ACEP Ultrasound Simulation Case Template **SIMULATION CASE TITLE: Positive EFAST with hemoperitoneum** **AUTHORS: Sarah Kennedy**	
PATIENT NAME: Bradley Smith **PATIENT AGE: 20 years old** **CHIEF COMPLAINT: MVC**	
Brief narrative description of case *Include the presenting patient chief complaint and overall learner goals for this case*	CC: MVC This is a 20 year old male who presents after an MVC. He was the unrestrained driver and was T-boned at approximately 45 mph in an intersection. He complains of pain to his abdomen and chest. He is found to have multiple left sided rib fractures and hemoperitoneum from splenic and liver lacerations. He is hemodynamically stable for EMS but becomes hypotensive and tachycardic in the ED. He should bypass CT and go straight to OR after free fluid found on his EFAST scan. Learners should be able to evaluate a trauma patient as well as perform and correctly interpret EFAST images.
Primary Learning Objectives *What should the learners gain in terms of knowledge and skill from this case? Use action verbs and utilize Bloom's Taxonomy as a conceptual guide*	1. Evaluation and management of a trauma patient – primary and secondary surveys 2. Recognize evolving vital signs that become abnormal 3. Address the abnormal vital signs with IVF or blood products 4. Perform and interpret EFAST ultrasound that shows hemoperitoneum 5. Recognize the need for operative management with trauma team
Critical Actions *List which steps the participants should take to successfully manage the simulated patient. These should be listed as concrete actions that are distinct from the overall learning objectives of the case.*	1. Place patient on monitor 2. IV access, labs 3. HPI and primary, secondary surveys 4. Recognize and address abnormal vital signs that evolve during evaluation 5. Perform and interpret bedside EFAST ultrasound 6. Recognize hemoperitoneum and unstable VS indicates surgical management
Learner Preparation *What information should the learners be given prior to initiation of the case?*	This case takes place in a tertiary care emergency department with all the appropriate services and consults available.

Required Equipment *What equipment is necessary for the case?*	ED room set up with cardiac monitor with BP cuff/pulse ox/temp probe, peripheral IV, IV fluids and medications, EKG, CXR image, ultrasound machine and images, stethoscope If patient decompensates: ETT, ventilator, laryngoscope, RSI medications, BVM.

INITIAL PRESENTATION	
Initial vital signs	HR: 118/min BP: 100/60 RR: 24/min O_2SAT: 96% on RA T: 36.5^{o}F
Overall Appearance *What do learners see when they first enter the room?*	Patient is a young man who appears to be in pain lying on a backboard with a c-collar in place.
Actors and roles in the room at case start *Who is present at the beginning and what is their role? Who may play them?*	Patient will provide the history, EMS also available for additional details, RN, tech, physician(s)
HPI *Please specify what info here and below must be asked vs what is volunteered by patient or other participants*	Volunteered by EMS: 20yo M s/p MVC. He was the unrestrained driver traveling at approx. 45mph. He was T-boned at an intersection. There was airbag deployment and patient self-extricated. He was ambulatory on scene when EMS arrived and they put him on a backboard and in a c-collar per their protocol. VS en route stable with BP 116/70, HR 105, SpO2 98%, RR 18. No PIV started, no meds given. Must be asked: Complains of pain to his chest and abdomen. Pain is severe, constant, worse with palpation and the potholes during the ambulance ride. Endorses nausea. Denies difficulty breathing (says "it just hurts"), vomiting, headache, neck pain, back pain. Does not know if he hit his head but remembers the entire event and denies LOC.
ROS	Volunteered: Denies cough, recent illness. Must be asked: Denies HA, neck pain, back pain, weakness, numbness, vomiting, visual changes.
Past Medical History	Negative Social: Denies tobacco, alcohol, illicits
Past Surgical History	Negative
Family History	Hypertension, myocardial infarction
Medications	none

Allergies	No known drug allergies
PHYSICAL EXAMINATION	
General	Awake, alert, appears uncomfortable, mild distress, GCS 15
HEENT	NC/AT, PERRL, EOMI, no septal hematoma, airway intact
Neck	In c-collar, trachea midline, no midline tenderness with palpation
Respiratory	Shallow respirations but clear and equal bilaterally
Cardiovascular	Tachycardic, tender to palpation over bilateral chest wall, no seatbelt sign
Abdomen	Diffusely tender to palpation, +guarding, no seatbelt sign, pelvis stable
Neurological	AAO x 3, CN 2-12 intact, motor intact, sensation intact, speech intact
Skin	Pale
GU	No blood at meatus
Extremities	Moves all extremities equally, abrasion to L knee and R forearm
Psychiatric	Cooperative

SCENARIO STATES, MODIFIERS AND TRIGGERS

This section should be a list with detailed description of each step than may happen during the case. If medications are given, what is the response? Do changes occur at certain time points? Should the nurse or other participant prompt the learners at given points? Should new actors or participants enter, and when? Are there specific things the patient will say or do at given times?

PATIENT STATUS	LEARNER ACTIONS, MODIFIERS & TRIGGERS TO MOVE TO THE NEXT STATE	
1. Baseline Rhythm: sinus tach HR: 118/min BP: 100/60 RR: 24/min O_2SAT: 96% on RA T: 36.5°F	<u>Learner Actions:</u> • Place patient on monitor • Request vital signs, place PIV • Recognize patient's VS show hypotension and tachycardia • Take HPI, PE with primary/secondary trauma surveys • Draw and send labs • Request CXR	<u>Modifiers:</u> *Changes to patient condition based on learner action* • If patient is not placed on monitor, VS will continue to deteriorate with patient becoming more somnolent and confused • If history/workup not initiated, patient should moan about his pain and BP drops to 85/50 <u>Triggers:</u> *For progression to next state* • Learner obtains new VS, recognizes VS have changed from EMS evaluation • Primary, secondary surveys completed

2. Rhythm: sinus tach HR: 120/min BP: 90/60 RR: 24/min O_2SAT: 95% T: 36.5°F Patient now diaphoretic, clammy, says he feels lightheaded	Learner Actions: • Perform and interpret EFAST, recognizing hemoperitoneum • Recognizing worsening vital signs • IVF started, pRBCs ordered	Modifiers: • If US not done, BP should drop to 70/40 • If IVF/pPRBCs started, BP will only drop to 80/50, if none are started, BP will drop to 60/40 Triggers: • Learner correctly interprets the bedside EFAST as showing free fluid in the abdomen
3. Rhythm: sinus tach HR: 130/min BP: 80/50 RR: 26/min O_2SAT: 94% T: 36.5°F	Learner Actions: • Consult trauma to go to OR	Modifiers: • If trauma not consulted, BP should drop to 60/40 • BP holds steady while speaking to trauma surgery Triggers: • Learner should recognize that hemodynamic instability and hemoperitoneum on US indicates surgical management in the OR; must speak with trauma about dispo to OR
4. Rhythm: HR: /min BP: / RR: /min O_2SAT: % T: °F	Learner Actions: •	Modifiers: • Triggers: •
5. Rhythm: HR: /min BP: / RR: /min O_2SAT: % T: °F	Learner Actions: •	Modifiers: • Triggers: •

SUPPORTING DOCUMENTS, LAB RESULTS AND MULTIMEDIA	
Lab Results	CBC- WBC: 12, Hgb: 13, Hct: 39, Platelets 170k BMP – Na: 138, Cl: 100, K: 3.7, CO2: 24, BUN: 26, Cr: 1.1, Ca: 8.5, Glucose 130 Type and Screen: A-positive
EKG	Sinus tachycardia, normal intervals, no ST depression/elevation
CXR CT imaging	CXR shows left sided rib fractures, no pleural effusions, no PTX CT images – should not obtain, should go straight to OR. If asked, CT should be unavailable.
Ultrasound Video Files	EFAST – hemoperitoneum, no pneumothorax or hemothorax

SAMPLE QUESTIONS FOR DEBRIEFING
1) What views should be obtained on an EFAST? **2) How can EFAST change your management of a trauma patient?** **3) Describe the 4 stages of hypovolemic shock.**

Ideal Scenario Flow

Provide a detailed narrative description of the way this case should flow if participants perform in the ideal fashion.

The learner(s) enter the room to find a patient lying flat on a backboard and c-collar in place.

EMS is present and gives a history that patient was unrestrained and T-boned at approximately 45mph in an intersection. He was ambulatory on their arrival, no medications given en route because they were not able to place a PIV. EMS reports patient's VS en route were stable with BP 116/70, HR 105, SpO2 98%. Patient appears uncomfortable but is able to provide more history when asked. He tells the team he is having chest and abdominal pain that has gotten progressively worse since the MVC 30 minutes ago. Learners should be putting patient on the cardiac monitor and performing primary/secondary surveys while obtaining history from patient and EMS. They should recognize the patient's VS have worsened since the last ones recorded by EMS and order labs, CXR, start IVF/pRBCs. If workup is not initiated, BP should continue to drop. If vitals are not recognized as worsening, patient should start to moan and BP should continue to drop. If no fluids or pRBCs started, patient's VS should deteriorate further. Team should then do a bedside EFAST ultrasound and recognize hemoperitoneum on the EFAST images. Trauma should then be consulted for operative management of patient. No CT imaging should be done on this patient; if requested, CT scan is busy with an acute stroke patient.

Anticipated Management Mistakes

Provide a list of management errors or difficulties that are commonly encountered when using this simulation case.

1. *Failure to obtain a new set of vital signs upon arrival to ED*
2. *Failure to perform primary, secondary surveys*
3. *Failure to perform EFAST*
4. *Failure to recognize hemoperitoneum*
5. *Incorrect management of patient with unstable vital signs and positive EFAST*