In Situ Simulation Sepsis Telehealth Toolkit

The purpose of this toolkit is to guide the process of training health care leadership and bedside staff how to integrate telehealth into the workflow by using in situ simulation as an instructional platform.

**The project and tools described within this toolkit are specifically for using telehealth in rural emergency departments (EDs) to assist with managing sepsis patients. However, the content could be modified for any telehealth implementation within any health care setting.*

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What is Sepsis?

Sepsis is a serious and potentially life-threating and overwhelming body infection that can result in death quickly if medical interventions are not implemented within recommended time frames (ex. antibiotics and fluids administered within three hours of onset and administration of vasopressors within six hours to bring the patient's dangerously low blood pressure back up).

National standards for the diagnosis and treatment of sepsis have been established to guide medical professionals on appropriate care practices for these critically ill patients. Meeting these standards can be challenging for health care professionals as a patient who once appeared stable can decline rapidly. This is where telehealth monitoring can assist in the care of sepsis patients presenting to emergency departments.

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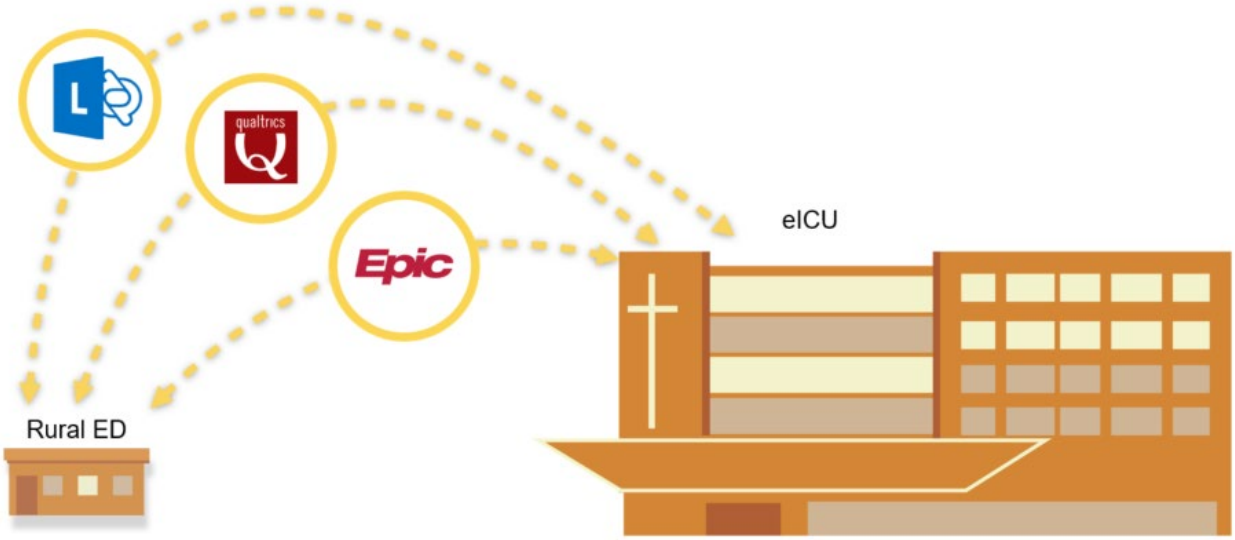
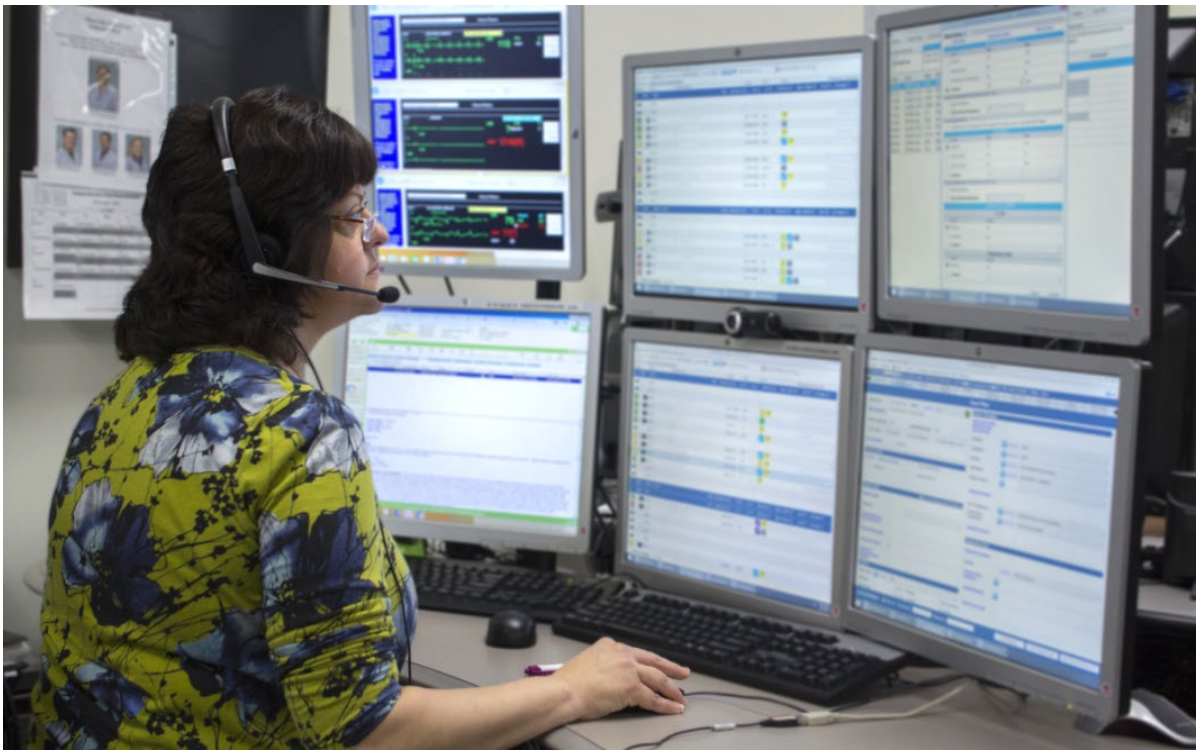
What is Telehealth?

Telehealth involves using electronic technologies to support the care of patients remotely. At OSF HealthCare, the telehealth department is known as OSF ConstantCare or the eICU. This team of critical care nurses and physicians support other clinicians in several emergency departments and intensive care units (ICUs) across OSF HealthCare so that another set of eyes is on the patient at all times. These clinicians monitor vital signs, blood and imaging test results and medications ordered or administered in real time from a remote site. They communicate with the bedside health care team when needed.

As a part of this sepsis project, **a telehealth cart** dedicated to the remote monitoring of sepsis patients was made available to two rural OSF HealthCare emergency departments (ED). If rural ED staff suspected a patient might have sepsis, they could bring the cart into the patient's room and utilize additional monitoring from critical care nurses from the eICU. This extra set of eyes is not intended to take over care of the patient, but rather add additional support to the rural ED team. Telehealth allows the ED nurse to continue monitoring other patients without fear of a potential sepsis patient declining rapidly. This previously mentioned process was followed during this particular sepsis telehealth project; however, telehealth equipment would not necessarily always include bringing in a separate cart each time a suspected sepsis patient presented to the ED exam room. Other telehealth technologies could include: 1) an already installed monitor/camera within the exam room which would allow for simply turning on the visual connection between the rural ED and eICU, 2) remote access to the patient's physiology (their blood pressure, heart rate, oxygen saturation, respiratory rate, temperature, heart monitor readings), and 3) simple telephone access between the ED and eICU.





eICU Constant Care Nurse monitors multiple patients in EDs and ICUs across OSF HealthCare.

Our Project:

Part 1: In situ simulation

Image of the sepsis telehealth cart used for real clinical telehealth audiovisual connection and for the in situ simulation connection (our study) between the bedside care team and the eICU team.

Jump Simulation collaborated with Northwestern University on a federally funded AHRQ grant between 2016 – 2019 [Agency for Healthcare Research and Quality Grant 1 R18 HS024027-01 "In Situ Simulation for Adoption of New Technology to Enhance Safety in Rural EDs"]. The project involved using in situ simulation to create a training plan with health care staff from two rural EDs to facilitate learning how to incorporate telehealth connections to the eICU within the normal workflow for the care of sepsis patients. Rural EDs were selected because they face unique challenges including smaller nursing and support staff, less physicians and fluctuating patient volumes with differing severity of illnesses. Since sepsis patients can decline rapidly from one moment to the next, having back-up critical care nurses monitoring the patient via telehealth gives rural ED nurses and physicians peace of mind to care for other patients without fear of missing a rapid change in a sepsis patient's status. The monitoring layer can include cameras, patient physiology as seen on monitors or both.

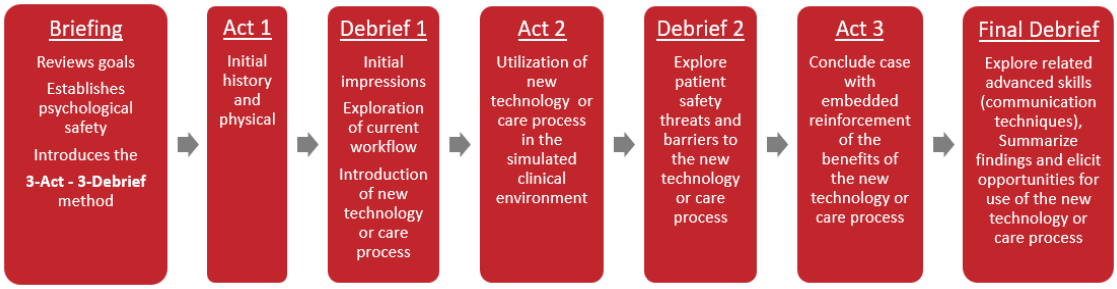
The Jump Research Team and the eICU nurses created and participated in the in situ (on-site) simulation training. An actor known in the simulation world as a standardized participant (SP) played the role of a patient presenting to the ED with possible sepsis. ED staff took turns assessing and monitoring the simulated patient just as they would if it had been a real patient. Labs, imaging, medications and fluids were ordered, and appropriate assessments were simulated on the SP. The scenario was written in three acts, so time for hands-on training with the telehealth interface could be embedded within the sepsis simulation scenario.

Barker, L.T., Bond, W.F., Vincent, A.L. *et al.*
A novel in situ simulation framework for introduction of a new technology: the 3-Act-3-Debrief model
Advances in Simulation 5, 25 (2020).
https://doi.org/10.1186/s41077-020-00145-x

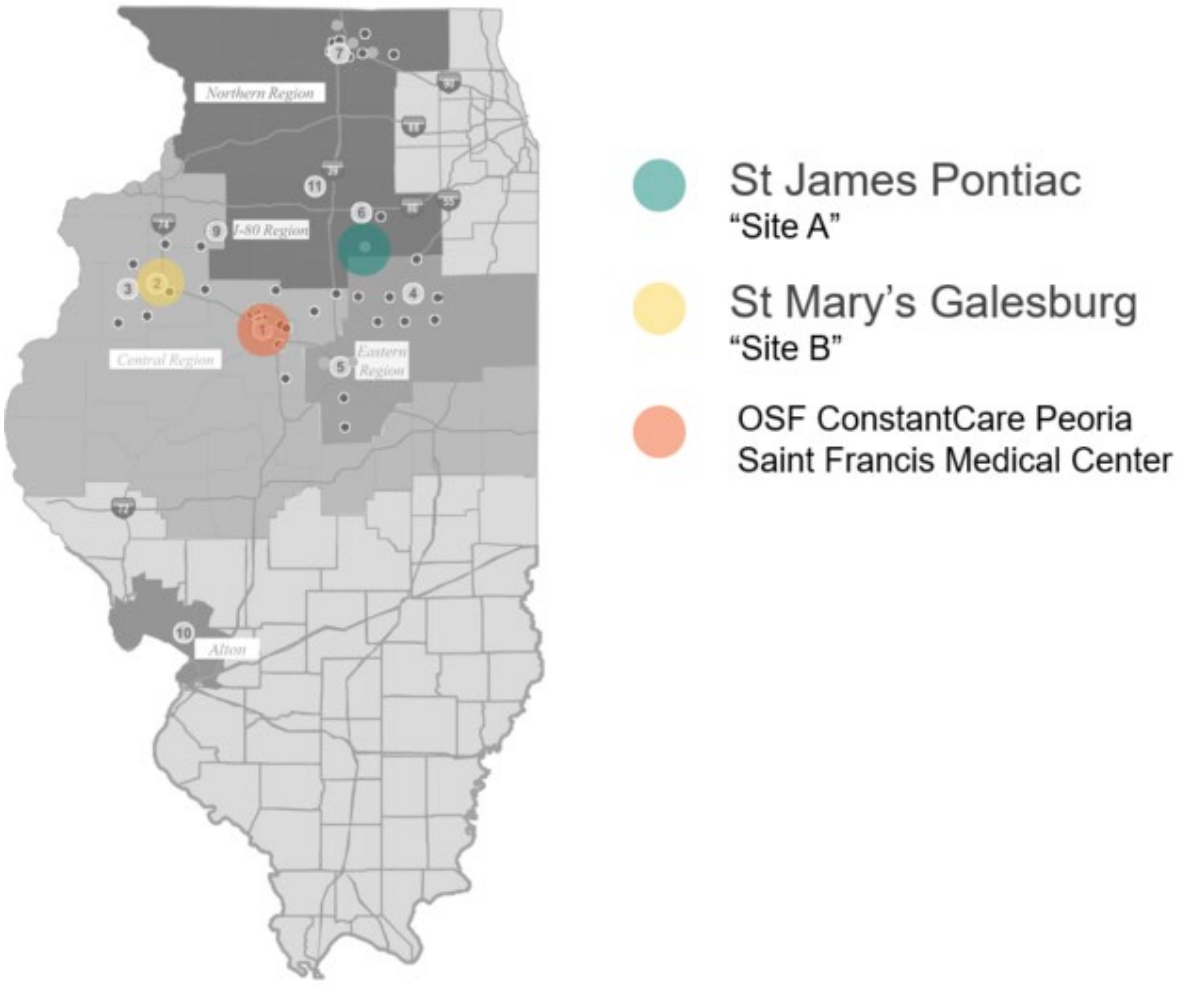
eICU nurses facilitated the sepsis telehealth cart training and actually connected with an eICU nurse at the tertiary care referral hospital that houses the eICU staff. The rural ED staff were allowed to practice using the real cart. During the second act of the simulation, the SP patient continued to decline to simulate how a sepsis patient becomes more ill in the real world. The rural ED staff simulated bringing the sepsis telehealth cart into the patient room at this time. They practiced turning it on again and connected with the off-site eICU nurse. Introductions were made between the remote eICU nurse and SP patient in the rural ED just as it would happen in the real world.

The simulation was paused again, so Jump Simulation faculty could debrief with the rural ED staff on the scenario and telehealth cart. This also gave a place for the eICU to call the rural ED and simulate that the SP patient was showing signs of confusion and low blood pressure. Those clinical signs were an indication the patient was going into septic shock. Staff went back into the simulated exam room to administer vasopressors in attempt to resuscitate the patient. The scenario ended with the SP responding to treatment and rural ED staff and Jump faculty participated with a final debrief.

Both sites received the same sepsis training via an electronic module prior to site A's initial in situ simulation. Refresher sepsis training and updated best practice alert (BPA) electronic health record (EHR) content was provided via an electronic module prior to site B's initial in situ simulation and site A's refresher simulation.



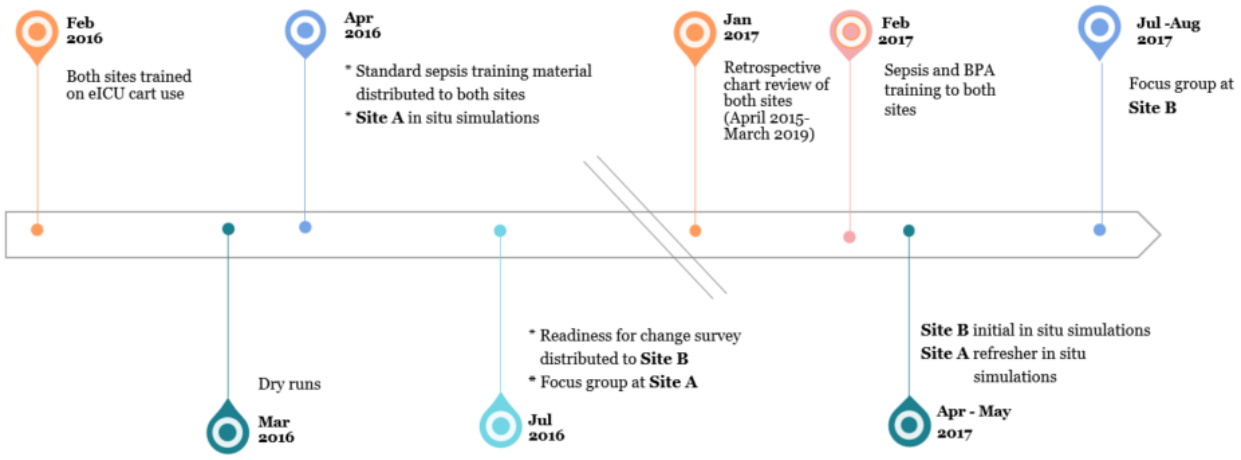
Displays the in situ simulation sepsis scenario flow divided between 3 Acts.



Displays the location of the two rural ED sites who participated in the in situ simulation and the location of the OSF ConstantCare site where the eICU staff is physically located at OSF HealthCare Saint Francis Medical Center.

Part 2: Chart review

Part 2 of the project involved performing a chart review of all sepsis patients seen at both rural ED sites one year before the training through one year after the training. The team wanted to investigate if using the telehealth cart in normal workflow improved treatment and outcomes for sepsis patients.



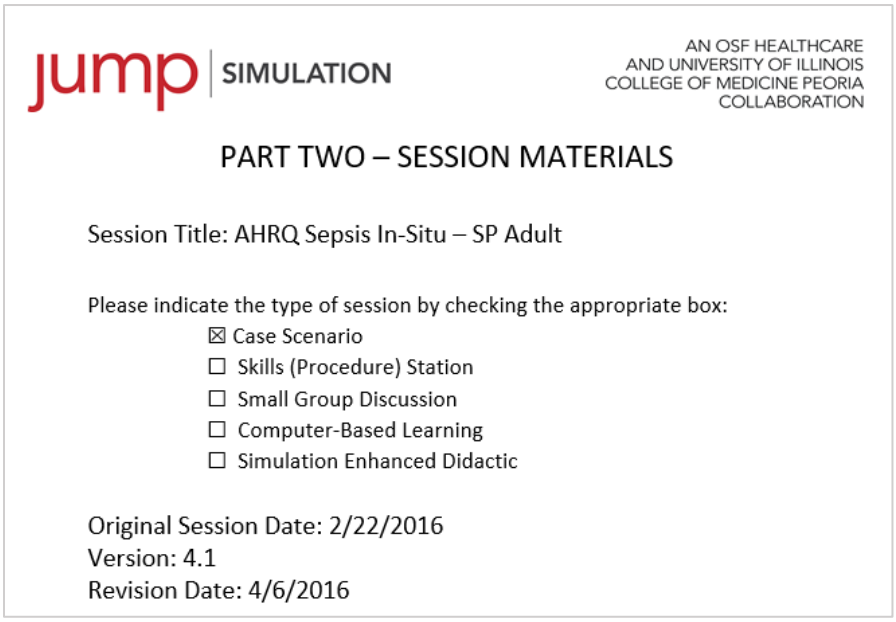
Jump Simulation and Northwestern Sepsis AHRQ Grant Research Project Timeline.

Bond, WF, Barker, LT, Cooley, KL, Svendsen, JD, Tillis, WP, Vincent, AL, Vozenilek, JA, & Powell, ES. **A Simple Low-Cost Method to Integrate Telehealth Interprofessional Team Members During In-Situ Simulation**. Simulation in Healthcare. 2019 14(2): 129-136. https://doi.org/10.1097/sih.0000000000000357

Tools to replicate or modify for an in situ simulation introducing telehealth technology

I. Simulation Documents:

A. ADULT SEPSIS SIMULATION CASE (Urosepsis)



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PART TWO – SESSION MATERIALS

Session Title: AHRQ Sepsis In-Situ – SP Adult

Please indicate the type of session by checking the appropriate box:

- ☒ Case Scenario
- ☐ Skills (Procedure) Station
- ☐ Small Group Discussion
- ☐ Computer-Based Learning
- ☐ Simulation Enhanced Didactic

Original Session Date: 2/22/2016
Version: 4.1
Revision Date: 4/6/2016

Included in Toolkit: 3a AHRQ In-Situ Sepsis Session Document.docx

B. ADULT SEPSIS SIMULATION CASE (Pneumonia)

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PART TWO – SESSION MATERIALS

Session Title: AHRQ Sepsis In-Situ - Refresher

Please indicate the type of session by checking the appropriate box:

- ☒ Case Scenario
- ☐ Skills (Procedure) Station
- ☐ Small Group Discussion
- ☐ Computer-Based Learning
- ☐ Simulation Enhanced Didactic

Original Session Date: 3/28/2017
Version: 2.1
Revision Date: Click here to enter a date.

Included in Toolkit: 3b AHRQ In-Situ Sepsis Refresher.docx

C. STANDARDIZED PARTICIPANT UROSEPSIS DOCUMENTS

i. Urospepsis SP Template

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Standardized Patient Case Template

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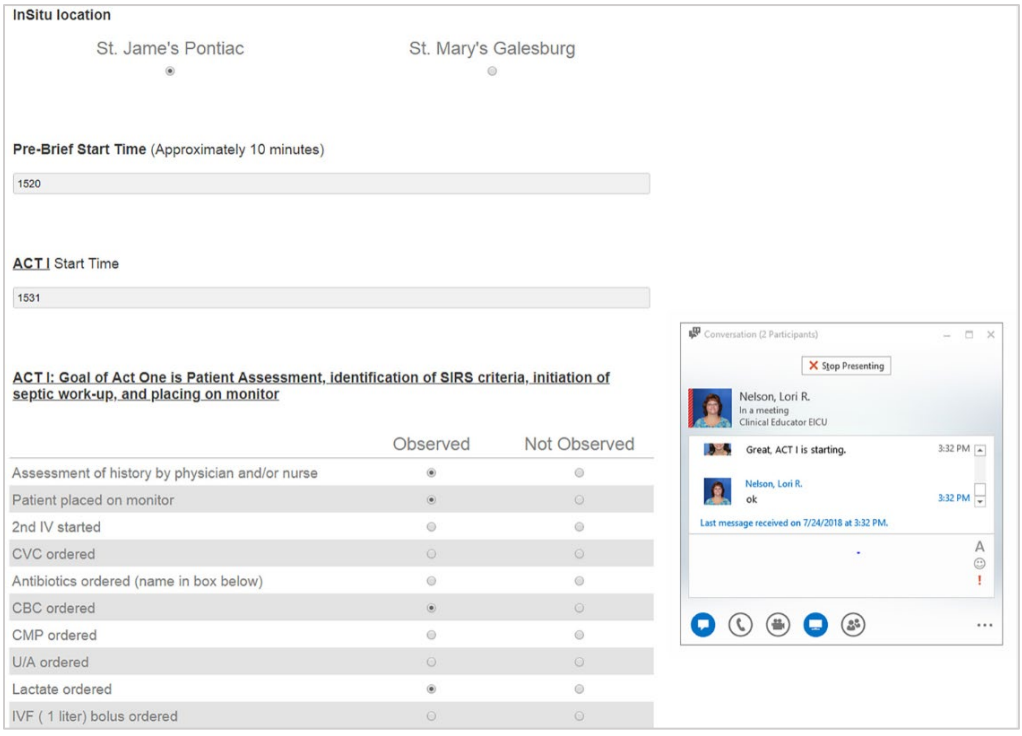
CASE CHIEF COMPLAINT:	Fever
CASE NAME:	AHRQ Sepsis In-Situ
CASE NUMBER: *(if available, assigned by Jump)*	
PRESENTING SITUATION: *(write a few sentences about the patients' presenting problem)*	Pt is a nursing home resident due to T12 paraplegia following a fall from a roof 5 years ago.
DIFFERENTIAL DIAGNOSIS: *(list competing diagnostic possibilities)*	Sources of fever: Pneumonia, Intra-abdominal process (occult due to lack of pain), Cellulitis/abscess (sacral decubitus ulcer), UTI, bacteremia
ACTUAL DIAGNOSIS:	Sepsis due to UTI
DESIGNED FOR: *(list what level of student this examination is designed for, i.e. 2nd year medical student; residents; staff RN, 2nd yr. nursing student, etc.)*	Interprofessional emergency department team
ACTIVITIES & TIME REQUIRED: *(determine how much time is needed for each encounter and how much time will be given for the post-encounter exercise.*	Scenario duration about 30 minutes Debriefing about 15 minutes
ASPECT OF PERFORMANCE TO BE ATTENDED TO & METHOD FOR OBSERVING PERFORMANCE: *(list instruments, and attach data collection checklist, professional behavior rating scale, or the post-encounter questionnaire).)*	Perception of teleheath integration

Included in Toolkit: 3c AHRQ Sepsis SP Template.docx

D. Critical Actions Checklist

This critical actions checklist was used by a Jump Research team member as she observed the in situ simulation taking place in the rural ED. The observer sat in the ED exam room in the corner and brought up the checklist on her laptop. A Microsoft Lync meeting was scheduled between the observer and the eICU nurse who was participating in the in situ at the OSF ConstantCare location in Peoria. By scheduling a meeting using Lync software, the observer was able to share her desktop screen that displayed the blank checklist so the eICU could view it in real-time.

Once the in situ simulation initiated, the observer marked off testing that was ordered and communicated other actions that occurred. This created a low-cost way to provide situational awareness to the confederate eICU nurse off site. Since the eICU nurse was written into the simulation, the nurse needed to know what was ordered during the simulation so she could provide guidance once the rural ED team turned the telehealth cart on. Since the simulation involved three acts, this also provided a means to communicate start and stop points embedded within the simulation.



InSitu location

St. Jame's Pontiac ◉ St. Mary's Galesburg ○

Pre-Brief Start Time (Approximately 10 minutes)

1520

ACT I Start Time

1531

ACT I: Goal of Act One is Patient Assessment, identification of SIRS criteria, initiation of septic work-up, and placing on monitor

	Observed	Not Observed
Assessment of history by physician and/or nurse	◉	○
Patient placed on monitor	◉	○
2nd IV started	○	○
CVC ordered	○	○
Antibiotics ordered (name in box below)	○	○
CBC ordered	◉	○
CMP ordered	○	○
U/A ordered	○	○
Lactate ordered	◉	○
IVF (1 liter) bolus ordered	○	○

Checklist included in Toolkit: 4a Sepsis Checklist.jpg

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Critical Clinical Actions Checklist

Pre-brief start time: _____ (10 min)

ACT I	**Start Time:**	
Goal of Act One is Patient Assessment, identification of SIRS criteria, initiation of septic work-up, and placing patient on monitor	**Observed**	**Not observed**
Assessment of history by physician and/or nurse	◯	◯
Patient placed on monitor	◯	◯
2nd IV started	◯	◯
CVC ordered	◯	◯
Antibiotics ordered (name in text box) _____	◯	◯
CBC ordered	◯	◯
CMP ordered	◯	◯
U/A ordered	◯	◯
Lactate ordered	◯	◯
IVF (1 liter) bolus ordered	◯	◯
IVF (2nd liter) bolus ordered	◯	◯
IVF (3rd liter) bolus ordered	◯	◯
Blood culture ordered X 2	◯	◯
Wound culture for decub	◯	◯
CXR ordered	◯	◯
ECG ordered	◯	◯
Identification of SIRS criteria	◯	◯
Tylenol given (temp goes down to 99.5 F°)	◯	◯
Other (free text comments) _____	◯	◯
Break for debrief 1 after lab work ordered (minimum CBC)		

End of Act 1 *Facilitator enters simulation at this time to begin Debrief 1* Stop Time: _____

Start Debrief One: _____ (10 – 15 minutes)

Includes cart intro. Cart intro involves eICU nurse. Ends with call from eICU nurse confederate about BPA firing, which is triggered by a Lync message.

ACT II	**Start Time:**	
45 min has transpired since patient's ED arrival. Goal of Act II is to react to BPA with resuscitation, set up cart for surveillance and give IV bolus	**Observed**	**Not Observed**
Re-assessment by physician and/or nurse	◯	◯
Cart brought to room and turned on	◯	◯
Clinical introductions for telehealth personnel to team/patient	◯	◯
eICU recommendations 30ml/kg fluid	◯	◯
Second IV started	◯	◯
CBC ordered	◯	◯
CMP ordered	◯	◯
U/A ordered	◯	◯
Lactate ordered	◯	◯
IVF bolus ordered (decreases HR to 110 after 1 liter given)	◯	◯
Blood culture ordered	◯	◯
CXR ordered	◯	◯
ECG ordered	◯	◯
Antibiotics _____(name)	◯	◯
Labs reviewed	◯	◯
Other (free text comments) _____	◯	◯
Go to Debrief 2 once orders verified and cart set up	◯	◯

End ACT II Stop Time: _____

Start Debrief 2: _____

Discussion of telehealth value, barriers, work flow (10 minutes)

End of Debrief 2 Trigger is eICU nurse call to bedside nurse for notification of change in patient status. Teleconferencing software message from research observer tells eICU when to call the ED.

ACT III	Start time:	
Goal of Act III is more resuscitation of septic shock. (2 hours has passed since patient's ED arrival)	Observed	Not Observed
Re-assessment of history by physician and/or nurse	○	○
Second IV started	○	○
CBC ordered	○	○
CMP ordered	○	○
U/A ordered	○	○
Lactate ordered	○	○
Repeat Lactate ordered	○	○
IVF bolus ordered	○	○
Vasopressor started (any type) _____(name)	○	○
Blood culture ordered	○	○
CXR ordered	○	○
ECG ordered	○	○
Antibiotics ordered _____(name)	○	○
Labs reviewed	○	○
Team member vocalizes Septic Shock	○	○
Free Text Comments _____		
Call made for transfer/admission to ICU (this ends ACT III)	○	○

End of ACT III Stop Time _____

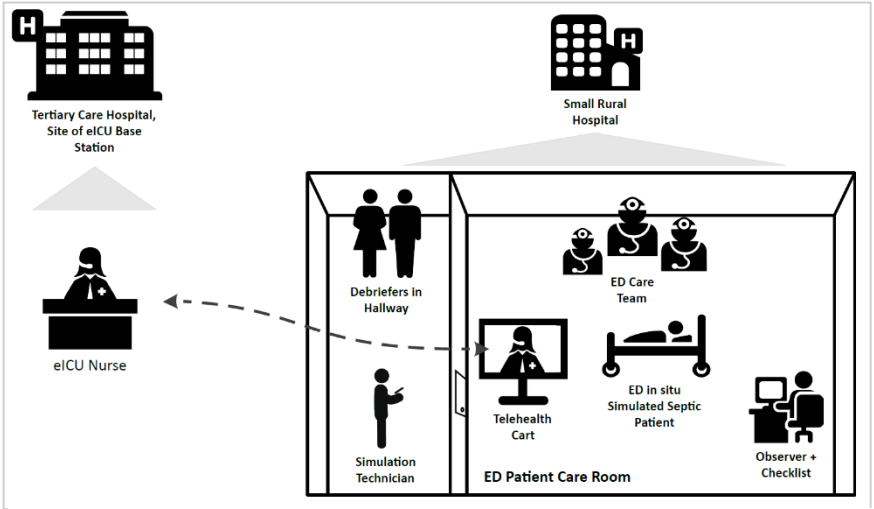
Final Debrief Start Time: _____

All team members plus telehealth present Includes communication strategies, points of contact, conflict communication, details of sepsis hospital concept, barriers vs benefits and when to use. (10 minutes)

Checklist included in Toolkit: 4b Critical Actions Checklist.docx

A member of the research team was present in the ED room where the simulation took place and observed the in situ as it transpired in real time. The observer shared their desktop screen via teleconferencing software with the eICU staff who were located at the tertiary hospital site. The above is an example of the critical action's checklist content shared on the research observer's desktop. As the observer viewed actions occurring, the checklist was completed. Free text options were available to include notes for special circumstances.

This real time checklist completion method provided the situational awareness needed for successful integration of the eICU staff with the ED during the in situ simulation so they could react accordingly as confederates.



A schematic representation of the in situ simulation showing the location of rural ED staff, Jump Simulation staff and the remote eICU in Peoria. 4c Information Flow Graphic

II. Example testing to use for either case:

A. CBC and CMP

Component Results

Component	Value	Flag	Range & Units
WBC	31.7	(H)	4.0 - 12.0 THOUS/UL
RBC	4.24		3.80 - 5.30 MILLION/UL
HEMOGLOBIN (HGB)	12.7		12.0 - 15.8 G/DL
HEMATOCRIT (HCT)	38.5		36.0 - 47.0 %
MCV	90.8		82.0 - 96.0 FL
MCH	30.0		26.0 - 34.0 PG
MCHC	33.0		31.0 - 36.0 G/DL
PLATELET COUNT	377		140 - 440 THOUS/UL
RDW	14.0		11.8 - 15.5 %
MPV	9.8		9.7 - 12.4 FL
DIFFERENTIAL TYPE	AUTOMATED		
NEUTROPHILS	88	(H)	47 - 73 %
LYMPHOCYTES	5	(L)	18 - 42 %
MONOCYTES	7		4 - 12 %
EOSINOPHILS	0		0 - 5 %
BASOPHILS	0		0 - 1 %
ABSOLUTE NEUTROPHILS	27.90	(H)	1.60 - 7.70 THOUS/UL
ABSOLUTE LYMPHOCYTES	1.59		1.30 - 3.20 THOUS/UL
ABSOLUTE MONOCYTES	2.22	(H)	0.20 - 1.00 THOUS/UL
EOSINOPHIL COUNT	0.00		0.00 - 0.40 THOUS/UL
ABSOLUTE BASOPHILS	0.00		0.00 - 0.10 THOUS/UL
WBC MORPHOLOGY			
LESS THAN 20% BANDS PRESENT			

Component Results

Component	Value	Flag	Ref Range	Units
SODIUM	134	(L)	136-145	mmol/L
POTASSIUM	3.4	(L)	3.5-5.1	mmol/L
CHLORIDE	103		98-107	mmol/L
CO2, VENOUS	23		22-30	mmol/L
ANION GAP	8.0		<18.0	mmol/L
GLUCOSE	96		70-99	mg/dL
BUN	14		8-26	mg/dL
CREATININE, BLOOD	1.43	(H)	0.70-1.30	mg/dL
BUN/CREATININE RATIO	10	(L)	12-20	ratio
TOTAL PROTEIN	6.5		6.3-8.2	g/dL
ALBUMIN	3.1	(L)	3.5-5.0	g/dL
A/G RATIO	0.9	(L)	1.0-2.2	
CALCIUM	8.6		8.4-10.2	mg/dL
T BILI	0.4		0.2-1.2	mg/dL
SGOT (AST)	28		5-34	U/L
SGPT (ALT)	18		0-55	U/L
ALKALINE PHOSPHATASE	99		40-150	U/L
GFR, EST. NONAFRICAN	51	(L)	>=60	
GFR, EST. AFRICAN	>60		>=60	
Comment:				

Included in Toolkit: 4d Urosepsis CBC, CMP.docx

B. LACTATE

Component Results

Component	Value	Flag	Ref Range
LACTIC ACID	4.6	(H)	0.7-2.1

Included in Toolkit: 4e Urosepsis Lactate.docx

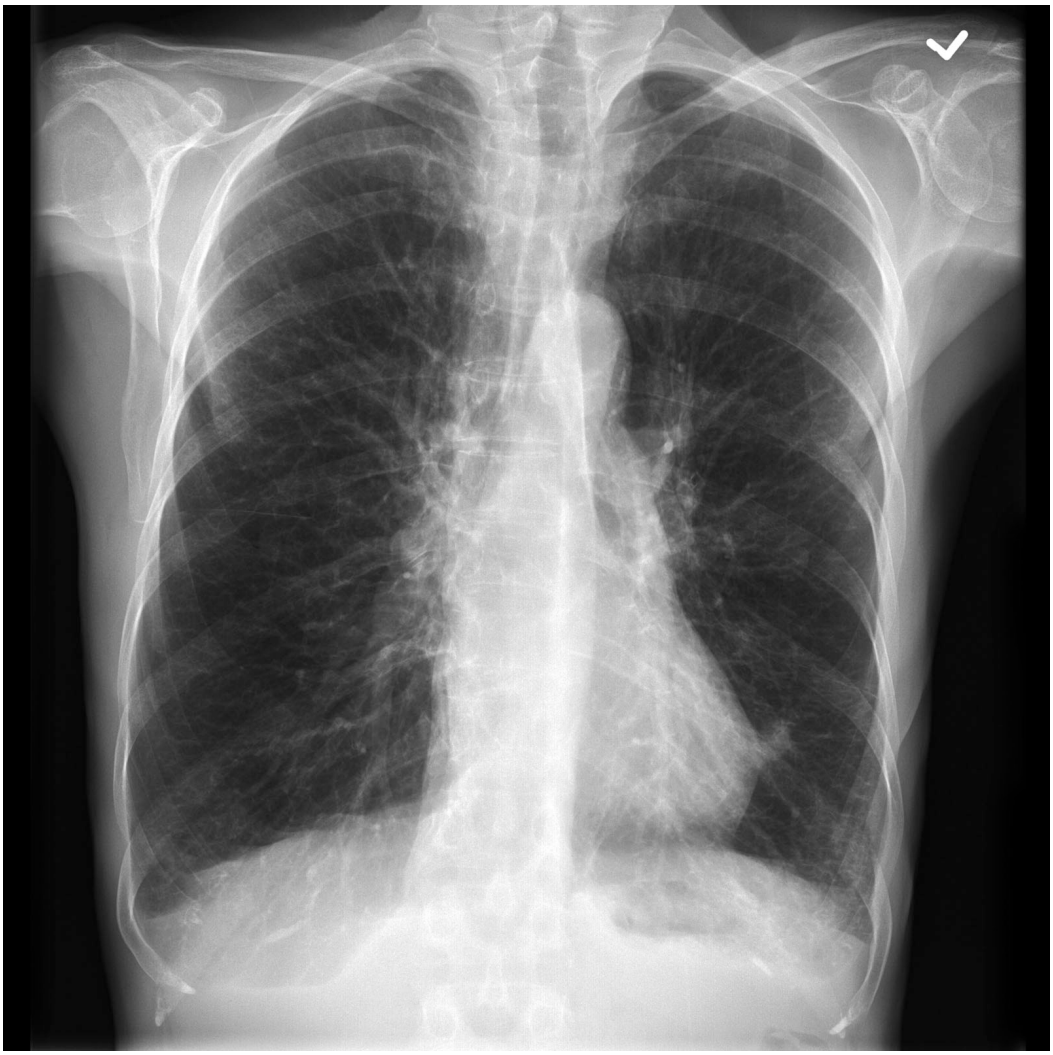
C. URINALYSIS

Component Results

Component	Value	Flag	Ref Range
SPECIFIC GRAVITY	1.004		1.003-1.030
URINE PH	7.0		5.0-9.0
WBC ESTERASE	3+	(A)	Negative
NITRITE	Positive	(A)	Negative
PROTEIN, RANDOM URINE	1+	(A)	Negative
URINE GLUCOSE, QUAL	Negative		Negative
URINE KETONES	Negative		Negative
UROBILINOGEN	Normal		Normal, 2.0
URINE BILIRUBIN	Negative		Negative
URINE BLOOD	2+	(A)	Negative
URINALYSIS COLOR	Pale yellow		
URINALYSIS CLARITY	Cloudy		
WBC (Urine)	51-150	(A)	Negative, 0-5
URINE RBC'S	0-5		Negative, 0-5
EPITHELIAL CELLS	Occasional		
BACTERIA, URINE	Negative		Negative

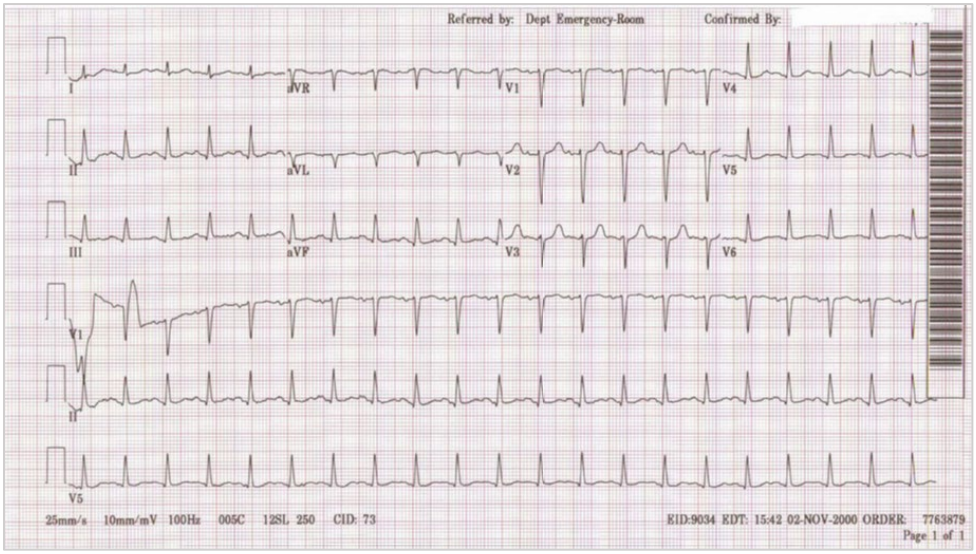
Included in Toolkit: 4f Urosepsis Urinalysis.docx

D. CHEST X-RAY



Included in Toolkit: 4g Urosepsis CXR.jpg

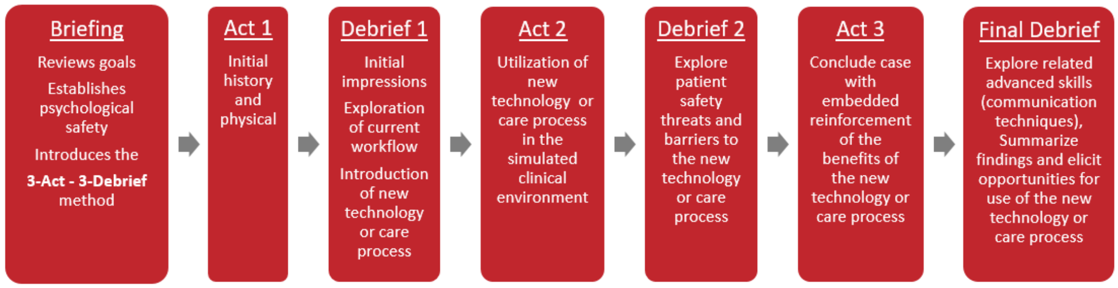
E. ELECTROCARDIOGRAM



Included in Toolkit: 4h Urosepsis ECG.jpg

III. MISC documents to help with coordination and implementation of an in situ simulation.

A. In situ Simulation Sepsis Scenario Flow



Included in Toolkit: 5a Simulation Flow.pptx

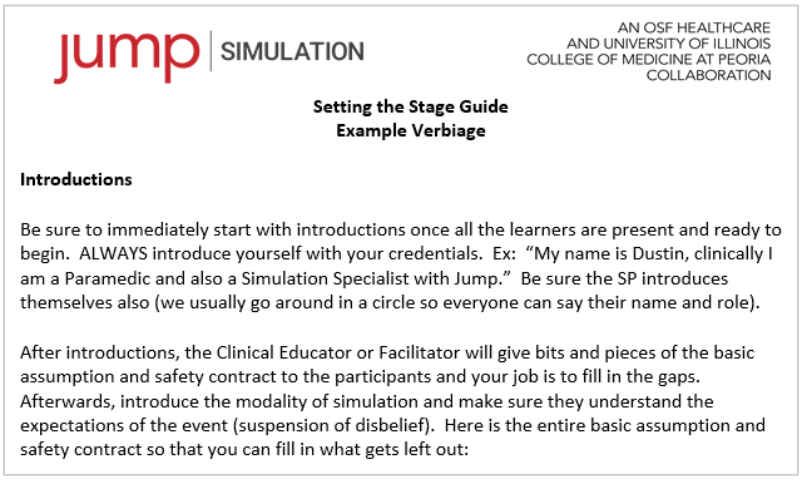
B. In Situ Learner Sign-Up Template

Date	Availability	Start time	End time	Nurse 1	Nurse 2	Tech	Physician
A	Available	6:15:00 AM	7:30:00 AM				
B	Available	7:30:00 AM	8:45:00 AM				
C	Available	8:45:00 AM	10:00:00 AM				
D	Available	10:00:00 AM	11:15:00 AM				
E	Available	11:15:00 AM	12:30:00 PM				
Date	Availability	Start time	End time	Nurse 1	Nurse 2	Tech	Physician
A	Available	6:15:00 AM	7:30:00 AM				
B	Available	7:30:00 AM	8:45:00 AM				
C	Available	8:45:00 AM	10:00:00 AM				
D	Available	10:00:00 AM	11:15:00 AM				
E	Available	11:15:00 AM	12:30:00 PM				
Date	Availability	Start time	End time	Nurse 1	Nurse 2	Tech	Physician
A	Available	6:15:00 AM	7:30:00 AM				
B	Available	7:30:00 AM	8:45:00 AM				
C	Available	8:45:00 AM	10:00:00 AM				
D	Available	10:00:00 AM	11:15:00 AM				
E	Available	11:15:00 AM	12:30:00 PM				
Date	Availability	Start time	End time	Nurse 1	Nurse 2	Tech	Physician
A	Available	6:15:00 AM	7:30:00 AM				
B	Available	7:30:00 AM	8:45:00 AM				
C	Available	8:45:00 AM	10:00:00 AM				
D	Available	10:00:00 AM	11:15:00 AM				
E	Available	11:15:00 AM	12:30:00 PM				

Included in Toolkit: 5b Learner Sepsis In Situ Sign Up Sheet.xls

C. Brief Documents

i. Setting the Stage Guide



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Setting the Stage Guide
Example Verbiage

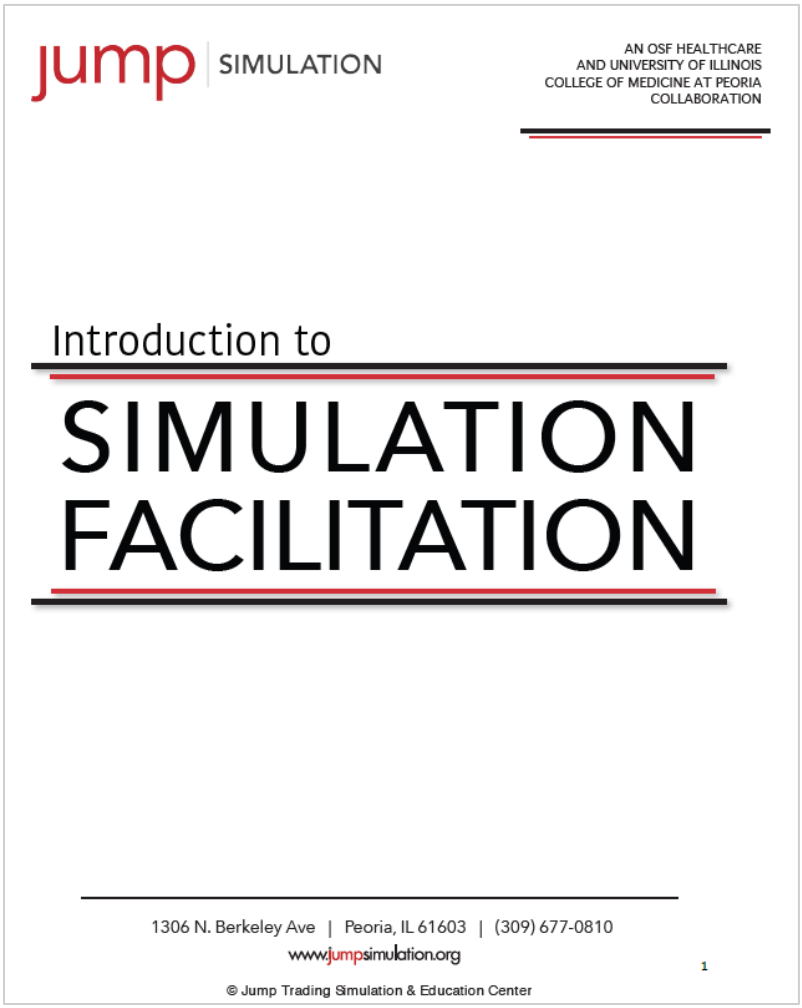
Introductions

Be sure to immediately start with introductions once all the learners are present and ready to begin. ALWAYS introduce yourself with your credentials. Ex: "My name is Dustin, clinically I am a Paramedic and also a Simulation Specialist with Jump." Be sure the SP introduces themselves also (we usually go around in a circle so everyone can say their name and role).

After introductions, the Clinical Educator or Facilitator will give bits and pieces of the basic assumption and safety contract to the participants and your job is to fill in the gaps. Afterwards, introduce the modality of simulation and make sure they understand the expectations of the event (suspension of disbelief). Here is the entire basic assumption and safety contract so that you can fill in what gets left out:

Included in Toolkit: 5c Setting the Stage Guide.docx

ii. Facilitator Course Booklet - Abridged



jump | SIMULATION

AN OSF HEALTHCARE AND UNIVERSITY OF ILLINOIS COLLEGE OF MEDICINE AT PEORIA COLLABORATION

Introduction to

SIMULATION FACILITATION

1306 N. Berkeley Ave | Peoria, IL 61603 | (309) 677-0810
www.jumpsimulation.org

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Included in Toolkit: 5d 2019 Facilitator Course Booklet.pdf

iii. Simulation – Your Safety and Privacy

Available online: https://youtu.be/o2qP19nDCVE

iv. Your Safety at Jump: Ensuring a Safe Learning Environment

Available online: https://youtu.be/LYon_lTFvzM

Presentations/Publications/Conference Posters:

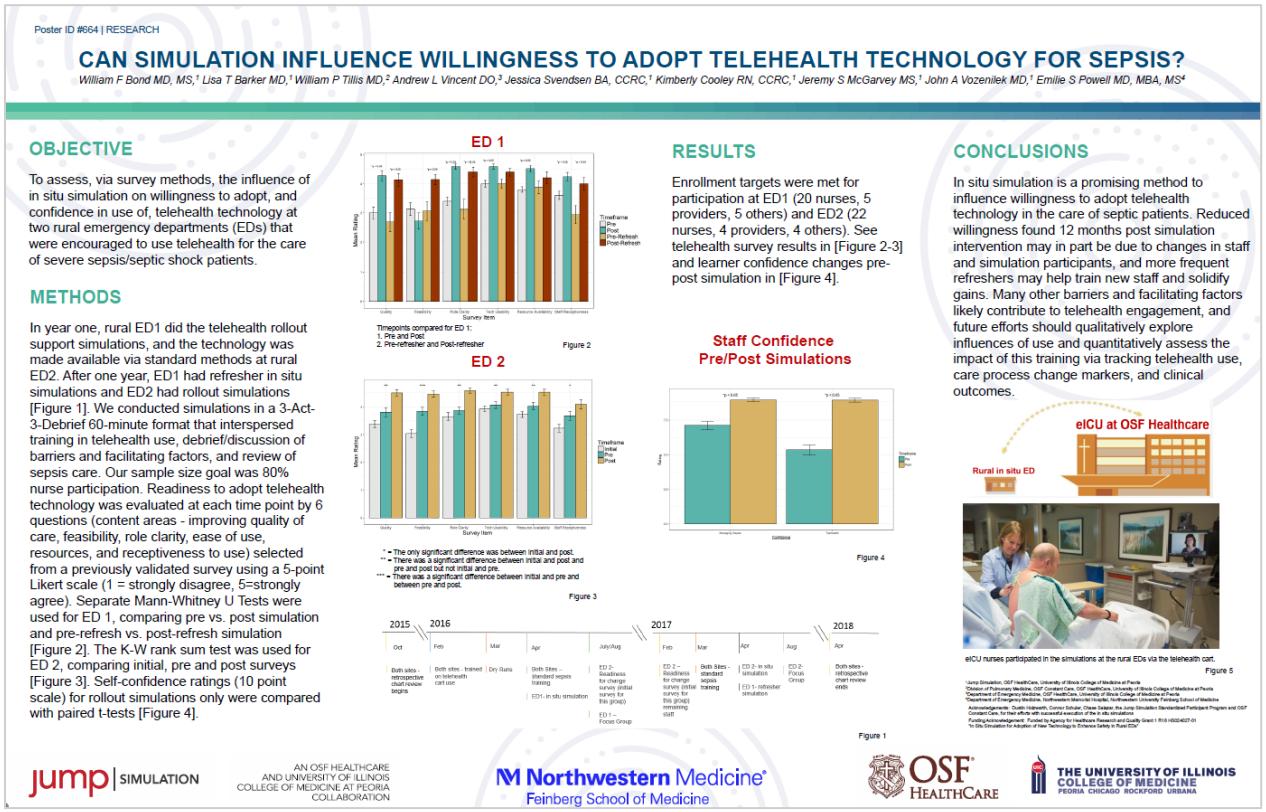
Manuscript Publications

Bond WF, Barker LT, Cooley KL, Svendsen JD, Tillis WP, Vincent AL, et al. **A simple low-cost method to integrate telehealth interprofessional team members during in situ simulation**. Simulation in healthcare: Journal of the Society for Simulation in Healthcare JID - 101264408. 2019; 14(2):129-136. Available from: https://www.ncbi.nlm.nih.gov/pubmed/30730469.

Barker LT, Bond WF, Vincent AL, Cooley KL, McGarvey JS, Vozenilek JA, & Powell, ES. **A novel in situ simulation framework for introduction of a new technology: the 3-Act-3 Debrief model**. Advances in Simulation. 2020; 5(25):1-10. Available from: *https://advancesinsimulation.biomedcentral.com/articles/10.1186/s41077-020-00145-x*

Conference Posters

International Medical Simulation in Healthcare Conference 2018



Included in Toolkit: 6a IMSH 2018 Sepsis Poster.pdf

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Emilie Powell, MD, MBA, MS
Northwestern Medicine Profile

Dr. Emilie Powell, Standardized Participant and eICU nurse practice the sepsis simulations before implementing them in the rural EDs.