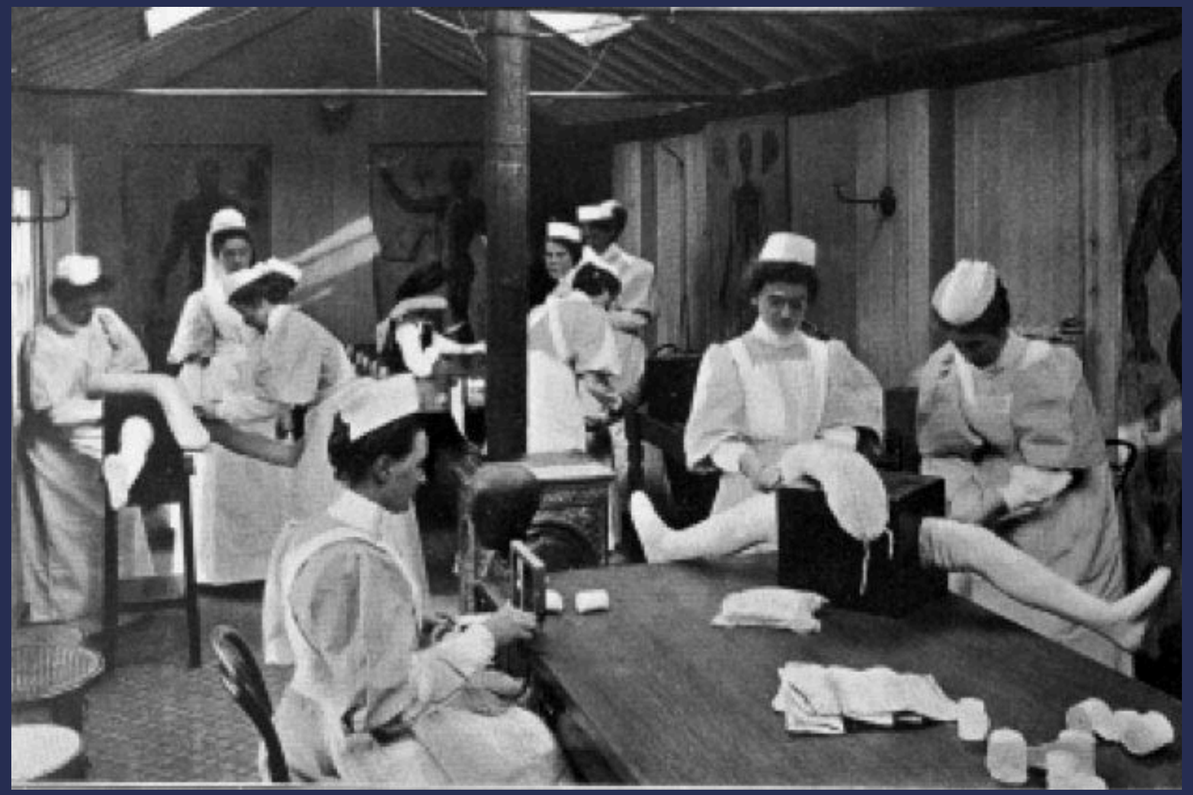
SIMULATION IN NURSING EDUCATION

HOW ITS EVOLVED OVER TIME

Simulation has been part of traditional nursing education for over a century.

Back in the 1800's, anatomical models of limbs as well as individual task trainers came out as a new method for nursing education.

After WWII, an increasing demand for well-trained, competent nurses led to more frequent use of simulation as a method of education. This led to the inception of sim labs and simulation programs which would prove to be a mainstay in nursing education for years to come.

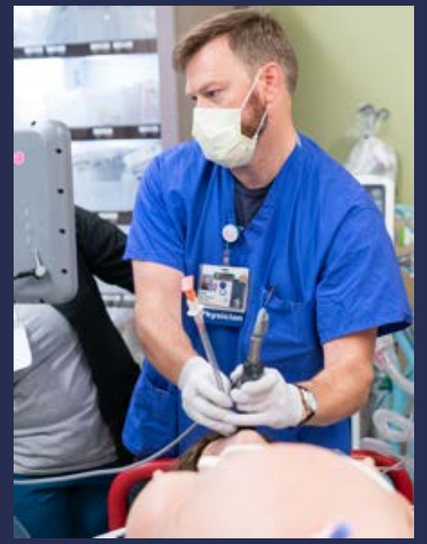


HOW IT STARTED

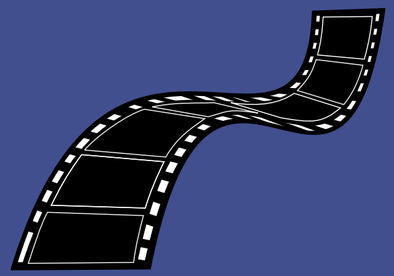
Meet Mrs. Chase!

Created in 1911, she was the very first mannikin used specifically for training healthcare workers.

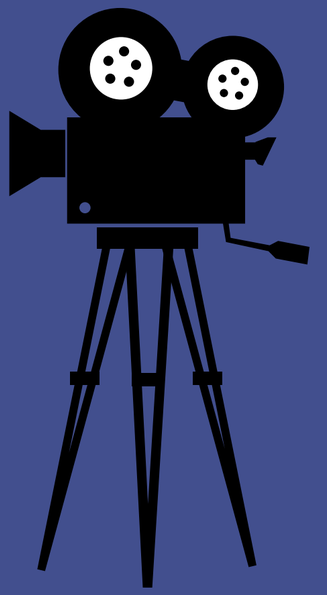
HOW IT'S GOING



REAL FOOTAGE FROM OB SIM 10/17/2023



LIGHTS CAMERA ACTION



SIMULATION AT OHSU

"The OHSU Simulation vision aims to advance excellence in interprofessional patient care through innovative, simulation-based education, training and research."

- Mannikin-based Simulation
- Skill-training Simulation
- Tissue-based Simulation
- Virtual Reality Simulation
- Standardized Patient Simulation

The Emergency Medicine Simulation program at OHSU is focused on providing hands-on learning opportunities for all members of the interdisciplinary team. The Trauma Surgery and Emergency Medicine teams collaborate together on a regular basis to create joint in situ simulation training events using high-fidelity equipment in our actual working environment.

WHY DO WE DO IT?
WHAT ARE THE GOALS?

"It is well documented that simulation-based training helps to enhance communication skills, the ability to cooperate with other members of the interdisciplinary team, the ability to manage complex situations, and to enhance self-efficacy and understanding of interpersonal relations."

Improve Communication/Team Dynamics

- Increase staff familiarity with interdepartmental roles.
- Improve systems and communication pathways with consultants and specialized services outside of the ED.
- Rehearsal/practice of communication techniques such as closed-loop, team pause, summary, etc.
- Improve insight and understanding of all perspectives involved in trauma/resuscitation.

Optimize Competency and Comfort Level with Practical Skills

- Maintain expertise in a complex, rapidly evolving field.
- Identify knowledge gaps and utilize focused, deliberate, repetition and practice to close those gaps.
- Improve medical practitioners' competency, and in turn, increase patient safety and reduce health care costs.
- Mental and physical rehearsal of rarely performed, high stakes procedures in a safe and controlled environment.

Identify Methods to Improve Environment and/or Systems

- Identify environmental/workspace barriers and develop solutions to eliminate them.
- Promote familiarity with equipment, environment, personnel, and processes.
- Reveal local system errors and barriers to efficiency in the workplace (e.g. layout of rooms, location of equipment).
- Improve protocols, systems and infrastructure.

SIM CENTER **VERSUS** IN SITU

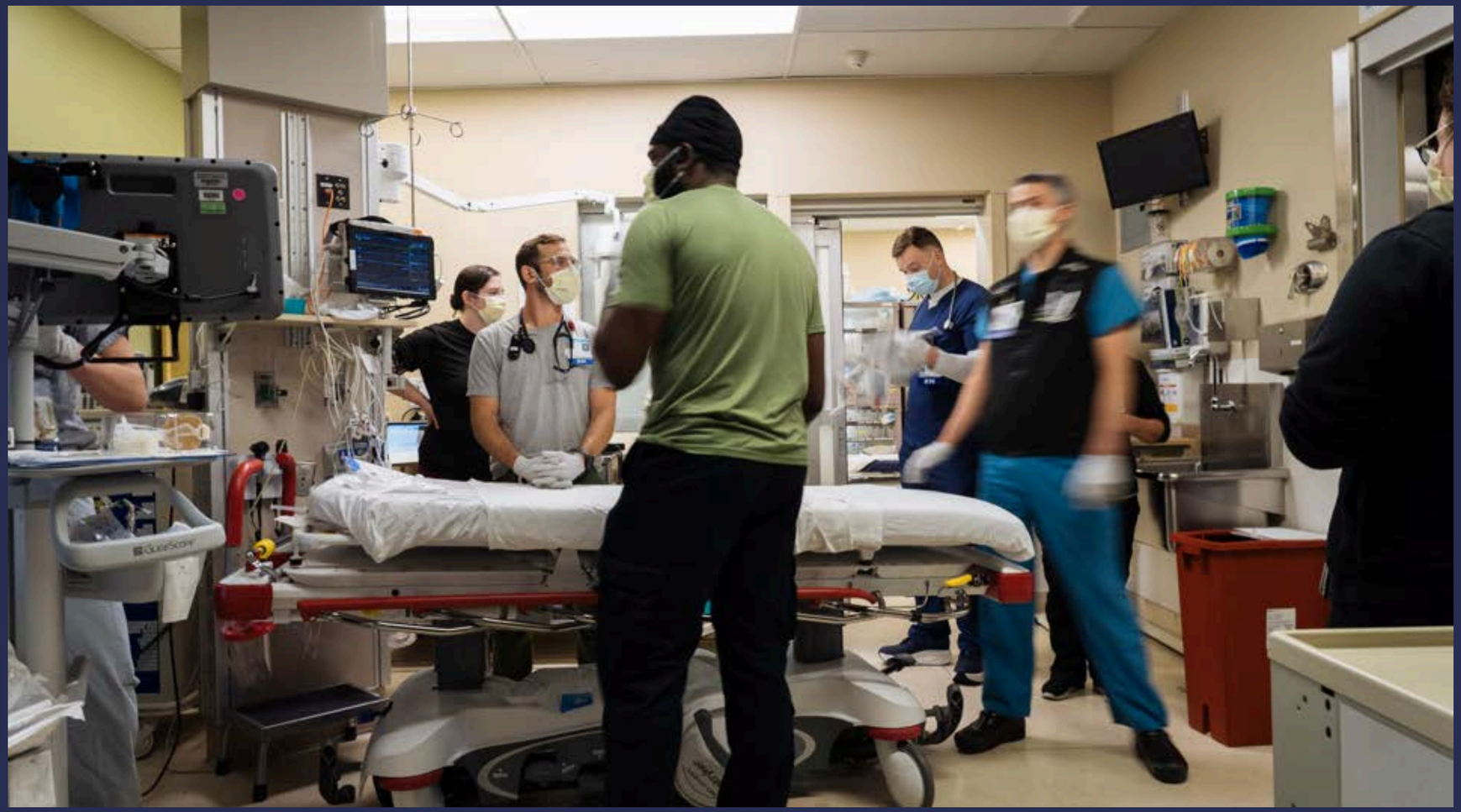
BENEFITS OF IN SITU

PRACTICE IN YOUR REAL-LIFE SETTING

- Improve teamwork/communication amongst teams that actually work together.
- Environment is realistic.
- Learners are more comfortable in their own environment - less pre-briefing/orientation is needed.

- Easier to allow for interdisciplinary collaboration.
- Allows for education on site for staff who were already at work that day.
- No additional funding needed for outside SIM facility.

- Patients, family members, and other departments witness efforts at improving trauma and resuscitation care.
- Easier to base cases off of real sentinel events that have occurred.



INTER-DISCIPLINARY TEAMS

OR

FELLOWS

RESIDENTS

NEUROSURGERY

EMERGENCY MEDICINE

IMAGING TECHS

NURSES

NICU

STUDENTS

ED TECHS

ANESTHESIA

SOCIAL WORK

ENT

PHARMACY

OB

CARDIOLOGY

TRAUMA SURGERY

PICU

RESPIRATORY THERAPY

ORTHOPEDICS

COMM CENTER

BARRIERS

Solutions

Barriers	Solutions
Culture/Buy-in from Staff	• Make SIM “cool,” interesting, and fun! • Protect psychological safety: no putting anyone down, there are no stupid questions. • Focus on quality improvement.
Boarders/Full Department/Space	• Try to always hold one room for SIM. • Change culture so people understand the benefits/importance. • Make sure equipment is easy to pack up quickly if needed.
Staffing Shortages	• Plan ahead, assign people to participate. • Annual requirement for nursing staff. • Utilize those in float roles. • Choose times that are less busy.
Funding	• Save expired equipment so you don’t have to use new supplies. • Use data/evaluation tools to track metrics and show how SIM is beneficial to your department/institution.

LOGISTICS

- **Preparation**
- **Simulation**
- **Structured debriefing**

HOW TO PULL IT OFF

- Scenarios based off real cases.
- Clear learning objectives.
- May or may not involve separate task trainer, an actor or coordination with other departments or services.

“I had a really interesting case recently, but I feel like this part didn’t go well....”

CASE WRITE-UP

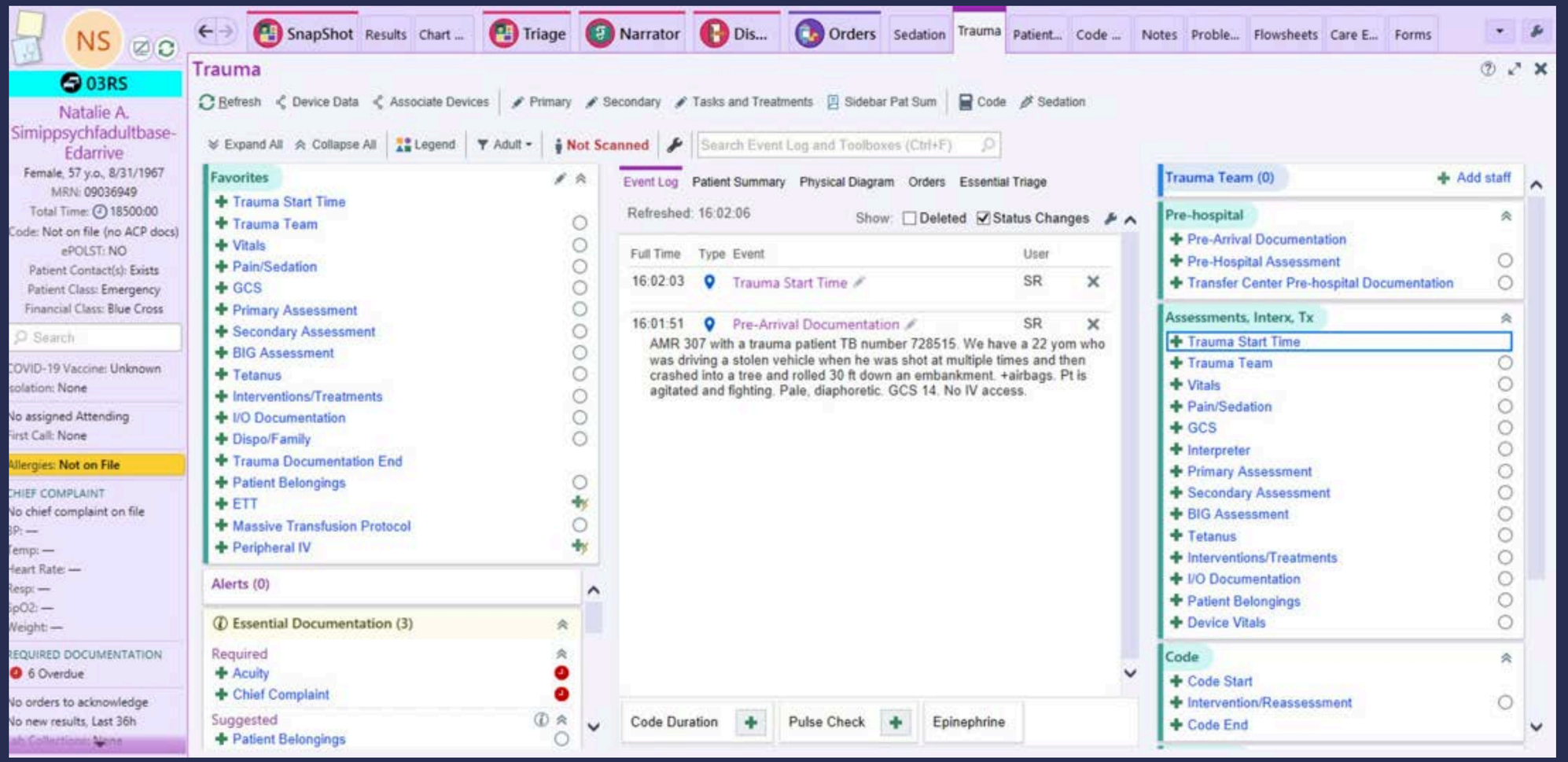
DATA	EXPECTED ACTION
Scenario: **Radio report:** (report to nurse) AMR 307 with a trauma report... AMR 307 with a trauma patient TB number 728515. We have a 22 yom who was driving a stolen vehicle when he was shot at multiple times and then crashed into a tree and rolled 30 ft down an embankment. +airbags. Pt is agitated and fighting. Pale, diaphoretic. GCS 14. No IV access. BP 80/40, HR 130, oxygen 90% on 15L NRB, RR 28, ETCO2 24. ETA 1 minute **Comm center report:** AMR 307, TR 728515, 182nd Powell, 22 yom, who was driving a stolen vehicle when he was shot at multiple times and then crashed into a tree and rolled 30 ft down an embankment. +airbags. Pt is agitated and fighting. Pale, diaphoretic. GCS 14. No IV access. BP 80/40, HR 130, oxygen 90% on 15L NRB, RR 28, ETCO2 24	1. Perform pre-arrival huddle, assign roles, crowd control (MD or RN) Talk about priorities. 2. Put in orders (RN) 3. Anticipate needs and gather any additional necessary supplies (MD/RN) 4. Ensure appropriate PPE including eye protection! (Everyone) 5. Discuss plan for securing airway if necessary, set up supplies for intubation including back up measures for failed airway (MD) 6. Order blood and send a runner to retrieve it (RN) RN to determine trauma level - FULL: mechanism, BP, HR, RR, anticipated need for OR and hemorrhage control

Adult Trauma Sim: 45 year old male

Learners	Goals	Objectives	Strategy	Assessment
Adult ED faculty, residents, and fellows. Adult ED nursing and other staff. Other members of the trauma team including surgical residents, faculty, and respiratory therapy.	Review and practice recognition of: 1. Recognize need for additional resources with unstable patient 2. Recognize need for airway support and critical steps. Including back up methods. 3. Recognize risks of RSI medications in unstable patient. 4. Prioritize interventions for uncontrolled bleeding. 5. Identify measures to determine success or failure of interventions and need for further interventions. 6. Prepare primary and secondary methods of intubation and demonstrate ability to quickly use either method. 7. Prioritize interventions in multiply injured trauma. 8. Identify appropriate radiography. 9. Identify roles and	1. Demonstrate prioritization of ABCs with continued reassessment. 2. Recognize inability to protect airway and need for intubation. 3. Evaluate effectiveness of airway with ability to oxygenate and oxygen saturation. 4. Identify appropriate RSI medications and medications for continued sedation/paralysis/pain control. 5. Recognize uncontrolled bleeding and institute stop the bleed measures and appropriate ordering of blood products. 6. Recognize hemothorax and demonstrate set up of chest tube system. 7. Recognize the need for rapid IV/IO access 8. Perform a thorough primary and secondary survey. 9. Evaluate and respond to abnormal vital signs.	1. High fidelity simulation 2. Structured debriefing	1. Critical action checklist 2. Teamwork Assessment Tool

Preparation includes writing an outline of the scenario. It should include goals, objectives, and expected outcomes related to patient presentation and interventions. Also includes prehospital report, and paramedic script for patient arrival.

CHART CREATION



Creation of real chart allows nursing staff to:

- **Order labs**
- **Print wrist-band**
- **Chart in real time**
- **Order blood products**
- **Place consults**

HI-FIDELITY:

THE MORE REALISTIC THE SIM SCENARIO FEELS, THE BIGGER THE IMPACT WILL BE ON THE LEARNINERS.

HI-FIDELITY MANNIKINS

- Life size, hi-fidelity mannikins provide learners the opportunity to practice assessment, procedures, diagnostics, and more, in life-like clinical scenarios.
- Clinicians get the benefit of hands-on experience and practice without putting actual patients at risk.
- Mannikins are capable of: blinking, breathing, seizing, crying, sweating, bleeding, vomiting. They have palpable pulses, audible breath sounds, and are capable of undergoing a variety of different procedures including intubation, intravenous or intraosseous access, mechanical CPR, etc. They can even give birth!

HI-FIDELITY MOULAGE

- Make-up, dress, props, fake blood, protruding bones, fake skin, etc. is used to mimic real-life appearance of injury, disease, and pathology.

HI-FIDELITY TECH

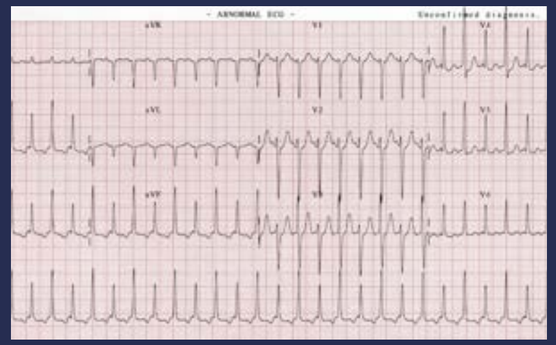
- Realistic vital signs on real monitors in the trauma bays.
- Capable of portraying any cardiac rhythm or vital sign.
- Real-time capability to change vital signs on the fly based on individualized scenarios and interventions.
- Real images are able to be displayed on video laryngoscope screen, POCUS screen, portable x-ray, etc.

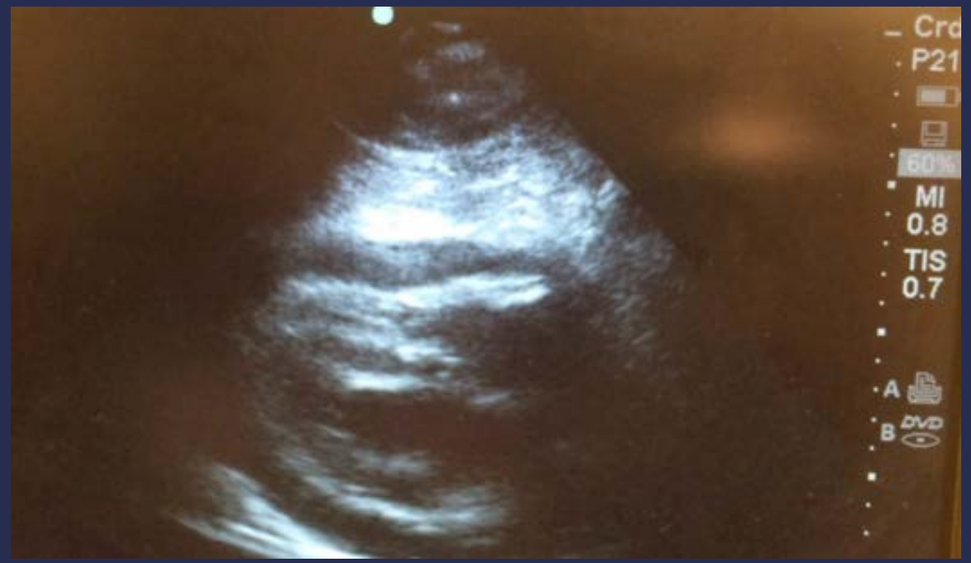
HI-FIDELITY TASK-TRAINERS

The more the learner practices these skills, the more proficient they'll be when the scenario arises on a real patient....

- Low-frequency, high stakes procedures such as: thoracotomy, surgical air-way, canthotomy, hysterotomy, pericardiocentesis, etc.
- Common procedures like central line placement, arterial line placement, chest tubes, and intubation.
- Ability to practice without fear of harming a patient.

DIAGNOSTICS | IMAGING STUDIES





We provide stock images/reports displaying inury/pathology on CT scan, Ultrasound, X-ray, Labs, EKG, etc.

STRUCTURED PRE-BRIEFING

LOGISTICS | CASE PRESENTATION

Example:

THE CASE:

TRAUMA RADIO

“71 YOM fall 20 ft from roof. Thigh was impaled with long metal object. Object still in leg. GCS 15, 80/40, hr 110, rr 20, 98% RA, giving fentanyl for pain.”

ETA 5 min

Cases are presented to our participants in their actual working environment through a simulated trauma radio.

KEEPIN IT REAL ....

SIM IN ACTION

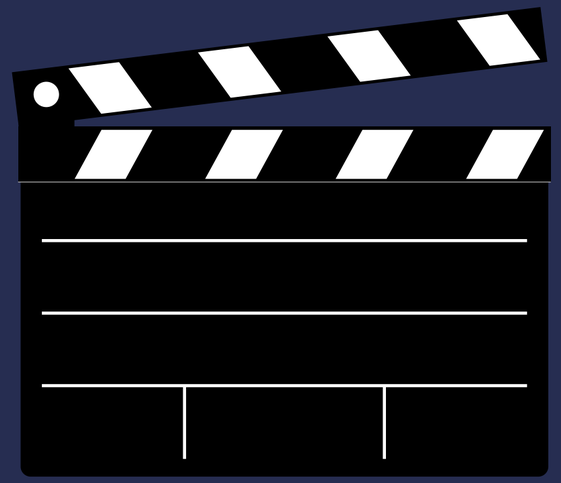
SIM IN ACTION

SIM IN ACTION

STRUCTURED DEBRIEFING

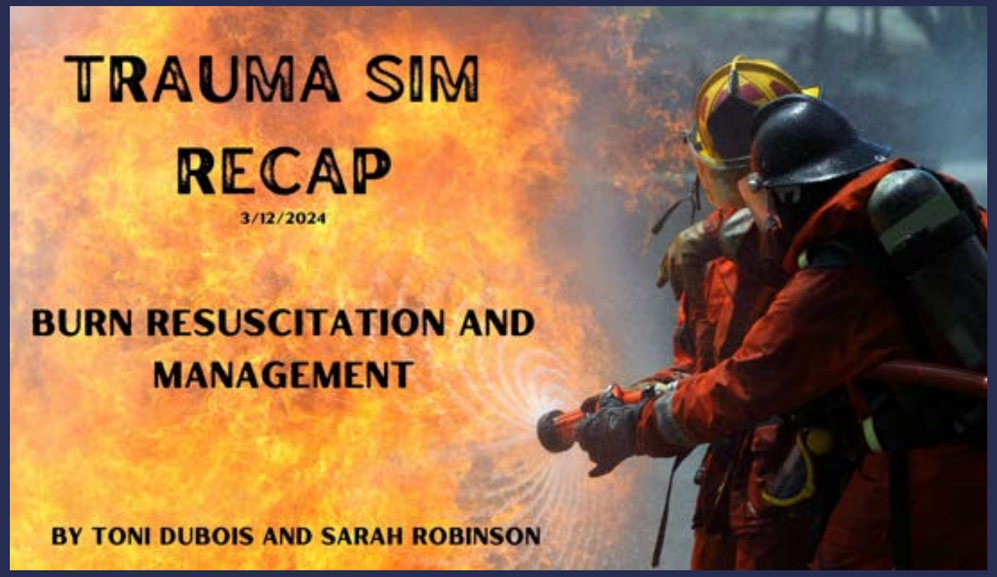
DEBRIEF WHILE IDEAS ARE STILL FRESH

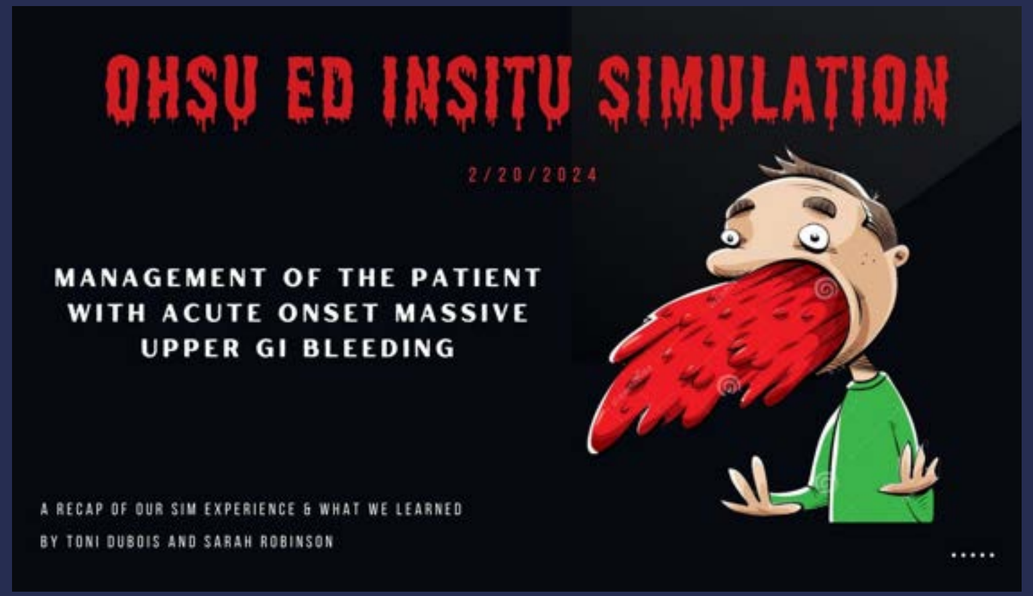
RECORDING
VIDEO REVIEW



Video recording of a skill significantly contributes to the evaluation of an activity by both the student and the teacher.

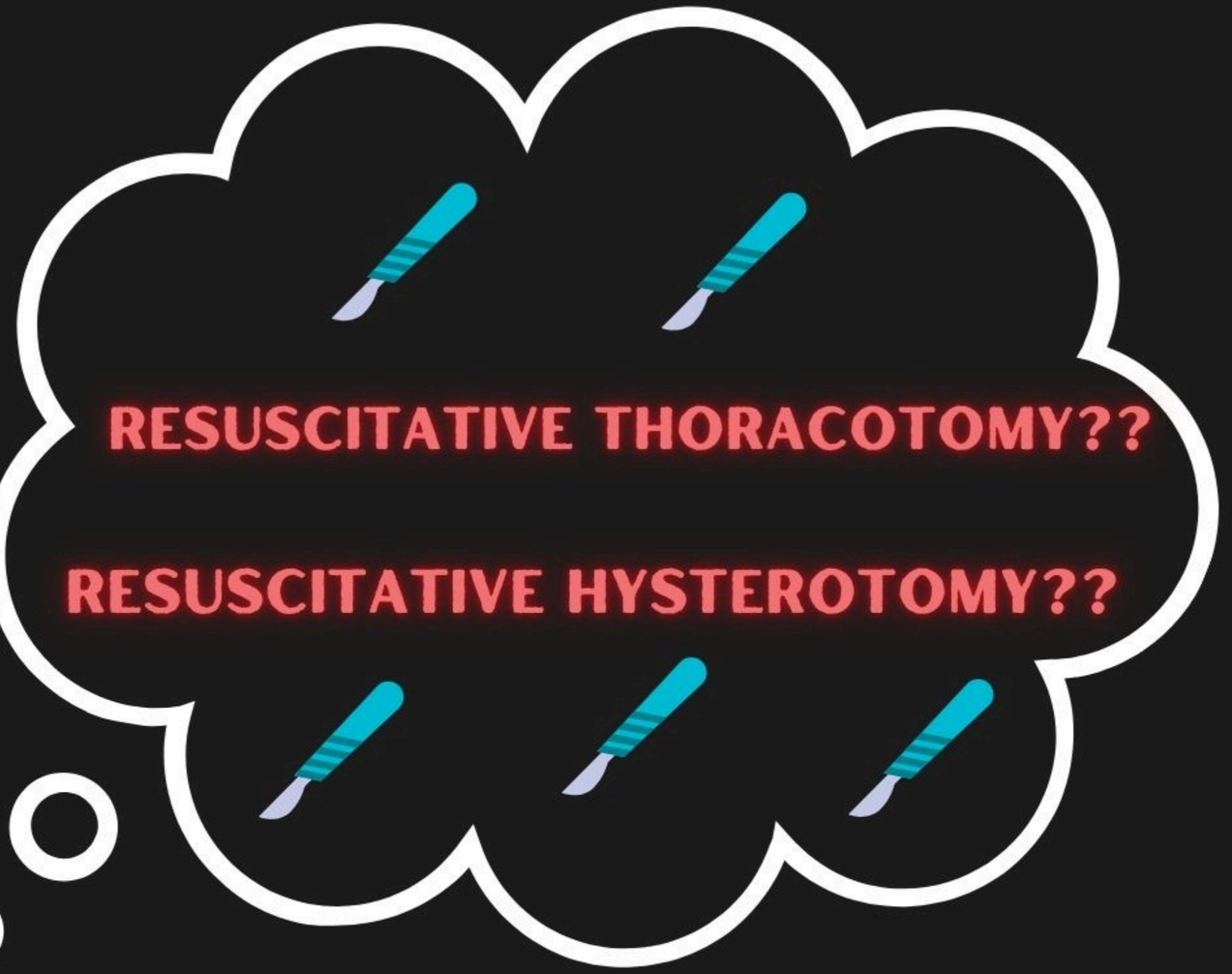
SIM WRITE-UPS | RECAPS





- **X** control eXsanguination
- **A** irway, establish patency/intubate
- **B** reathing/ventilation/tension ptx
- **C** irculation/access/give blood/MTP
- **D** isability, pupils, GCS
- **E** xposure, prevent hypothermia

+



.....ARE THESE PROCEDURES INDICATED?

IF SO, IN WHAT ORDER SHOULD THEY BE PERFORMED?

SHOULD THEY HAPPEN SIMULTANEOUSLY?

WHO SHOULD PERFORM THEM?

.....OB/NICU ARE ON TH WAY, BUT NOT HERE YET

ED THORACOTOMY

GOALS OF THORACOTOMY:

- RELIEVE CARDIAC TAMPONADE
- CROSS-CLAMP THE AORTA TO CONTROL EXSANGUINATION BELOW LEVEL OF CROSS-CLAMP
- OPEN CARDIAC MASSAGE--->MAXIMIZES CARDIAC AND CEREBRAL BLOOD FLOW
- RELIEVE TENSION PNEUMOTHORAX (ALSO ACHIEVED W/ FINGER THORACOSTOMIES AND/OR CHEST TUBES)
- TEMPORIZE THORACIC BLEEDING

CONSIDERATIONS:

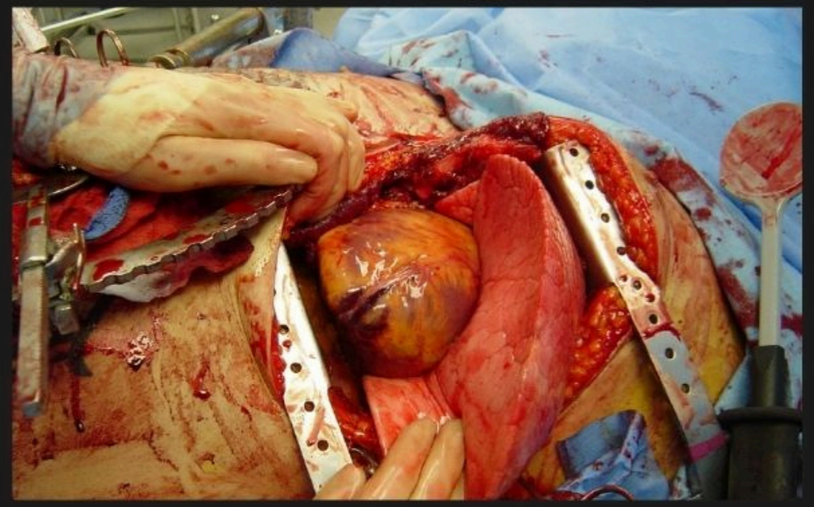
- AGE OF PATIENT
- LIKELIHOOD OF NEUROLOGICAL RECOVERY/IS THERE AN OBVIOUS DEVASTATING HEAD INJURY?
- IS THERE CARDIAC ACTIVITY ON POCUS?
- SIGNS OF LIFE?
- RISK TO STAFF
- REMEMBER YOUR PPE, INCLUDING EYE PROTECTION!

THORACOTOMY PODCAST LINK 1

THORACOTOMY PODCAST LINK 2

TWO MOST COMMON APPROACHES:

LEFT ANTEROLATERAL

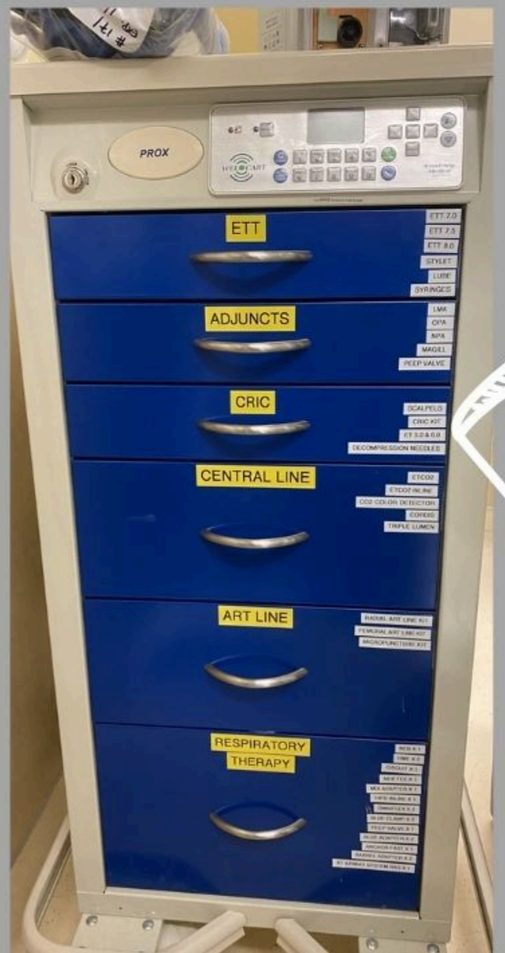


BILATERAL ANTERIOR OR "CLAMSHELL"

IF TOO MUCH SWELLING/EDEMA IN THE THROAT, A SURGICAL AIRWAY MIGHT BE THE ONLY OPTION.

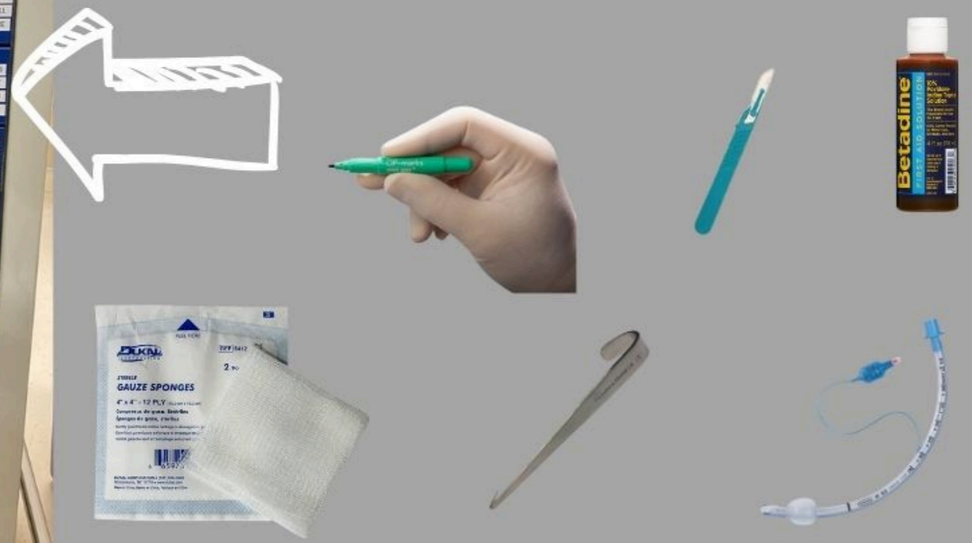
CRICOTHYROTOMY

OPEN SURGICAL TECHNIQUE, WHERE AN INCISION THROUGH THE CRICOTHYROID MEMBRANE IS MADE TO ALLOW THE INSERTION OF A TRACHEOSTOMY TUBE OR CONVENTIONAL ENDOTRACHEAL TUBE DIRECTLY INTO THE TRACHEA BELOW THE VOCAL CORDS

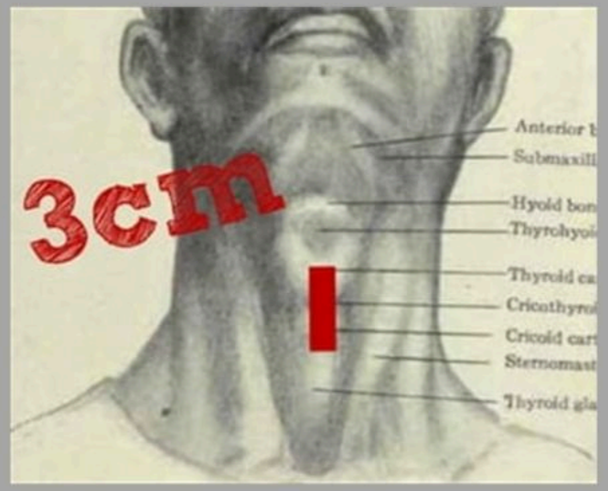


[LINK FOR VIDEO ON HOW TO PERFORM CRIC]

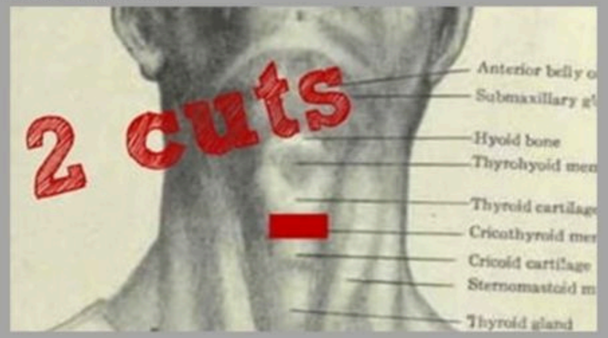
THE 3RD DRAWER FROM THE TOP HAS EVERYTHING YOU NEED TO PERFORM A SURGICAL AIRWAY!



First Cut

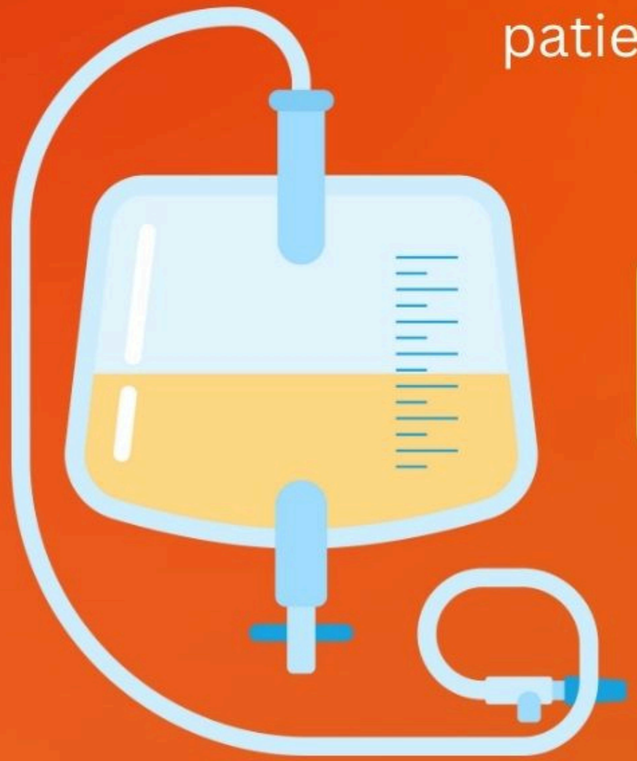


Second Cut



PLACE FOLEY TO MONITOR URINE OUTPUT

A urinary catheter is important because urine output is currently the best monitor of adequate organ perfusion and, thus, fluid resuscitation. All patients with burns ≥20% TBSA should have a urinary catheter.



URINE OUTPUT GOALS:

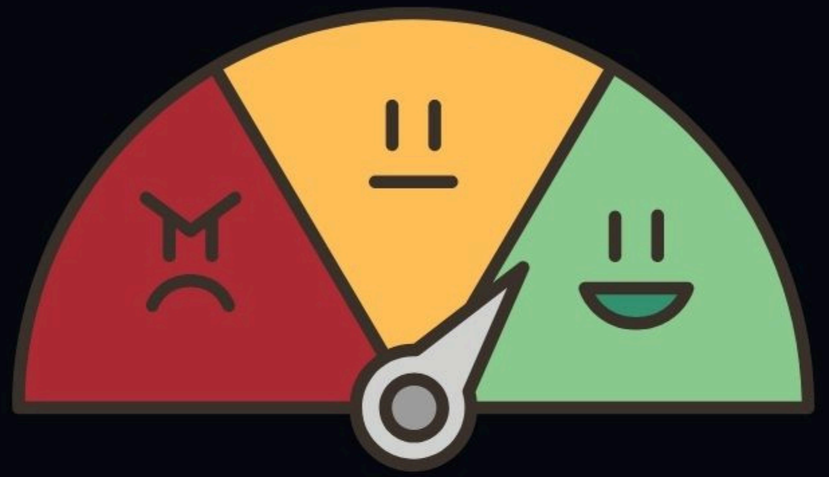
- **ADULTS: 0.5 ML/KG/HOUR (OR 30–50 ML/HOUR)**
- **CHILDREN (AGE < 12 YEARS): 1 ML/KG/HOUR (OR 30 ML/HR ONCE THEY REACH 30 KG)**
- **ADULT PATIENTS WITH HIGH-VOLTAGE ELECTRICAL INJURIES WITH EVIDENCE OF MYOGLOBINURIA: 75–100 ML/HOUR UNTIL URINE CLEAR**

NOT ABLE TO MAKE IT?

NO BIG DEAL!

WE RECORDED IT!

WATCH HERE



https://ohsu.ca1.qualtrics.com/jfe/form/SV_4TMvQohPxPfaTeC

PLEASE SCAN THE QR CODE, OR CLICK THE LINK ABOVE TO PROVIDE YOUR HONEST FEEDBACK FOR US! WE ARE CONSTANTLY STRIVING TO MAKE THESE BETTER AND WORTHWHILE FOR YOU GUYS!!

OUTCOMES

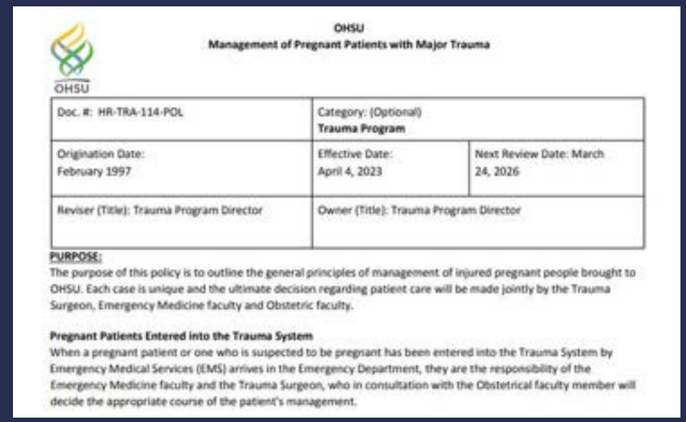
ACHIEVEMENTS

- Increased staff comfort level in trauma activations
- Environmental quality improvement
- Development of new policy (e.g. OB Trauma Activation)
- Improved working relationships between nurses and residents

CARTS

KITS

PROTOCOLS



OHSU

Management of Pregnant Patients with Major Trauma

Doc. #: HR-TRA-114-POL	Category: (Optional) **Trauma Program**	
Origination Date: February 1997	Effective Date: April 4, 2023	Next Review Date: March 24, 2026
Reviser (Title): Trauma Program Director	Owner (Title): Trauma Program Director	

PURPOSE:

The purpose of this policy is to outline the general principles of management of injured pregnant people brought to OHSU. Each case is unique and the ultimate decision regarding patient care will be made jointly by the Trauma Surgeon, Emergency Medicine faculty and Obstetric faculty.

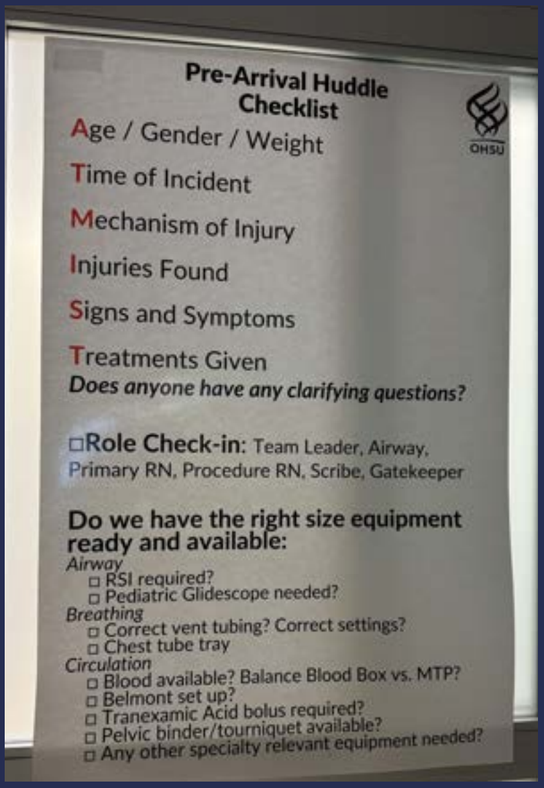
Pregnant Patients Entered into the Trauma System

When a pregnant patient or one who is suspected to be pregnant has been entered into the Trauma System by Emergency Medical Services (EMS) arrives in the Emergency Department, they are the responsibility of the Emergency Medicine faculty and the Trauma Surgeon, who in consultation with the Obstetrical faculty member will decide the appropriate course of the patient's management.

OUTCOMES | ACHIEVEMENTS

TEAM DYNAMICS: ROLE IDENTIFICATION

SYSTEMS/PROTOCOLS: PRE-BRIEF



TESTIMONIALS

“The high-fidelity simulations accurately recreated the fast-paced, high-stakes environment of real trauma situations, allows me to practice critical decision-making, teamwork, and hands-on procedures in a controlled setting.” Shakira De Irish, RN

“Appreciate the fact that SIMS are created using real scenarios where systemic issues have been identified.” Sara Brady, RN

“I think there are two specific circumstances where the simulation really helped us – we drilled the response to an unstable pregnant patient and a private vehicle drop off of a multi compartment gunshot wound. Both of these eventually happened and then both of them are response times were excellent, the team was coordinated, patient got fantastic care. Real really speaks to the benefit of the simulation situation.” - McKenzie Cook, MD

“These simulations were instrumental in preparing me to handle real-life trauma cases with competence and composure.”

“Being able to work alongside experienced professionals in such a realistic environment not only helped refine my technical abilities but also deepened my understanding of effective communication during emergencies.”

“Out of the many sims I’ve been a part of, what really stands out and has stuck with me has been understanding everyone’s role in a critical situation. I personally love the debriefs in which I can ask questions to the interdisciplinary team about what would make things easier. I now am a champion of starting MTP early when necessary and advocating for upgrading line access for sick traumas. All things that may go unnoticed when things get hectic.” - Megan Alberton, RN

“I have noticed much more frequent use of team pause before the arrival of code 3 ambulances and full traumas after practicing this during simulation.”

TESTIMONIALS

"Things that feel akward to do in real life seem easier to do after practicing them in a safe environment."

"Attending medical simulations in the emergency department at OHSU was an invaluable experience that significantly enhanced my clinical skills and confidence."

"As a Resident, I believe Trauma SIM is beneficial in my development. Personally, I am very soft spoken/mumbler. Through SIM I have learned to become comfortable being more vocal (Speaking more loudly and clearly). The educational opportunity provided through SIM challenges you (whether this maybe be your crashing hypotensive, or victim with extensive burns who loses pulses). It provides a collaborative environment where you interact with different teams (e.g Trauma team, nursing, Ortho, etc..). Most important is that it humbles you. You realize that learning is a continuous life long process and no one person knows it all." - Keino Robinson, EM resident pgy 3

"Sims with nurses improved my communication skills and team dynamics. Knowing nurses' concerns reminds me to verbalize my thinking process during a code or critical situation." - Alvaro Lewis, EM resident pgy 2

"Having simulation in our actual workspace with my colleagues created a much more realistic experience and left me feeling much more prepared to face a similar clinical patient." - Sara Kirkpatrick, EM resident pgy 3

"The in-situ simulations have been amazing for resident and physician education. It gives the learners the independence to run critical cases on their own in a safe environment. Further, by doing it in situ instead of in the simulation lab, the environment is the one they practice in and helps refine their systems based practice. As the OHSU Emergency Medicine Residency director, I am so excited that we have this resource available to our learners, and hope we can continue to refine this process." David Jones, MD

FUTURE STATE

- POP UP SIM/UNANNOUNCED
- DIFFERENT TIMES (NIGHT SHIFT)
- DIFFERENT AREAS (TRIAGE LOBBY, CAFETERIA, ETC.)

IMPROVED MANNIKIN FIDELITY

Trauma Tom!

IMPROVED TECHNOLOGY/VIRTUAL REALITY

CAPTURING DATA

TEAMWORK EVALUATION TOOL

BDMS Case #5: 6-year old boy with drowning

Team#:
Evaluator:

Critical Action Checklist

	Yes	No	
1)	☐	☐	Identifies respiratory distress
2)	☐	☐	Assigns team roles
3)	☐	☐	Administers supplemental oxygen via NRB or HFNC
4)	☐	☐	Identifies drowning and possible ARDS/pulmonary edema as cause of distress
5)	☐	☐	Identifies hypothermia
6)	☐	☐	Initiates rewarming
8)	☐	☐	Places IV and initiates fluid resuscitation
9)	☐	☐	Recognizes respiratory failure and prepares for intubation
10)	☐	☐	Performs RSI using appropriate medications and weight-based doses
11)	☐	☐	Confirms placement of endotracheal tube
12)	☐	☐	Uses DOPE pneumonic when patient deteriorates
13)	☐	☐	Adjusts FiO2 or PEEP to improve oxygenation
14)	☐	☐	Communicates using closed-loop commands

THANK YOU

ACKNOWLEDGEMENTS

Josh Kornegay, M.D.,

Emergency Medicine Simulation Education Director

Josh has been a faculty attending physician in the ED at OHSU since 2014. He is very involved in the resident education program, with one of his primary focuses being simulation. Without Josh, our in situ simulation program in the ED would not exist. We collaborate on a regular basis with him to discuss cases and strategize together on how to create meaningful simulation scenarios where all members of our team can benefit from the learning. He is a brilliant wealth of knowledge and we are so incredibly lucky to work with him!

THANK YOU

ACKNOWLEDGEMENTS

Nicole Callison,

Senior Simulation Operations Specialist

Huge thank you to Nicole and the OHSU simulation team for making all of our in situ SIM dreams come true. She is the master mind behind all things hi-fidelity. We tell her the mechanism and injuries we want the patient to have, and she goes to great lengths to makes it happen! She also handles all the tech and is present for each SIM to make sure everything goes smoothly. Her expertise and willingness to collaborate with us has been absolutely vital to achieving our SIM goals.

SPECIAL SHOUT OUT
ACKNOWLEDGEMENTS

NATALIE CAPACCI, MSN, RN, CPEN

Pediatric ED Educator

Natalie runs OHSU's pediatric emergency departments simulation program

QUESTIONS?!

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