Altered Mental Status: Epilepsy, Acute Psychosis, Intoxication or Delirium Tremens?

Shannon Toohey, MD, MAEd*

*University of California, Irvine, Department of Emergency Medicine, Orange, CA

Correspondence should be addressed to Shannon Toohey, MD, MAEd at stoohey@uci.edu

Submitted: July 7, 2016; Accepted: August 22, 2016; Electronically Published: September 13, 2016; https://doi.org/10.21980/J8G592

**ABSTRACT:**

**Audience:** This simulation session can be used for emergency medicine residents or medical students, but it may be more appropriate for senior residents. Junior residents and medical students may also misdiagnose delirium tremens as a seizure disorder.

**Introduction:** Delirium tremens (DT) is a rare, severe form of withdrawal that includes tremors, seizures, fever and delirium and occurs in approximately 5% of patients with alcohol withdrawal. Early identification and prompt treatment is essential as DT has a 5%-20% mortality rate which can be reduced to 1%-5% with appropriate therapy.

**Objectives:** At the end of this simulation session the learner will: 1) Recognize signs and symptoms of delirium tremens (DT); 2) promptly treat DT with benzodiazepines and supportive care; 3) appropriately manage a patient with DT and effectively communicate with nurses and other team members during the resuscitation of an acutely ill patient.

**Method:** This educational session is a high-fidelity simulation.

**Topics:** Alcohol withdrawal, substance abuse, delirium tremens, simulation, seizure, toxicology, adult resuscitation.
Delirium tremens is a rare, severe form of alcohol withdrawal with a high mortality rate (5%-15%). Prompt resuscitation and treatment with benzodiazepines are essential. By using simulation, learners will practice evaluating and managing an acutely ill patient with DT. They will experience the difficulty in managing a patient with DT, given the patient’s hemodynamic instability. The learner will achieve the third tier of Miller’s pyramid by “showing how” to diagnosis and manage DT. The debriefing session can discuss any cognitive, diagnostic or management errors, problems with communication, or points of confusion.

Recommended pre-reading for instructor:
Any resource to review delirium tremens (DT) and alcohol withdrawal would be appropriate. For suggestions see reference list below.

Results and tips for successful implementation:
This can be completed on a high- or moderate-fidelity simulation or could be incorporated as a mock oral board case. The patient should initially present brought in by EMS from jail, with altered mental status, which leaves a fairly wide differential.
This simulation case was built based on an actual patient case. The simulation case was piloted with 8 PGY-2 and 3 residents. After pilot implementation, we made moderate adjustments to make the diagnosis more straightforward and the resuscitation more difficult.

References/suggestions for further reading:
Case Title: Altered Mental Status: Epilepsy, Acute Psychosis, Intoxication, or Delirium Tremens?

Case Description & Diagnosis (short synopsis): The scenario takes place in an ED at a tertiary care teaching hospital. A 48-year-old male is brought into the ED by medics. Per report, he has been in jail for two days. He was normal last night, but was found altered in his cell this morning. The medics report that he appears to be incontinent. They think he may have had a seizure. On arrival, the patient is combative, mumbling to himself and not answering questions appropriately. His vital signs are significant for hypertension and tachycardia. He has an otherwise benign exam, with no evidence of trauma. The patient continues to have worsening agitation, hypertension and tachycardia. The learner should recognize the concern for delirium tremens (DT). The patient will require multiple rounds of benzodiazepines to hold still for a head CT, and will continue to have severe tachycardia and ultimately, hypotension. Learners should recognize the need for escalating doses of benzodiazepines. They will need to intubate him and start high dose benzodiazepines and sedation drips. Once the drips are started, the patients will be fully sedated and blood pressure and heart rate will improve and the patient can be admitted to the medical intensive care unit (MICU).

Equipment or Props Needed:
High- or moderate-fidelity simulator
Infusion pumps
Normal Saline
Prop benzodiazepine vials and syringes
Prop anti-psychotic vials and syringes
Intubation/airway tray
Blood pressure cuff
Cardiac monitor
Two-lead ECG
Pulse oximeter

Confederates needed: This simulation needs a confederate or narrator from the simulation control room to give the initial EMS report and a nurse to assist with the management of the patient.
Stimulus Inventory:
#1 Complete blood count
#2 Comprehensive metabolic panel
#3 Lipase
#4 Urine Drug Screen
#5 Lactate
#6 Alcohol Level
#7 CT head
#8 CXR
#9 Post-intubation CXR

Background and brief information: The scenario takes place in an ED at a tertiary care teaching hospital. The patient is brought in from jail by medics with altered mental status, agitation, hypertension and tachycardia. The medics state they believe the patient had a seizure because he had incontinence.

Initial presentation: 48-year-old male is brought into the ED by medics from jail. He is tachycardic and hypertensive with agitation as he is moved to a gurney.

How the scenario unfolds: Participants should ask medics to stay, while quickly checking airway, breathing, and circulation (ABCs). Participants should then obtain a history from medics and perform a complete physical exam. They need to consider the differential for the patient’s altered mental status including seizure, intoxication, alcohol withdrawal, infection, and trauma. They should order appropriate labs and imaging (including a head CT) and recognize that the patient’s agitation will require intervention.

The nurse will report to the participant that they tried to take the patient for head CT but he was too agitated. His heart rate and blood pressure are still very elevated. If the participants do not start treating the patient with benzodiazepines, he will decompensate with worsening tachycardia, hypertension, and unremitting seizures. If they continue to fail to provide benzodiazepines (especially if they give repeated doses of anti-psychotics), he will go into ventricular fibrillation, code and die.

If participants give benzodiazepines, they will need to be repeated, escalating the dose. The patient will continue to have severe hypertension and tachycardia. The participant should recognize that these symptoms are more consistent with delirium tremens than a seizure.
disorder or acute psychosis. Given the failure of multiple push-dosed benzodiazepines, they should intubate the patient and start him on a benzodiazepine and propofol drip. The patient should then be admitted to the MICU.

Critical Actions:

1. Perform ABCs
2. Order appropriate basic labs and head CT
3. Recognize likely delirium tremens and aggressively treat with benzodiazepines
4. Recognize continued agitation and need to intubation and start benzodiazepine and sedation drips
5. Admit the patient to the MICU
Case title: Altered Mental Status: Epilepsy, Acute Psychosis, Intoxication, or Delirium Tremens?

Chief Complaint: 48 year-old M with history of polysubstance abuse, brought in by medics from jail for altered mental status. Patient is unable to provide history, but medics report they found him incontinent of both bowel and bladder and they think he had a seizure.

Vitals: HR 120  BP 195/116  RR 26  Temp 37.1  O2Sat 100%

General Appearance: Agitated, laying in gurney with handcuffs on

Primary Survey:
- Airway: Patent, protected, patient is moaning incoherently
- Breathing: Tachypneic, clear breath sounds bilaterally
- Circulation: Bounding femoral pulses, tachycardic

History:
- History of present illness: Per report the patient has been in jail for two days. He was normal last night, but was found altered in his cell this morning at 5am. Medics report he has both fecal and urinary incontinence and they think he had a seizure. Patient is only oriented to self. He is agitated and uncooperative, muttering to himself. No known preceding trauma. No known ingestions.
- Past Medical history: Polysubstance abuse, otherwise unknown
- Past Surgical history: Unable to obtain due to patient mental status
- Patients Medications: Unable to obtain due to patient mental status
- Allergies: Unable to obtain due to patient mental status
- Social history: Polysubstance abuse per medic report
- Family history: Unable to obtain due to patient mental status

Secondary Survey/Physical Examination:
- General Appearance: Agitated, laying in gurney with handcuffs on
- HEENT:
  - Head: Normocephalic, atraumatic
  - Eyes: within normal limits, but not cooperative with extraocular movements
  - Ears: within normal limits
  - Nose: within normal limits
  - Throat: within normal limits
• **Neck:** within normal limits, moving head spontaneously
• **Heart:** tachycardic, regular rhythm, no murmurs noted
• **Lungs:** tachypneic, clear to auscultation bilaterally
• **Abdominal/GI:** within normal limits
• **Genitourinary:** within normal limits
• **Rectal:** within normal limits
• **Extremities:** within normal limits
• **Back:** within normal limits
• **Neuro:** Agitated. Awake but confused, staring off into distance, no eye contact, not answering questions or following commands. Appears to be responding to internal stimuli. GCS 13 (M5V4E4), only able to answer name when asked. Face symmetric, pupils equally round and reactive to light, not pinpoint or enlarged. Moving all extremities equally and localizes to pain. No hyperreflexia or clonus.
• **Skin:** within normal limits, sweaty
• **Lymph:** within normal limits
• **Psych:** agitated, unable to answer questions, possibly responding to internal stimuli
Results:

CBC
WBC 11.5 /mm$^3$
Hemoglobin 14.2 g/dL
Hematocrit 44.1%
Platelets 228 /mm$^3$

CMP
Na 131 mEq/L
K 3.3 mEq/L
Cl 101 mEq/L
CO2 28 mEq/L
BUN 35 mg/dL
Cr 1.4 mg/dL
AST 54 Units/L
ALT 46 Units/L
Alk Phos 126 Units/L
Albumin 1.9 g/dL
Tbili 1.3 mg/dL

Lipase 9 Units/L

Lactate 1.2 mEq/L

Alcohol level
None detected

Urine toxicology
Positive for opiates and benzodiazepines, otherwise negative
CT Head

CXR
Post-Intubation CXR
## SIMULATION EVENTS TABLE:

<table>
<thead>
<tr>
<th>Minute (State)</th>
<th>Participant action/ Trigger</th>
<th>Patient Status (Simulator response) &amp; Operator Prompts</th>
<th>Monitor Display (Vital Signs)</th>
</tr>
</thead>
<tbody>
<tr>
<td>0:00 (Baseline)</td>
<td>Medics arrive.</td>
<td>Patient altered, agitated, combative.</td>
<td>T 36.9</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>HR 120</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>BP 195/116</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>RR 26</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>O2 100%</td>
</tr>
<tr>
<td>1:00</td>
<td>Evaluate ABCs.</td>
<td>Patient is altered and unable to provide a history.</td>
<td>T 36.9</td>
</tr>
<tr>
<td></td>
<td>Obtain history from medics.</td>
<td>History is given per medics that he has been altered</td>
<td>HR 120</td>
</tr>
<tr>
<td></td>
<td></td>
<td>since this morning and they believe that he had a</td>
<td>BP 195/116</td>
</tr>
<tr>
<td></td>
<td>Start 2 large bore IVs.</td>
<td>seizure.</td>
<td>RR 26</td>
</tr>
<tr>
<td></td>
<td>Monitors (cardiac and</td>
<td></td>
<td>O2 100%</td>
</tr>
<tr>
<td></td>
<td>pulse ox).</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3:00</td>
<td>Labs are ordered.</td>
<td>Patient is still agitated, tachycardic and</td>
<td>T 36.9</td>
</tr>
<tr>
<td></td>
<td>Head CT ordered.</td>
<td>hypertensive.</td>
<td>HR 130</td>
</tr>
<tr>
<td></td>
<td>Benzodiazepines ordered</td>
<td>If participant does not recognize the need to treat</td>
<td>BP 205/116</td>
</tr>
<tr>
<td></td>
<td>for agitation and</td>
<td>agitation and severe vital sign abnormality, RN can</td>
<td>RR 26</td>
</tr>
<tr>
<td></td>
<td>possible alcohol withdrawal.</td>
<td>cue participant that they tried to take the patient for</td>
<td>O2 100%</td>
</tr>
<tr>
<td></td>
<td></td>
<td>head CT but he was too agitated.</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>If anti-psychotics are ordered instead of benzodiazepines, they should have no effect on the patient.</td>
<td></td>
</tr>
<tr>
<td>Minute (State)</td>
<td>Participant action/ Trigger</td>
<td>Patient Status (Simulator response) &amp; Operator Prompts</td>
<td>Monitor Display (Vital Signs)</td>
</tr>
<tr>
<td>---------------</td>
<td>-----------------------------</td>
<td>----------------------------------------------------</td>
<td>------------------------------</td>
</tr>
<tr>
<td>5:00</td>
<td>Further benzodiazepines should be ordered due to continued agitation, tachycardia and hypertension. If benzodiazepines have not been ordered or if patient is given multiple doses of anti-psychotics, the patient will have seizure, then go into ventricular fibrillation arrest and die.</td>
<td>Continued hypertension and tachycardia. Labs available: CBC, CMP, lipase, lactate, alcohol level.</td>
<td>T 36.9 HR 120 BP 210/120 RR 26 O2 100%</td>
</tr>
<tr>
<td>6:00</td>
<td>If the participant orders at least 100mg of Valium, the patient will hold still long enough for head CT; otherwise patient will continue to be too agitated.</td>
<td>Head CT performed once sufficient benzodiazepines are ordered.</td>
<td>T 36.9 HR 120 BP 215/120 RR 26 O2 100%</td>
</tr>
<tr>
<td>7:00</td>
<td>Order more benzodiazepines.</td>
<td>Continued hypertension and tachycardia, recurrence of agitation after head CT. Head CT results available.</td>
<td>T 36.9 HR 120 BP 215/120 RR 26 O2 100%</td>
</tr>
</tbody>
</table>
## OPERATOR MATERIALS

<table>
<thead>
<tr>
<th>Minute (State)</th>
<th>Participant action/ Trigger</th>
<th>Patient Status (Simulator response) &amp; Operator Prompts</th>
<th>Monitor Display (Vital Signs)</th>
</tr>
</thead>
<tbody>
<tr>
<td>8:00</td>
<td>Recognize failure of repeat doses of benzodiazepine and need for heavy sedation and benzodiazepine drips requiring intubation. If the participant does not recognize the need for intubation and higher doses of sedation and benzodiazepines, the patient will have a seizure, then go into ventricular fibrillation arrest and die.</td>
<td>Continued agitation, hypertension and tachycardia.</td>
<td>T 36.9 HR 120 BP 215/120 RR 26 O2 100%</td>
</tr>
<tr>
<td>9:00</td>
<td>Intubate the patient. Order post-intubation CXR.</td>
<td>Patient sedated for intubation, continued hypertension and tachycardia.</td>
<td>T 36.9 HR 120 BP 215/120 RR 26 O2 100%</td>
</tr>
<tr>
<td>10:00</td>
<td>Order versed drip and/or propofol drip (or barbiturate).</td>
<td>Patient sedated from drips, hypertension and tachycardia improved. Post-intubation CXR available.</td>
<td>T 36.9 HR 105 BP 170/95 RR 26 O2 100%</td>
</tr>
<tr>
<td>11:00</td>
<td>Call MICU for admission and sign out the patient.</td>
<td>Patient sedated from drips, hypertension and tachycardia improved. Patient admitted to the MICU for further management.</td>
<td>T 36.9 HR 105 BP 170/95 RR 26 O2 100%</td>
</tr>
</tbody>
</table>
**Diagnosis:** Delirium tremens with severe sympathomimetic instability unresponsive to benzodiazepine push doses, requiring intubation and medication drips.

**Disposition:** The patient should be admitted to the MICU for further management of delirium tremens. If the participants did not recognize the need for benzodiazepines the patient will have a seizure and code and will not have return of spontaneous circulation regardless of resuscitative efforts.
Delirium Tremens

Epidemiology
- In the United States it is estimated that 5%-10% of the population has alcoholism, and a substantial portion of the population is at risk for suffering alcohol withdrawal.
- Mortality rate is as high as 20% if left untreated, can be reduced to approximately 1%-5% with appropriate treatment.
- Alcohol is the most common withdrawal syndrome in the Emergency Department and unlike opiate withdrawal, it can be life-threatening.

Pathophysiology
- Chronic alcohol use down-regulates GABA receptors and up-regulates NMDA receptors.
- Sudden reduction in use causes increased adrenergic activity.
- Alcohol withdrawal is a spectrum of disease ranging from minor to major withdrawal.

Presenting Signs and Symptoms
- Minor withdrawal occurs within 6-24 hours and consists of tremors, tachycardia, hypertension, diaphoresis, anorexia and insomnia.
- Major withdrawal symptoms start after 24 hours, peak after 48-72 hours and consist of worsening tremors, tachycardia, hypertension, and can include fevers, seizures, altered mental status, and delusions.

Diagnosis
- History of previous alcohol withdrawal or chronic abuse with recent decreased intake is key to diagnosis.
- Diagnosis is by recognition of history and signs and symptoms consistent with alcohol withdrawal.
- Further diagnostic testing should be based on suspicion of other associated diseases such as traumatic injury, associated intoxication, or infection. In general, electrolytes, BUN, creatinine, glucose, magnesium, CBC, and alcohol level may be useful.
- Imaging is generally not required but CT head may be necessary to rule out trauma if patient is altered, and CXR may be useful in ruling out infection.
DEBRIEFING AND EVALUATION PEARLS

Treatment

• ABCs
  • Benzodiazepines are the mainstay of treatment for alcohol withdrawal: Lorazepam, diazepam, or chlordiazepoxide can be used. Large repeated doses may be required to control symptoms.
  • Propofol and barbiturates are also useful in patients not responding to benzodiazepines.
  • Phenytoin and other anti-epileptic medications are not recommended for seizures related to alcohol withdrawal.
  • Haloperidol and other anti-psychotics may lower the seizure threshold and prolong the QT interval.
  • If patient is receiving high doses of benzodiazepines or adjunct agents, they may require intubation for airway protection.
  • Lorazepam is generally avoided as a drip, as high doses may be associated with propylene glycol toxicity.
  • Resuscitation with fluids.
  • Electrolyte repletion.
  • Patients with DT usually require ICU admission for close monitoring and frequent reassessment and repeat medication.

Further Reading

**Assessment Timeline**

This timeline is to help observers assess their learners. It allows observer to make notes on when learners performed various tasks, which can help guide debriefing discussion.

<table>
<thead>
<tr>
<th>Critical Actions</th>
<th>0:00</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Perform ABCs</td>
<td></td>
</tr>
<tr>
<td>2. Order appropriate basic labs and head CT</td>
<td></td>
</tr>
<tr>
<td>3. Recognize likely delirium tremens and aggressively treat with benzodiazepines</td>
<td></td>
</tr>
<tr>
<td>4. Recognize continued agitation and need to intubation and start benzodiazepine and sedation drips</td>
<td></td>
</tr>
<tr>
<td>5. Admit the patient to the MICU</td>
<td></td>
</tr>
</tbody>
</table>
SIMULATION ASSESSMENT
Altered Mental Status: Epilepsy, Acute Psychosis, Intoxication or Delirium Tremens

Learner: ________________________________

Critical Actions:
☐ Perform ABCs
☐ Order basic labs and head CT
☐ Recognize likely delirium tremens and treat aggressively with benzodiazepines
☐ Recognize continued agitation and need to intubate and start benzodiazepine and sedation drips
☐ Admit to the MICU

Summative and formative comments:

Milestones assessment:

<table>
<thead>
<tr>
<th></th>
<th>Milestone</th>
<th>Did not achieve level 1</th>
<th>Level 1</th>
<th>Level 2</th>
<th>Level 3</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Emergency Stabilization (PC1)</td>
<td>☐ Did not achieve Level 1</td>
<td>☐</td>
<td>☐</td>
<td>☐ Manages and prioritizes critical actions in a critically ill patient</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Recognizes abnormal vital signs</td>
<td>Recognizes an unstable patient, requiring intervention</td>
<td>Reassesses after implementing a stabilizing intervention</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Performs primary assessment</td>
<td>Discerns data to formulate a diagnostic impression/plan</td>
<td></td>
</tr>
</tbody>
</table>

Standardized assessment form for oral boards cases. JETem © Developed by: Megan Osborn, MD, MHPE; Shannon Toohey, MD; Alisa Wray, MD
<table>
<thead>
<tr>
<th></th>
<th>Milestone</th>
<th>Did not achieve level 1</th>
<th>Level 1</th>
<th>Level 2</th>
<th>Level 3</th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
<td>Performance of focused history and physical (PC2)</td>
<td>Did not achieve Level 1</td>
<td>Performs a reliable, comprehensive history and physical exam</td>
<td>Performs and communicates a focused history and physical exam based on chief complaint and urgent issues</td>
<td>Prioritizes essential components of history and physical exam given dynamic circumstances</td>
</tr>
<tr>
<td>3</td>
<td>Diagnostic studies (PC3)</td>
<td>Did not achieve Level 1</td>
<td>Determines the necessity of diagnostic studies</td>
<td>Orders appropriate diagnostic studies</td>
<td>Prioritizes essential testing</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Reviews risks, benefits, contraindications, and alternatives to a diagnostic study or procedure</td>
</tr>
<tr>
<td>4</td>
<td>Diagnosis (PC4)</td>
<td>Did not achieve Level 1</td>
<td>Considers a list of potential diagnoses</td>
<td>Considers an appropriate list of potential diagnosis</td>
<td>Makes the appropriate diagnosis</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Considers other potential diagnoses, avoiding premature closure</td>
</tr>
<tr>
<td>5</td>
<td>Pharmacotherapy (PC5)</td>
<td>Did not achieve Level 1</td>
<td>Asks patient for drug allergies</td>
<td>Selects an medication for therapeutic intervention, consider potential adverse effects</td>
<td>Selects the most appropriate medication and understands mechanism of action, effect, and potential side effects</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Considers and recognizes drug-drug interactions</td>
</tr>
</tbody>
</table>
## SIMULATION ASSESSMENT

**Altered Mental Status: Epilepsy, Acute Psychosis, Intoxication or Delirium Tremens**

Learner: _________________________________________

<table>
<thead>
<tr>
<th>Milestone</th>
<th>Did not achieve level 1</th>
<th>Level 1</th>
<th>Level 2</th>
<th>Level 3</th>
</tr>
</thead>
<tbody>
<tr>
<td>6 Observation and reassessment (PC6)</td>
<td>☐ Did not achieve Level 1</td>
<td>☐</td>
<td>☐</td>
<td>☐ Consistently evaluates the effectiveness of therapies at appropriate intervals</td>
</tr>
<tr>
<td>7 Disposition (PC7)</td>
<td>☐ Did not achieve Level 1</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td>9 General Approach to Procedures (PC9)</td>
<td>☐ Did not achieve Level 1</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td>20 Professional Values (PROF1)</td>
<td>☐ Did not achieve Level 1</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
</tr>
</tbody>
</table>

---

Standardized assessment form for oral boards cases. JETem © Developed by: Megan Osborn, MD, MHPE; Shannon Toohey, MD; Alisa Wray, MD

SIMULATION ASSESSMENT
Altered Mental Status: Epilepsy, Acute Psychosis, Intoxication or Delirium Tremens

Learner: ________________________________

<table>
<thead>
<tr>
<th>Milestone</th>
<th>Did not achieve level 1</th>
<th>Level 1</th>
<th>Level 2</th>
<th>Level 3</th>
</tr>
</thead>
<tbody>
<tr>
<td>22</td>
<td>Patient centered communication (ICS1)</td>
<td>□ Did not achieve level 1</td>
<td>□ Establishes rapport and demonstrates empathy to patient (and family)</td>
<td>□ Elicits patient’s reason for seeking health care</td>
</tr>
<tr>
<td>23</td>
<td>Team management (ICS2)</td>
<td>□ Did not achieve level 1</td>
<td>□ Recognizes other members of the patient care team during case (nurse, techs)</td>
<td>□ Communicates pertinent information to other healthcare colleagues</td>
</tr>
</tbody>
</table>

Standardized assessment form for oral boards cases. JETem © Developed by: Megan Osborn, MD, MHPE; Shannon Toohey, MD; Alisa Wray, MD