

- I. **Title:** U/SS case 3
Multi-trauma patient with Liver Laceration / Intra-abdominal Hemorrhage
- II. **Date Created:** January 31, 2006
Date Revised: December 8, 2006
- III. **Category:** Ultrasound Simulation; Teamwork / Resident Core Curriculum; ACLS
- IV. **Target Audience:** undergraduate and graduate medical trainees and staff, nurses, paramedics
- V. **Learning Objectives or Assessment Objectives**
 - A. Primary -
 - a.) recognition and management of semi-stable trauma patient
 - b.) recognition and management of natural progression / deterioration of hemorrhaging intra-abdominal lesion
 - c.) recognition and management of hemorrhaging liver laceration
 - d.) integration of serial or repeated bedside ultrasonography into an organized trauma resuscitation
 - e.) deployment of teamwork behaviors
 - B. Secondary -
 - a.) appropriate airway management
 - b.) appropriate circulatory support
 - c.) appropriate consultation and disposition
 - C. Critical actions checklist (see Appendix A)-
 - 1. Simple checklist of critical actions
 - a.) call for help (Level I trauma- blunt trauma with hypotension)
 - b.) establishment of team structure with role assignment
 - c.) deployment of appropriate communications and teamwork behaviors
 - d.) primary trauma survey
 - e.) basic airway / breathing management (100% oxygen administration)
 - f.) recognition of circulatory dysfunction
 - g.) basic circulatory support (cardiac monitor, intravenous access, fluid administration)
 - h.) advanced circulatory support (blood product administration, Foley)
 - i.) secondary trauma survey
 - j.) traumatic hypotension evaluation and management (reviews injury mechanism and patterns, implementation of specific testing and treatment- CXR, pelvis XR, FAST #1 [negative])
 - k.) recognition of initial response to circulatory support
 - l.) recognition of recurrent hemodynamic deterioration (partial-responder state)

- m.) institution of early packed red blood cell (PRBC) transfusion
- n.) traumatic hypotension re-evaluation and management (incl. FAST #2)
- o.) recognition of abnormal FAST #2 [positive RUQ fluid stripe]
- p.) disposition to operating room (OR)

- 2. Optimal sequence of critical actions- expected sequence as above
- 3. Duration to critical actions- resuscitation to be completed within 20-25 minutes of starting scenario
- 4. Behavioral ratings- see Appendix A

VI. ACGME Competencies Assessed

- A. Patient Care
- B. Medical Knowledge
- C. Interpersonal/Communication Skills

VII. Environment and Props

- A. Lab Set Up – Emergency Department in simulation center / lab
- B. Manikin Set Up –
 - a.) advanced medical simulation manikin
 - b.) male patient moulage with street clothing, c-collar / backboard, O2 mask
 - c.) lines needed: right antecubital 18g IV
 - d.) drugs needed: PRBC, fluid (NS)
- C. Props – see “USS CASE 3 IMAGES” folder
(basic airway and code blue cart is assumed)
 - a.) ECGs: sinus tachycardia 90-100s
 - b.) bedside ultrasound: normal FAST
abnormal FAST (fluid in Morrison’s Pouch)
- D. Distractors – none

VIII. Simulation Personnel and Assigned Roles (Faculty, Actors, etc)

- A. Roles – paramedic x 1-2, nurse x 1, trauma surgeon
- B. Who may play them – other residents, other students, actors
- C. Action Role – supportive (see narrative)

IX. Case Narrative (describes what the learner will experience)

A. Paragraph narrative overview of case and how case starts-

At 1pm, EMS brings in a 35 year old man who was a restrained passenger from an MVA who was struck on his side (T-boned) by a pickup truck, some intrusion of door into passenger compartment, prolonged extrication because door was stuck. Pt is alert and talking, complaining of mild right chest pain, says it hurts a little to breathe. No obvious extremity deformities. VS in the field: HR 96, BP 95/60, SaO2 99% on 100% NRB. NS 1L running; 750 cc remaining.

B. Board format overview of patient:

1. Name/Age/Sex: Brian Ray 35 year old male
2. Mode of arrival: EMS
3. Accompanied by: none (driver refused treatment)
4. Triage Note: n/a
5. Chief Complaint: "My chest hurts a little when i breathe. Can you get this plastic neck thing off?"

6. Past Medical History: **TB exposure remotely (+PPD)**
7. Medications and Allergies: none, **allergic to niacin (flushing)**
8. Family and Social History: occasional smoker; welder
9. Patient's Initial Exam:

Vital signs: heart rate: **98 bpm**
blood pressure: **97/58**
respiratory rate: 12
oxygen saturation: 99% on 100% NRB;
98% RA
temperature: 98.4

Airway: intact
Breathing: **slight splinting on right**
Circulation: good pulses, warm extremities

Secondary Exam: well-developed male
HEENT: normal
Neck: no JVP noted; **midline neck tenderness**
Lungs: clear bilateral with full inspiration
right chest + costal tenderness
Cardiac: normal
Abdomen: **right costal margin tenderness**
Extremities: warm
Neurologic: GCS 15 (E4/V5/M6). pupils 4mm

Additional information:

Fingerstick blood sugar: normal
EKG: normal sinus rhythm 96
C-spine XR: normal
CXR: no PTX or HTX
pelvis XR: normal

FAST #1: negative

FAST #2: +fluid in right upper quadrant (Morrison's Pouch)

PCP: None

- C. Flow diagram with branch points, times of expected interventions and reactions from Sim Man with notes (see Appendix A + B)

Case progression:

1. After 2 liter fluid bolus for "soft" hypotension, blood pressure improves for 5 minutes.

Vital signs: heart rate: 94 / minute

blood pressure: 108 / 70 mmHg

respirations: 11 / minute

2. After 3 minutes of hemodynamic stability (8 minutes into scenario), blood pressure starts to drop into systolic 80s. Patient still without significant changes, remains semi-stable at SBP 90s with blood products, but does not go above 100. FAST #2 at this point will be positive.

3. Given persistent hypotension despite fluid resuscitation in a semi-stable state with a positive FAST, the patient should be dispositioned urgently to the operating room. (DPL is an option and will be positive.)

4. The patient will remain alert with minimal complaints in the persistently "semi-stable" state for the remainder of the case. (This may make the decisions regarding imaging (FAST, CT) and disposition issues (OR, VIR) more subtle.)

D. Distracters in case: none

E. Trends needed: none

X. Instructors Notes (what the instructor must do to create the experience)

- A. Tips to keep scenario flowing in lab and via computer
 - presentation of patient in extremis hypotension.
 - lulls in activity may be broken with re-entry of EMS
- B. Tips to direct actors- as above
- C. Scenario programming- see Appendix B
 1. Optimal management path
 2. Potential complications path(s)
 3. Potential errors path(s)
 4. Program debugging

XI. Debriefing Plan

A. Method of debriefing

1. This is a case of a blunt thoracoabdominal trauma patient who is hiding a significant liver laceration and intra-abdominal hemorrhage. With minimal complaints and partially-responsive vitals signs that start to deteriorate, he needs to remain in the Resuscitation area and be dispositioned based on his instability and changing bedside sonographic findings.

2. Debriefing Topics

a.) didactic content

- emergency ultrasound in trauma patients (FAST / E-FAST)
 - 4+ views
 - limits of detection
 - serial or repeat FAST exams
- liver laceration with free intra-abdominal hemorrhage
 - presentation
 - intra-abdominal injuries associated with chest injury and hematuria as surrogate markers
 - 10% of abdominal injuries diagnosed by CT have no abdominal tenderness or abdominal wall bruising
 - *may* have profound hemodynamic instability
 - evaluation
 - labs (serial bloods, lactate)
 - role of bedside FAST to assess presence of intra-abdominal bleeding
 - ? DPL
 - operative evaluation / laparoscopy
 - CT scan if patient is hemodynamically stable
 - treatment
 - aggressive hemodynamic resuscitation
 - interventional radiology
 - operative exploration / management
 - disposition
 - OBS admit
 - ICU admit
 - VIR
 - OR

b.) teamwork behaviors

- leadership
 - resuscitation leadership establishment
 - role and responsibility assignment
- collaboration
 - recognition and integration of team input
 - error recognition and correction

- communication
 - callouts of critical information
 - callbacks for confirmation of information
- situational awareness
 - continued patient reassessment
 - plan development and execution
 - task prioritization
 - workload assessment
 - team member cross-monitoring
 - requests for assistance
- professionalism

XII. Pilot Testing and Revisions

- A. Numbers of participants- 3-5 learners (1-2 leaders)
- B. Performance expectations, anticipated management mistakes
 - not getting FAST #1
 - not reassessing patient with change in status
 - not repeating FAST

XIII. Authors and their affiliations

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XIV. Additional Debriefing Materials:

Blackbourne LH, Soffer D, McKenney M et al. Secondary ultrasound examination increases the sensitivity of the FAST exam in blunt trauma. *J Trauma* 2004; 57: 934-8.

Rose JS. Ultrasound in abdominal trauma. *Emerg Med Clin North Am* 2004; 22: 581-99.

Tang A, Euerle B. Emergency department ultrasound and echocardiography. *Emerg Med Clin North Am* 2005; 23: 1179-94.

Appendix A

Scenario Evaluation Form



Resident Name _____

Examiner _____

Case Title _____



Scenario Type Single Patient Multiple Patient

Critical Actions Checklist

	Critical Action	Yes	No	Time
1	call for help (Level I trauma- blunt trauma with hypotension)			
2	establishment of team structure with role assignment			
3	deployment of appropriate communications and teamwork behaviors			
4	primary trauma survey			
5	basic airway / breathing management (100% oxygen administration)			
6	recognition of circulatory dysfunction			
7	basic circulatory support (cardiac monitor, intravenous access, fluid administration)			
8	advanced circulatory support (blood product administration, Foley)			
9	secondary trauma survey			
10	traumatic hypotension evaluation and management (reviews injury mechanism and patterns, implementation of specific testing and treatment- CXR, pelvis XR, FAST #1 [negative])			
11	recognition of initial response to circulatory support			
12	recognition of recurrent hemodynamic deterioration (partial-responder state)			
continued				

	Critical Action	Yes	No	Time
13	institution of early packed red blood cell (PRBC) transfusion			
14	traumatic hypotension re-evaluation and management (incl. FAST #2)			
15	recognition of abnormal FAST #2 [positive RUQ fluid stripe]			
16	disposition to operating room (OR)			

ACGME Competencies		
Competency	Required Skill	Check
<i>Patient Care</i>		
	Caring and respectful behaviors	
	Interviewing	
	Informed decision-making	
	Develop & carry out patient management plans	
	Performance of procedures	
	a) Routine physical exam	
	b) Medical Procedures	
	Work within a team	
<i>Medical Knowledge</i>		
	Investigatory and analytic thinking	
<i>Practice-Based Learning and Improvement</i>		
	Analyze own practice for needed improvements	
	Use of information technology	
	Facilitate learning of others	
<i>Interpersonal & Communication Skills</i>		
	Creation of therapeutic relationship with patients	
	Listening skills	
<i>Professionalism</i>		
	Respectful, altruistic	
	Ethically sound practice	
<i>System-Based Practice</i>		
	Understand interaction of their practices with the larger system	
	Knowledge of practice and delivery systems	
	Practice cost-effective care	

Teamwork Assessment Form

Date _____ Unit _____ Team _____ Shift _____

1. Maintain Team Structure & Climate	
a.	Establish the leader
b.	Designate roles and responsibilities
c.	Communicate essential team information
d.	Resolve conflicts constructively
Overall rating:	
2. Plan & Problem Solve	
a.	Engage team members in the decision making process
b.	Identify established protocol to be used or develop a plan
c.	Communicate the plan to teammates
d.	Cross monitor actions of team members
Overall rating:	
3. Communicate with the Team	
a.	Effective use situational awareness updates
b.	Call out critical information during emergent events
c.	Use check-backs to verify information transfer
d.	Systematically hand off responsibilities during team transitions
Overall rating:	
4. Manage Workload	
a.	Re-prioritize patients care in response to overall caseload of team
b.	Execute team established plan
c.	Balance workload within the team
d.	Request assistance for task overload
Overall rating:	
5. Improve Team Skills	
a.	Conduct event reviews
b.	Conduct shift reviews
Overall rating:	

Very Poor	Poor	Marginal	Acceptable	Good	Very Good	Superior
1	2	3	4	5	6	7

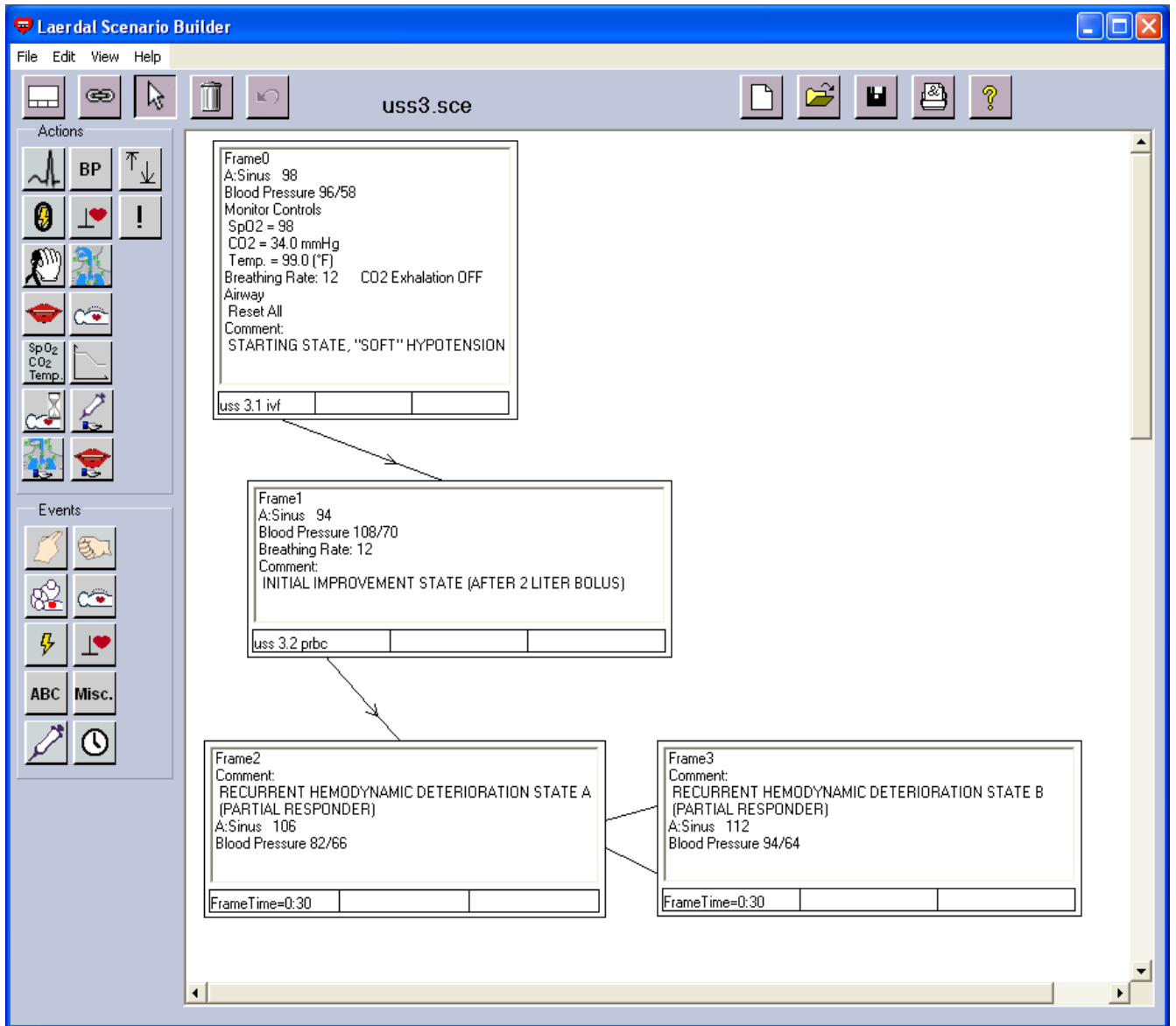
Teamwork Assessment Form

Likert Scale Descriptors

1. Very Poor
 - ❖ Teamwork principles operating minimally
 - ❖ Evidence of a hostile negative environment
2. Poor
 - ❖ Elements of teamwork observed about ten percent of the time
3. Marginal
 - ❖ Elements of teamwork observed about twenty-five percent of the time
4. Acceptable
 - ❖ Elements of teamwork observed about fifty percent of the time
5. Good
 - ❖ Elements of teamwork observed about seventy-five percent of the time
6. Very Good
 - ❖ Elements of teamwork observed about ninety percent of the time
7. Superior
 - ❖ Elements of teamwork observed ninety-eight percent of the time

Appendix B

Laerdal SimMan v2.2 scenario content



Note: The events to force transitions to a new frame will need to be edited via the "Edit Event Menus" feature within Scenario Builder