EMRA Simulation Guide

An Introduction for Beginners

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Simulation Guide

An Educational Guide for Beginners

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ABBREVIATIONS

ABG . . . . . Arterial blood gas
ACS . . . . . Acute coronary syndrome
Af Am . . . . . African American
ALT/AST . . . . . Alanine aminotransferase/aspartate aminotransferase
AMS . . . . . Altered mental status
AOx3 . . . . . Alert and oriented times 3
Appy. . . . . Appendectomy
AXR . . . . . Abdominal x-ray
BiPAP . . . . . Bilevel positive airway pressure
BMP . . . . . Basic metabolic panel
BNP . . . . . B-type natriuretic peptide
BP . . . . . Blood pressure
BPH . . . . . Benign prostatic hyperplasia
BS (+/-) . . . . . (present/absent) bowel sounds
BUN . . . . . Blood urea nitrogen
BVM . . . . . Bag valve mask
CA . . . . . Cancer
CAD . . . . . Coronary artery disease
CAGB . . . . . Coronary artery bypass graft
CBC . . . . . Complete blood count
CCU . . . . . Cardiac care unit
CHF . . . . . Congestive heart failure
Chole . . . . . Cholecystectomy
CN . . . . . Cranial nerves (eg. CN 2-12 intact); Cyanide (eg. CN toxicity panel)
Coags . . . . . Coagulation profile (PT, PTT, INR)
COPD . . . . . Chronic obstructive pulmonary disease
CPAP . . . . . Continuous positive airway pressure
Cr . . . . . Creatinine
C-section. . . . . Caesarean section
CSF . . . . . Cerebrospinal fluid
CT . . . . . Computed tomography
CTAB . . . . . Clear to auscultation bilaterally
CVA . . . . . Costovertebral angle
CVA . . . . . Cerebrovascular accident
CXR . . . . . Chest x-ray
D5W . . . . . 5% Dextrose in water
DM . . . . . Diabetes mellitus
DOE . . . . . Dyspnea on exertion
EC/ED . . . . . Emergency center/Emergency department
EEG . . . . . Electroencephalography
EKG/ECG. . . . . Electrocardiogram
EMS . . . . . Emergency Medical Services
ESRD . . . . . End stage renal disease
EtOH. . . . . Alcohol
FiO2 . . . . . Inspired fraction of O2
FOAMed . . . . . Free Open Access Medical Education
FSBG . . . . . Fingerstick blood glucose
G#P#### . . . . . Gravida – number of confirmed pregnancies Para/Parity – Births (Format is Term/Preterm/Abortions/Living)
GCS . . . . . Glasgow coma scale
GERD . . . . . Gastroesophageal reflux disease
GIB . . . . . Gastrointestinal bleeding
H/o . . . . . History of
hCG . . . . . Human chorionic gonadotropin
HCO3 . . . . . Bicarbonate
HCTZ . . . . . Hydrochlorothiazide
HEENT . . . . . Head, ears, eyes, nose, and throat
HELLP. . . . . Hemolysis, elevated liver enzymes, low platelets
Hg/Hgb . . . . . Hemoglobin
HIV . . . . . Human immunodeficiency virus
HLD . . . . . Hyperlipidemia
HPI . . . . . History of present illness
HR . . . . . Heart rate
HSV . . . . . Herpes simplex virus
HTN . . . . . Hypertension
ICS . . . . . Intracostal space
IM . . . . . Intramuscular
INR . . . . . International normalized ratio
IV/PIV . . . . . Intravenous/peripheral intravenous
IVC . . . . . Inferior vena cava
JVD . . . . . Jugular venous distention
KUB . . . . . Kidney ureters bladder (radiograph)
LDH . . . . . Lactate dehydrogenase
LFT . . . . . Liver function tests
LMP . . . . . Last menstrual period
LOC . . . . . Loss of consciousness
Mg . . . . . Magneseium
MI . . . . . Myocardial infarct
MICU . . . . . Medical intensive care unit
MRA . . . . . Magnetic resonance angiogra-

phy

NA . . . . . Not applicable
NBNB . . . . . Non-bloody, non-bilious
NC . . . . . Nasal cannula
NKDA . . . . . No known drug allergies
NPO . . . . . Nothing by mouth
NRB . . . . . Non-rebreather mask
NSAIDs . . . . . Non-steroidal anti-inflammatory drugs
OCP . . . . . Oral contraceptives
OU . . . . . Oculus uterque (both eyes)
PCN . . . . . Penicillin
PCP . . . . . Primary care physician
PCR . . . . . Polymerase chain reaction (measures viral load)
PERRL . . . . . Pupils equal, round, and reactive to light
PID . . . . . Pelvic inflammatory disease
PMHx . . . . . Past medical history
PMI . . . . . Point of maximal impulse
PND . . . . . Paroxysmal nocturnal dyspnea
PO . . . . . Per os (oral administration)
POC . . . . . Point of care (fingerstick)
Posm . . . . . Plasma osmoles
Ppd . . . . . Pack per day
PSHx . . . . . Past surgical history
RA . . . . . Room air (airway setting)
RBC . . . . . Red blood cells
RLQ/RUQ/LLQ/LUQ . . . Right/left lower/upper quadrant
RR . . . . . Respiratory rate
RRR . . . . . Regular rate and rhythm
SVT . . . . . Supraventricular tachycardia
T . . . . . Temperature
TKA . . . . . Total knee arthroplasty
TM . . . . . Tympanic membranes
TPA . . . . . Tissue plasminogen activator
TTE . . . . . Transthoracic echocardiogram
TVUS . . . . . Transvaginal ultrasound
UA . . . . . Urinalysis
UDS . . . . . Urine drug screen
UE/LE . . . . . Upper/Lower extremities
UPT . . . . . Urine pregnancy test
US . . . . . Ultrasound
UV . . . . . Ultraviolet (eg. Fluourescent urine)
VBG . . . . . Venous blood gas
WBC . . . . . White blood count

TABLE OF CONTENTS

FOREWORD

This is a guide I put together during my fourth year of medical school. I absolutely love doing medical simulation and contributing to medical education, so this was something fun for me to make for those participating in simulation exercises, starting their own programs, or just wanting to review cases. Editing this book now as a Simulation Director and new mom, I hope you find this guide easy to pick up whenever small amounts of time are available and are able to use the cases both to help prepare for your ABEM oral board examination and for simulated patient encounters.

I by no means consider myself an expert on medical simulation, and I still have a tremendous amount to learn. This guide is intended for all interested parties, especially those of all levels of training who are new to medical simulation. Remember, you are incredibly smart and are going to have an incredible impact on the face of medicine. You are not “just” a student, “just” a resident, or “just” a new attending–you are incredible and brilliant. I believe in you!

The handbook includes an introduction of what to expect, common terminology, and a few sample cases. I have included a few links to EKGs, radiographs, and other helpful resources thanks to the wonders of FOAMed.

This is not intended to be medical advice, and this should not be considered a source for standard of care.

I hope that with this guide I am able to impart some of my enthusiasm for this educational tool to each of you. Happy reading!

Sincerely,
Shehni Nadeem, MD

P.S. Thank you to my wonderful husband, Samir; my loving son, Aman; and my parents for your sacrifices and support to make this possible.

INTRODUCTION

What is medical simulation?

Medical simulation is an educational tool in medicine utilized to train learners in a controlled environment. Typically, medical simulation can involve either simulated patient encounters with standardized patients or simulated human patients with programmable mannequins. This allows the learner to develop clinical skills in an environment entirely devoted to teaching concepts by putting them into practice. The best part is, there is no harm to any real human patients as one performs physical exams, procedures, and other interventions.

Who does medical simulation?

Simulation has long been used by the US military for training the troops, and recently medical simulation has gained popularity as we learn the merits of such training. Medical simulation is a useful tool at all levels of training whether it is a pre-clinical medical student or a fellow in Critical Care.

What are the benefits of medical simulation?

Medical simulation offers the unique opportunity to medical students/residents to develop and practice clinical skills at any level of training. Additionally, simulation allows medical students and residents to cultivate their confidence, decision-making skills, and abilities to assess and manage a critically ill patient. Past research studies also seem to indicate that participation in medical simulation improves medical student and resident performance on subsequent multiple-choice examinations and clinical functions.

Do I have to be committed to EM to do simulation?

No. Medical simulation spans many fields, and the knowledge acquired can likewise be applied broadly. Additionally, the confidence gained from simulation exercises helps in any field of medicine.

What equipment do I need for medical simulation?

It depends! You may either have a fellow medical student/resident play the patient role, or use a high fidelity simulation mannequin. For those who are looking to start a simulation program from scratch, using fellow participants is a great way to practice. For those with large simulation labs at their schools, it is recommended to involve the Director of Simulation Education at your institution in your plans to learn how to use the mannequins. Additional medical device props (e.g. bag-valve mask) may also be added to simulation scenarios to better represent clinical conditions and will be suggested in the sample clinical cases included in this guide.

How much does this cost?

Student and resident simulation groups can run entirely free of cost! Using volunteers or simulation mannequins that the school already has access to can help to eliminate expenses. For schools without simulation labs, it may additionally be helpful to investigate if clinical departments (e.g. medicine or surgery) have mannequins available for use.

How do I organize a simulation group?

Take a moment to sketch out your ideas and goals for the group. Then, share your plans with your peer group and identify people who may be interested in helping. Also consider presenting your proposal to your medical school/residency administration for help in establishing a simulation society/curriculum.

Typical simulation group formats include a ten-minute specific subject didactic session followed by simulation practice. Sample cases for simulation practice are included in this guide, but you may choose to add your own cases to the

mix as well. Specific roles and instructions for running the simulation cases are better defined in the “How to Use this Guide” and “Debriefing” sections. Groups can choose to vary faculty involvement as they feel comfortable.

How do I find interested faculty?

To identify faculty mentors, approach the Director of Simulation Education (if your progra has one) or reach out to faculty in Emergency Medicine, Internal Medicine, General Surgery, or Obstetrics and Gynecology. Asking the school administration may also be helpful

But I don’t know everything?!?

That’s okay! In medicine there is always more to learn. Medical simulation imparts organizational skills and efficient methods for handling critical and potentially chaotic situations. It imparts data gathering, communication, and assessment skills simply by exposure even for the pre-clinical medical student or intern. Your knowledge base will grow as your complete more medical school coursework and simulation exercises.

HOW TO USE THIS GUIDE

For ABEM Oral Board Exam Review

These cases are written so they may be utilized in myriad formats. You may use these cases systematically to help prepare for the oral board examination, or you may elect to use these cases to develop your fund of knowledge.

About the Examination

The format of the ABEM Oral Board Examination continues to evolve. In 2023, candidates were presented with 5 single-patient encounters and 2 structured interview cases. Prior to the examination, review the sample single-patient encounter videos found on the ABEM website. These cases will require you to progress through patient care in a conventional format as you would in real life. The structured interview is designed to delve further into your thought process and clinical reasoning. Unlike in the single-patient encounter, you are speaking with the examiner directly rather than to the patient or simulated nurse. Essentially, you will talk through a single-patient case in a more academic style where the examiner will progress the case as necessary. You have 15 minutes to complete each case including all the critical actions. You might have one additional case that is experimental only.

Evaluation and Scoring

Prior to your oral board examination, refer to the ABEM website for a document titled "Detailed Performance Criteria: Oral Exam." The evaluation criteria include:

- **Data Acquisition**
  - ✓ All critical data points must be obtained
  - ✓ An orderly and timely approach to data acquisition must exist
  - ✓ The approach must be integrated into the management plan
- **Problem-solving**
  - ✓ Consider appropriate alternative diagnoses and work through the differential in an appropriate and prioritized fashion
  - ✓ Stabilize and manage the patient efficiently and appropriately
- **Patient Management**
  - ✓ Appropriate and timely care provided with anticipation of future care-related issues
- **Resource Utilization**
  - ✓ Ordered relevant studies to work through appropriate differential diagnoses
  - ✓ Demonstrated logical resource use
- **Health Care Provided (Outcome)**
  - ✓ Standard of care was followed in present time
  - ✓ How the patient did overall
- **Interpersonal relations and communication skills**
  - ✓ Spoke with staff, patient, EMS, and other scenario-specific bodies with respect
  - ✓ Explained plan to patient or family.
  - ✓ Made the patient and/or family feel comfortable
- **Comprehension of pathophysiology**
  - ✓ How well you understand why you are doing what you are doing (e.g. the utility of ordering an EKG on a toxicology case)
- **Clinical Competence (overall)**
  - ✓ Overall cognitive and procedural skills

Practicing the Format

A systematic approach to gathering and processing information for each case is critical. Work through the cases with an idea of how you want to gather information each time (please refer to the sample cases for one example of how to do this). Keep track of the information you gathered by setting up your blank sheet of paper the same way each time.

This way, you are able to quickly reference the information you need as the case progresses and can ensure no critical actions are missed. Remember to stay within the ABEM time limits for each case. Consider a "mock" oral board session to give you trial run of the full oral board examination rather than just an individual case.

Solo Practice

You may choose to read through the cases on your first pass through this guide. However, you may find it even more helpful to quiz yourself in a dynamic fashion as you move through the cases. Ask yourself, "What do I see, hear, and smell?" as you start a case and reveal only the next pertinent piece of information. Verbalize as you would if an examiner was sitting across from you. At the end of each case, review the list of critical actions and ensure you have an understanding of what to improve the next time. Make sure to keep track of time so you are not regularly running out of time before the case is complete.

Partner Practice

Should you be fortunate enough to have a willing colleague, mentor, or someone else to quiz you, you should role play the way you would for the actual exam. One person will play the role of the examiner and the other will be the examinee. The examiner should read the case ahead of time to better prepare for the role. You should move through the case with only each pertinent piece of information available at a time. Stimuli should be delayed as they would be with the real examination. To end the case, your partner should indicate the conclusion of the encounter with, "This concludes the case," and allow you a 5 minute break before the next case.

For Simulation Practice

For simulation, there will be medical team and ancillary actors needed to run the case. All roles should be assigned prior to the start of the case. Multiple roles can be played by one individual if the need presents.

- **Consultants** — This individual should either guide the pre-clinical student/intern with fund of knowledge (eg, ECG interpretation), serve as the defining clinical intervention (eg, surgical management), or accept the patient for admission. Should prompt team members for 1-2 line patient summary and reason for consult if not provided.
- **Case Manager** — This individual will run the case and should start by providing a one-line statement of the patient's age and reason for presentation. Those participating in the case should be allowed to extract pertinent history from either a) patient, b) family/caretaker, or c) EMS. If participants fail to obtain history from parties other than the patient (including previous medical records), the case manager should gently prompt.

  Additionally, the case manager will be responsible for reporting vital signs as they evolve with the case. Vital signs in the sample cases will have parentheses indicating what repeat vitals should be after the recommended intervention. If participants ask for repeat vitals after no intervention, the case manager should provide the initial set of vitals again (except in cases where the patient may have decompensated without acute intervention). If the participants use a different intervention other than the recommended intervention, the case manager may take creative license to vary the repeat vitals and flow of the case.

  Physical exam findings are also documented in the sample cases. The participants should attempt to perform a physical exam and should specifically ask for each finding. For instance, if a participant is performing the abdominal exam, the participant should specifically ask, "What do I hear?" and "Is the patient tender to palpation?" while pantomining the motion. If the team asks overly broad questions, the case manager should guide them to clarify/specify. If the team member omits a portion of the physical exam, the case manager should not reveal it until directly prompted to by the team members.

  Laboratory values will be reported to the case manager as well. The case manager should simply omit the results of any extraneous labs ordered by participants. Lab values should be revealed one to two minutes after the initial request. Whether all the lab values are revealed simultaneously or in batches is at the discretion of the case manager. It may be helpful to print laboratory values for participants or to display them on a screen when first starting simulation exercises.

  Similarly, the case manager should also display imaging results (whether in print or electronically). Representative imaging has been provided in the sample cases, and participants should be responsible for interpreting the imaging. If they are unable to do so, the case manager may prompt them to consult the radiologist. Although this

is not the most realistic representation, this guide is designed to expose any level of participant to simulation despite fund of knowledge limitations.

Finally, critical actions will be listed at the end of each case. The case manager should take care to review these critical actions prior to the start of the case to guide the flow the case. With this guide, efforts have been taken to ensure that the sample cases do not have too many variations, complexities, or unexpected turns that would be more appropriate for the advanced student or resident. This is reflected in the critical actions checklist. *Note: Some participants have found it beneficial to program a handheld tablet device or a laptop computer to display the vitals, rhythm strip, etc. This is at the discretion of the case manager.*

- **Nurse:** Team members should ask the nurse to start peripheral IV lines with statement of specific gauge if possible. Team members should also directly ask nurses to draw laboratory studies. If necessary, nurses can assist with chest compressions but should be directed to do so by the particpants.
- **Family/EMS**: This individual may be responsible for reporting parts of the history of present illness and should thus refer to the case manager role in terms of imparting information from the history. At times, the family member may take free license with the role to be distracting or to appear emotionally upset for the team to best approach and handle the situation.
- **Debrief Manager:** This role is further elaborated in the debriefing section. This individual should review the critical action steps and make note of which actions were performed and which were omitted. This individual should also take notes throughout the duration of the case to assess areas of expertise and areas for improvement. At the end of the allotted time for the case or at the team's resolution of the case (which ever comes first), the debrief manager should signal the cessation of the simulation exercise.
- **Team:** For the purpose of simulation, teams for each case are particularly useful. Most teams comprise 4–5 participants in order to allow each student/resident to have a distinct role and learning opportunity. Groups should be encouraged to assign roles for the purpose of improved communication, clearly defined tasks, and overall organization. Suggested roles are as follows but are quite fluid and can be shifted around as needs change. Participants are encouraged to rotate roles at the end of each case.
  - **Team Leader**: This individual should synthesize the information provided by all the team members and should summarize the case + interventions every so often, initiate discussion of differential diagnoses, and make the definitive decision for interventions.
  - **History/Labs/Imaging/Consults:** This individual should extract the history of present illness from the patient, family, or EMS. Then findings should be shared with the team and specifically the team leader. Any labs or imaging that need to be ordered should be done by this person, and any results of these tests should be reported back to this person. Any consults needed should be called by this team member starting with a brief summary of the case to that point (1-2 lines) and a reason for consult.
  - **Airway/Procedure:** This person is largely responsible for ensuring the airway is maintained. Any other procedures that arise such as central lines, arterial lines, etc. should also be conducted by this individual. In a case warranting chest compressions, this participant may rotate responsibility for the airway with the "Physical Exam/Compressions" team member.
  - **Physical Exam/Compressions:** This individual's role is to perform the primary and secondary survey (which includes a head to toe physical exam). In trauma cases, this individual should ask the "Airway/Procedure" team member to initiate the count for rolling so that further physical exam may be conducted. Additionally, this person is responsible for running a LifePak device, obtaining EKGs, and asking for updated vital signs.

For the actual set-up of the case, please refer to the beginning of each sample case. This will list recommended environment (to rule in need for scene safety), any drastic change in the appearance of the actor or mannequin that should be disclosed (eg, trauma), and other equipment or props. In some cases, not all equipment/props will be used.

Additionally, in non-obstetric and non-trauma cases, ultrasounds should not be considered a mandatory test (unless it is first line standard imaging).

THE DEBRIEFING SESSION

The debriefing session is one of the most important parts of the medical simulation experience. This is where students/residents have the opportunity to evaluate their performance and to hear what they did well. It is also a chance for participants to learn how their processes or systems of patient care could improve. Students/Interns may feel that fund of knowledge was a limiting factor. To supplement knowledge, post-case resources in addition to a pre-simulation didactic session may be helpful.

Feedback should be initiated by the "Debriefing Manager" at the end of each case. Only one person should speak at a time, and others should wait to be called upon by the "Debrief Manager" for ease of understanding.

The debrief manager should take careful notes during the case to discuss with the team at the end of the scenario. Feedback should include the following:

- Team's self-assessment of what went well
  - Each team member should be prompted to share thoughts
- Team's self-assessment of areas to improve
  - Each team member should be prompted to share thoughts
- Leadership
  - Clearly defined roles
  - Involvement of all team members
  - Summarization of case
  - Discussion of differential
- Collaborative Effort
  - Closed-loop communication (including echo back of requests/results)
  - Professionalism
  - Respect to other team members
  - Allowing other team members to express their concerns
  - Delegating duties with patient safety in mind (not overloading one individual with too many tasks that may risk the patient's wellbeing)
- Fund of Knowledge
  - Critical actions achieved
  - Understanding of pathophysiology, basic management, and anticipated disposition
  - Ability to identify severity of illness
- Next steps
  - Resources for improvement
  - Future meeting times

PRACTICE CASES

Heart Block (Mobitz Type II)

Updated by Michael J. Rivera-Rios, MD

Keywords: bradycardia, arrhythmia, AV block
Procedures: transcutaneous pacing, transvenous pacing

LEARNING OBJECTIVES

1. Manage a patient with symptomatic bradycardia
2. Create a broad differential for a patient with bradycardia
3. Order appropriate studies to elucidate the cause of patient's clinical deterioration
4. Recognize need for early consultation
5. Perform transcutaneous pacing

CRITICAL ACTIONS

- ✓ Obtain IV access with two large bore peripheral IVs
- ✓ Early fingerstick glucose
- ✓ Place patient on cardiac monitor with continuous oxygen saturation monitoring
- ✓ Ask for a full set of vital signs including HR, BP, oxygen saturation, and temperature
- ✓ Ask for and interpret appropriate labs (CBC, Coagulation Profile, Cardiac Biomarkers, Chemistry)
- ✓ Administer atropine
- ✓ Perform transcutaneous pacing
- ✓ Counsel patient
- ✓ Provide analgesia
- ✓ Check for mechanical capture
- ✓ Obtain EKG, CXR
- ✓ Reassess patient and vital signs
- ✓ Call appropriate consultations (Cardiology, ICU)
- ✓ Use closed-loop communication
- ✓ Summarize case to team or consultant
- ✓ Bonus: Prepare for transvenous pacing

CASE ONE-LINER

64-year-old male presents with weakness and diaphoresis

PRESENTATION

SETTING	Hospital ED
ADDITIONAL ROLES	Sim operator, sim RN, debrief manager **CONSULTANTS:** Cardiology, CCU
PATIENT	64yo male
CHIEF COMPLAINT	"I feel weak and sweaty!"
Hx of PRESENTING ILLNESS	A 64-year-old male presents to the ED after growing diaphoretic and feeling weak while at his PCP's office 10 minutes prior to arrival. Also notes retrosternal pressure that has resolved now. Denies associated dyspnea, abdominal or back pain, or extremity edema. He does endorse some dizziness but denies LOC. Patient has had this happen before 1 week ago in line at a Taylor Swift concert. Has come close to falling a few times. Did not take his home medications this morning (only report if directly asked).
ROS	(+) Dizziness, diaphoresis, weakness, chest pressure (-) Loss of consciousness, headache, dyspnea, abdominal pain, back pain, extremity edema
PMH/PSH	Hypertension, Diabetes Mellitus, HIV +/ Lap Cholecystectomy
MEDICATIONS	Metoprolol, Vitamin C supplements, metformin
ALLERGIES	None
SOCIAL Hx	Occasional EtOH Never smoker Never tried recreational drugs

INITIAL VITAL SIGNS

HR	BP	RR	PULSE OXIMETRY	TEMP	WEIGHT
45	100/75	15	99% on room air	97.9F	80 kg

PHYSICAL EXAM

Items in red need to be verbalized

PRIMARY SURVEY

- **Airway:** Patent, speaking full sentences
- **Breathing:** Equal chest rise, no cyanosis
- **Circulation:** Thready pulses, mottled color of skin

GENERAL: AAOx3, diaphoretic
HEENT: Normocephalic, atraumatic. PERRL, TM physiologic, tongue midline
NECK: No JVD, no crepitus
CV: Bradycardic, physiologic heart sounds
PULM: CTAB in all fields, no tachypnea
ABD: Non-tender, non-distended abdomen, +bowel sounds, no rebound or guarding
EXT: 2+ pulses throughout - though thready, no edema
NEURO: Normal

PHASE 1: INITIAL PRESENTATION				
TIME	**CLINICAL PROMPT**	**EXPECTED MANAGEMENT**	**CONSEQUENCES**	**CRITICAL ACTIONS**
00:00-03:00	64yo male presents wtih weakness and diaphoresis **Repeat Vital Signs (after atropine)** BP: 100/73 HR: 40 RR: 18 O2 sat: 99% on RA	• Order full set of vital signs, cardiac monitor, continuous oxygen saturation monitoring • Order 2 large bore IVs • Obtain 12-lead ECG • Order troponin • Order point-of-care glucose (POC glucose – 94) • Place pads on patient • Introduce self to the patient • Administer atropine (may attempt up to 3 times but will not alter vitals)	• RN prompts, "Do you want vitals/patient on the monitor/ IV access?" if not requested • RN prompts, "Doc, do you want a fingerstick?" if not requested • RN prompts, "Do you want me to put the pads on the patient?" if not conducted. • Patient to ask, "Who are you?" if no introduction provided	**Obtained a complete set of vital signs?** I P N **Recognized abnormal VS?** I P N **Performed focused physical exam?** I P N **Ordered 2-large bore IVs?** I P N **Obtained and interpreted ECG?** I P N **Ordered a fingerstick glucose?** I P N **Introduced self to patient?** I P N **Atropine attempted?** I P N **Pads placed?** I P N

PHASE 2: REASSESSMENT AND SECONDARY INTERVENTION				
TIME	**CLINICAL PROMPT**	**EXPECTED MANAGEMENT**	**CONSEQUENCES**	**CRITICAL ACTIONS**
3:01-6:00	Patient develops chest pain and feels near syncopal **Repeat Vital Signs** BP: 80/57 HR: 47 RR: 15 O2 sat: 98% on RA **Repeat Vital Signs (after pacing)** BP: 104/75 HR: 70 RR: 16 O2 sat: 98% on RA **Repeat Vital Signs** (if no pacing) Cardiac arrest	• Order STAT labs • Order STAT CXR • Provide analgesia and perform transcutaneous pacing (must assess for mechanical capture) • Re-assess vitals and patient after transcutaneous pacing performed (will not be successful until 70 mA) • Broad DDx for etiology of bradycardia • Glucagon is an optional treatment and will not impact the vitals • If insulin is given, hypoglycemia will develop and patient will decompensate	• RN prompts, "Do you want any imaging/ labs?" if not requested • RN prompts, "Do we place pacing pads on the patient?" if not done by 5:00 • RN prompts, "Is the pacing working?" if no evaluation for mechanical capture • RN prompts, "What's causing HR to be so low?" if no DDx verbalized • Patient to groan in pain if pacing initiated without analgesia	**Ordered appropriate labs?** I P N **Ordered STAT CXR?** I P N **Interpreted ECG correctly?** I P N **Formed broad DDx?** I P N **Administered analgesia prior to pacing?** I P N **Performed transcutaneous pacing w/ assessment for mechanical capture?** I P N **Reassessed VS after interventions?** I P N

PHASE 3: REASSESSMENT, TERTIARY INTERVENTION, RESULTS, RESOLUTION				
TIME	**CLINICAL PROMPT**	**EXPECTED MANAGEMENT**	**CONSEQUENCES**	**CRITICAL ACTIONS**
6:01-10:00	Patient improves after pacing **Repeat Vital Signs (after pacing)** BP: 104/75 HR: 70 RR: 16 O2 sat: 98% on RA	• Suggest or conduct transvenous pacing • Reassess vital signs • Relay findings and plan of care to patient • Present case to Cardiology/CCU	• Lab results at 6:30 • RN prompts, "What did the imaging/labs show?" if no interpretation • RN prompts, "Who's admitting this patient?" if no consult called • RN prompts, "The patient wants to know what's going on" if no update provided to patient	**Called consultant?** I P N **Succinct and direct hand-off to specialist?** I P N **Interpreted test results accurately?** I P N **Updated patient at any point?** I P N **Reassessed VS?** I P N

PHASE 4: CONCLUSION & DEBRIEFING	
TIME	**ACTIONS**
10:00-20:00	Debrief Q&A Session/Teaching Evaluations

DEBRIEFING POINTS

GENERAL POINTS	SCENARIO-SPECIFIC POINTS
• What went well? • What are some opportunities for improvement? • Did you identify any gaps in knowledge? • Was there any delay in treatment? • How was communication between team members?	• Management of high-grade AV blocks • Bradycardia differential diagnosis including beta-blocker toxicity, calcium channel block toxicity, digoxin toxicity, hyperkalemia, etc. • Transcutaneous and transvenous pacing methods

ORAL BOARDS PEARLS

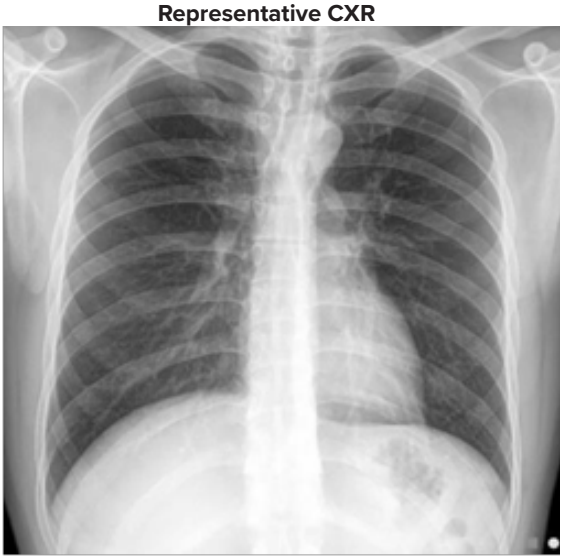
- Have a format for how you would like to approach each case
- Remember to consider POC glucose as part of the initial vitals or assessment, re-assess the vital signs, re-assess after each intervention, and follow up on any studies
- Remember to explain to the patient/family the same way you would in real life
- If the examiner attempts to cue you or ask "anything else", take a moment to synthesize what has been done to help organize your thoughts (this may be your final chance to correct something you forgot!) and ensure the examiner recorded all of your intended actions
- Make sure you include toxidrome or other causes of bradycardia in your work-up

SCENARIO STIMULI

Complete Blood Count		Coagulation Profile	
WBC	11.5 (Normal 5.0 - 14.5 x 10^3/mL)	PT	12 (Normal 11-13.5 seconds)
Hemoglobin	12.0 (Normal 11.5-15.5 gm/dL)	PTT	28 (Normal 25-35 seconds)
HCT	34.5 (Normal 35%-45%)	INR	1.1 (Normal 0.8-1.1)
Platelets	300 (Normal 150-450 x 10^3/mL)		
MCV	84 (Normal 76-90 fL/red)		
Basic Metabolic Panel		**Additional Tests**	
Sodium	136 (Normal 136-145 mEQ/L)	Troponin I	< 0.02 (Normal < 0.08 ng/mL)
Potassium	5.1 (Normal 3.5-5.5 mEQ/L)	Type/Cross	Type A Negative
Chloride	105 (Normal 95-105 mEQ/L)		
CO_2	22 (Normal 17-29 mEQ/L)		
BUN	18 (Normal 5-20 mg/dL)		
Creatinine	1.1 (Normal 0.5-1.1 mg/dL)		
Glucose	140 (Normal 70-110 mg/dL)		

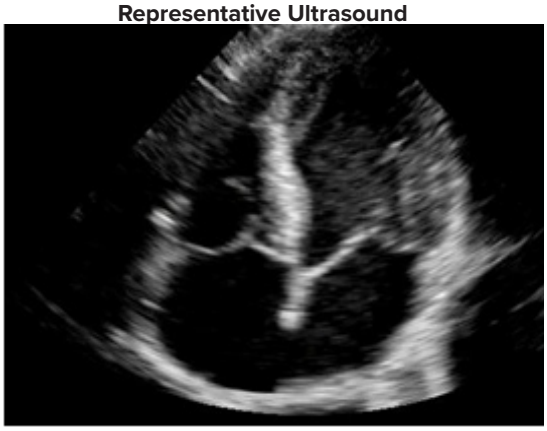
IMAGING

Representative CXR



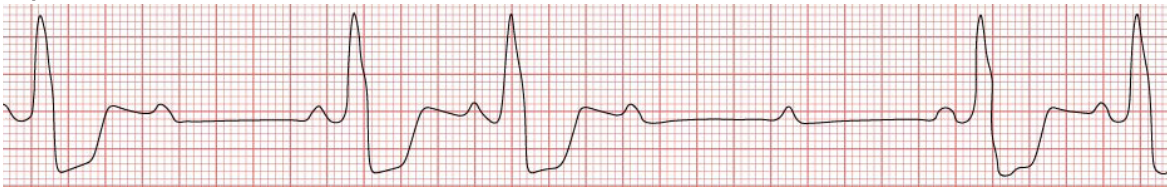
(IMAGE FROM RADIOPAEDIA.ORG)

Representative Ultrasound



(IMAGE FROM EMERGENCYULTRASOUNDTEACHING.COM)

Representative ECG



CHF Exacerbation

Updated by Gina Hana; Evan Strobelt, MD

Keywords: CHF, congestive heart failure
Procedures: none

LEARNING OBJECTIVES

1. Recognize the symptoms that a patient with CHF exacerbation may display
2. Learn to employ a systematic approach to a dyspneic patient
3. Create a differential diagnosis for dyspnea
4. Understand the initial management of CHF exacerbation
5. Develop a basic understanding of the steps in oxygen escalation therapy

CRITICAL ACTIONS

- ✓ IV access x2
- ✓ Supplemental oxygen
- ✓ Non-rebreather
- ✓ Non-invasive positive pressure ventilation (CPAP or BiPAP)
- ✓ Telemetry monitoring
- ✓ Patient history
- ✓ Physical exam
- ✓ Ask for crash cart
- ✓ EKG
- ✓ CXR
- ✓ Labs: CBC, coagulation profile, BMP, cardiac biomarkers, BNP
- ✓ Furosemide IV
- ✓ Reassessment of vitals
- ✓ Consults called
- ✓ Closed-loop communication
- ✓ Summarize case to team and/or consultant

CASE ONE-LINER

55-year-old male presents with worsening dyspnea

PRESENTATION

SETTING	Hospital ED
ADDITIONAL ROLES	Sim operator, sim RN, debrief manager **CONSULTANTS:** Cardiology, CCU, Radiology
PATIENT	55yo male
CHIEF COMPLAINT	"I can't breathe."
Hx of PRESENTING ILLNESS	A 55-year-old man presents to ED with acute worsening of dyspnea in past 2 hours while walking the dog. For the past 2 weeks, the patient has experienced 3-pillow-orthopnea, PND, and cough productive of frothy sputum. He additionally notes his shoes have been tight and he has gained 20 lbs in 1 month unintentionally. Denies fevers, chills, chest pain. He has never experienced this before.
ROS	(+) DOE, orthopnea, PND, LE edema, productive cough, unintentional weight gain (-) Fever, chills, chest pain
PMH/PSH	PMH: HTN PSH: None
MEDICATIONS	Lisinopril
ALLERGIES	Codeine
SOCIAL Hx	Family Hx: mom = HTN Social Hx: (-) tobacco, (+) 2-8oz beers/wk

INITIAL VITAL SIGNS

HR	BP	RR	PULSE OXIMETRY	TEMP	WEIGHT
73	172/95	30	80% on room air	98.8F	80 kg

PHYSICAL EXAM

Items in red need to be verbalized

PRIMARY SURVEY

- **None provided**

GENERAL: AAOx3, in distress

HEENT: PERRL, TM physiologic, no signs of trauma, tongue midline

NECK: +JVD to angle of mandible

CV: S1/S2, RRR, (+) S3, (+) S4. No murmurs, rubs, or gallops. PMI displaced.

PULM: Rales diffusely in bilateral lower lung fields, tachypneic

ABD: Soft, non-tender, non-distended, +BS, no CVA tenderness

EXT: Warm with 2+ pitting edema to mid-thigh bilaterally

NEURO: Moving extremities freely

PHASE 1: INITIAL PRESENTATION				
TIME	**CLINICAL PROMPT**	**EXPECTED MANAGEMENT**	**CONSEQUENCES**	**CRITICAL ACTIONS**
00:00-03:00	55yo male presents w/ dyspnea **Repeat Vital Signs (after atropine)** BP: 100/73 HR: 40 RR: 18 O2 sat: 99% on RA	• Order full set of vital signs, cardiac monitor, continuous oxygen saturation monitoring • Order 2 large bore IVs • Begin assessment of ABCs	• RN prompts, "Do you want vitals/patient on the monitor/ IV access?" if not requested	**Obtained a complete set of vital signs?** I P N **Obtained a focused history?** I P N **Performed focused physical exam?** I P N **Ordered 2-large bore IVs?** I P N **Recognized abnormal VS?** I P N

PHASE 2: REASSESSMENT AND SECONDARY INTERVENTION				
TIME	**CLINICAL PROMPT**	**EXPECTED MANAGEMENT**	**CONSEQUENCES**	**CRITICAL ACTIONS**
3:01-6:00	Patient still in respiratory distress, speaking in shorter sentences **Repeat Vital Signs (after NRB)** BP: 168/95 HR: 70 RR: 28 T: 98.8F O2 sat: 85% on RA	• Order STAT labs • Order STAT EKG • Order STAT CXR • Start patient on non-rebreather (or place on O2 nasal cannula, then escalate to non-rebreather)	• RN prompts, "Do you want any imaging/ labs?" if not requested • RN prompts, "What do you want to do about his shortness of breath?" if no action • RN prompts, "Do you want me to call anyone for help?" if no consults called	**Ordered STAT labs?** I P N **Ordered STAT CXR?** I P N **Ordered STAT EKG?** I P N **Placed on non-rebreather?** I P N

PHASE 3: REASSESSMENT, TERTIARY INTERVENTION, RESULTS, RESOLUTION				
TIME	**CLINICAL PROMPT**	**EXPECTED MANAGEMENT**	**CONSEQUENCES**	**CRITICAL ACTIONS**
6:01-10:00	AFTER appropriate intervention (ie, furosemide IV, BiPAP/CPAP), pt becomes less tachypneic, O2 sat improves **Repeat Vital Signs (after pacing)** BP: 140/90 HR: 75 RR: 18 T: 98.8F O2 sat: 95% on RA	• Order furosemide IV • Start BiPAP/CPAP • Call consultant for definitive management and admission	• After furosemide and BiPAP, RN to prompt, "Who is admitting this patient?" if no service identified	**Interpreted lab and imaging results accurately?** I P N **Started furosemide?** I P N **Escalated to NIPPV?** I P N **Called consultant?** I P N **Succinct and direct handoff to specialist?** I P N **Updated patient at any point?** I P N

PHASE 4: CONCLUSION & DEBRIEFING	
TIME	**ACTIONS**
10:00-20:00	Debrief Q&A Session/Teaching Evaluations

DEBRIEFING POINTS

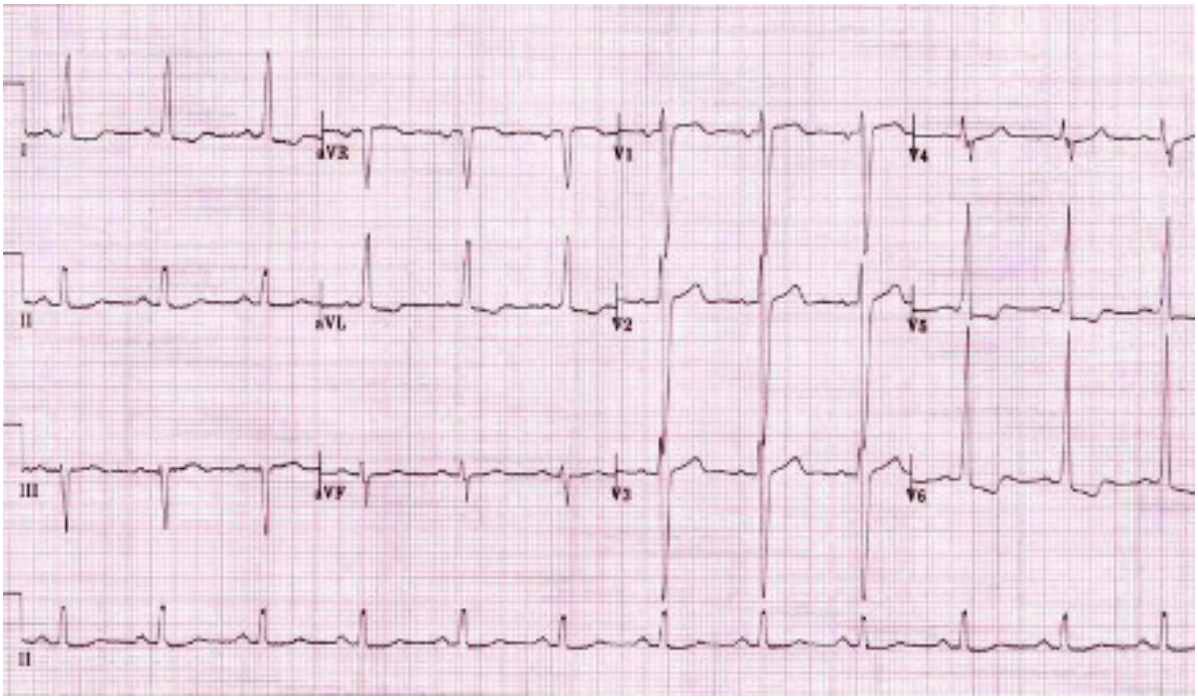
GENERAL POINTS	SCENARIO-SPECIFIC POINTS
• What went well? • What are some opportunities for improvement? • Did you identify any gaps in knowledge? • Was there any delay in treatment? • How was communication between team members?	• Oxygen supply choices in the setting of worsening dyspnea • Differential diagnosis of dyspnea • Contraindications to BiPAP (general considerations) • Treatment options for CHF exacerbation (eg, diuretics, nitrates, oxygen supplementation - including non-invasive ventilation up to intubation)

SCENARIO STIMULI

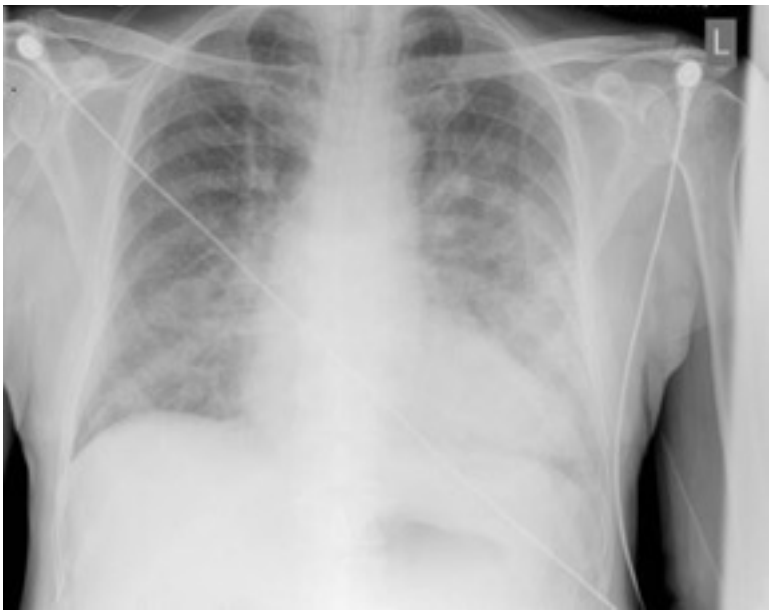
Complete Blood Count		Coagulation Profile	
WBC	10.3 (Normal 5.0 - 14.5 x 10^3/mL)	PT	12 (Normal 11-13.5 seconds)
Hemoglobin	13.7 (Normal 11.5-15.5 gm/dL)	PTT	25 (Normal 25-35 seconds)
HCT	39.5 (Normal 35%-45%)	INR	1.0 (Normal 0.8-1.1)
Platelets	260 (Normal 150-450 x 10^3/mL)		
MCV	84 (Normal 76-90 fL/red)		
Basic Metabolic Panel		**Additional Tests**	
Sodium	138 (Normal 136-145 mEQ/L)	Troponin I	0.22 (Normal < 0.08 ng/mL)
Potassium	4.5 (Normal 3.5-5.5 mEQ/L)	BNP	2000 (Normal < 100 pg/mL)
Chloride	103 (Normal 95-105 mEQ/L)		
CO_2	23 (Normal 17-29 mEQ/L)		
BUN	14 (Normal 5-20 mg/dL)		
Creatinine	0.9 (Normal 0.5-1.1 mg/dL)		
Glucose	99 (Normal 70-110 mg/dL)		

IMAGING

Representative EKG



Representative CXR



Representative POCUS

No ultrasound available

Pericardial Tamponade

Updated by Evan Strobelt, MD; Shehni Nadeem, MD

Keywords: Pericardial tamponade, shock, penetrating trauma
Procedures: Pericardiocentesis

LEARNING OBJECTIVES

1. Recognize when an adult has an immediate life-threatening condition
2. Learn to employ a systematic approach to a critically ill trauma patient
3. Create a differential diagnosis for shock in the setting of penetrating trauma
4. Identify pericardial tamponade and performance of a pericardiocentesis

CRITICAL ACTIONS

- ✓ IV access x2
- ✓ Supplemental oxygen
- ✓ Telemetry monitoring
- ✓ Patient history
- ✓ Physical exam
- ✓ Ask for crash cart
- ✓ EKG
- ✓ CXR
- ✓ Ultrasound (FAST exam)
- ✓ Labs: CBC, coagulation profile, BMP, type and cross, troponin
- ✓ Fluid administration
- ✓ Pericardiocentesis +/- pericardial window
- ✓ Tetanus vaccine
- ✓ Reassessment of vitals
- ✓ Consults called
- ✓ Closed-loop communication
- ✓ Summarize case to team and/or consultant

CASE ONE-LINER

24-year-old male presents with a stab wound to the left 3rd intercostal space at the midclavicular line

PRESENTATION

SETTING	Hospital ED
ADDITIONAL ROLES	Sim operator, sim RN, debrief manager **CONSULTANTS:** Trauma, Cardiothoracic Surgery
PATIENT	24yo male
CHIEF COMPLAINT	Stab wound to the L 3rd intercostal space at the midclavicular line
Hx of PRESENTING ILLNESS	A 24-year old male presents to the ED after suffering a stab wound to the left chest 20 minutes prior in a knife fight outside of the local grocery store. He is experiencing diffuse chest pain, left shoulder pain, and nausea. He denies any dyspnea, abdominal pain, or dizziness. He does not remember the date of his last tetanus shot.
ROS	(+) trauma to L. chest, non-radiating diffuse chest pain, left shoulder pain, shortness of breath, and nausea (-) Loss of consciousness, dyspnea, abdominal pain, dizziness, numbness, tingling
PMH/PSH	None
MEDICATIONS	None
ALLERGIES	None
SOCIAL Hx	Marijuana use

INITIAL VITAL SIGNS

HR	BP	RR	PULSE OXIMETRY	TEMP	WEIGHT
127	100/60	17	100% on room air	98.9F	80 kg

PHYSICAL EXAM

Items in red need to be verbalized

GENERAL: AAOx3, significant distress and agitation
HEENT: PERRL, no hemotympanum, tongue midline, atraumatic
NECK: +JVD, no crepitus
CV: Tachycardic, muffled heart sounds, PMI difficult to assess. Penetrating wound at L 3rd ICS at mid-clavicular line with frank bleeding. No other deformities or penetrating wounds
PULM: CTAB in all fields
ABD: Non-tender, non-distended abdomen. +BS. No rebound/guarding
EXT: 2+ pulses throughout, strength 5/5 and equal throughout
NEURO: 2+ reflexes throughout, sensation grossly normal
SKIN: 2 cm abrasion to R flank, no other penetrating injuries. Cool/clammy skin

PHASE 1: INITIAL PRESENTATION				
TIME	**CLINICAL PROMPT**	**EXPECTED MANAGEMENT**	**CONSEQUENCES**	**CRITICAL ACTIONS**
00:00-03:00	24yo male presents w/ stab wound to L chest	• Order full set of vital signs, cardiac monitor, continuous oxygen saturation monitoring • Order 2 large bore IVs • Begin assessment of ABCs	• RN prompts, "Do you want vitals/patient on the monitor/ IV access?" if not requested	**Obtained a complete set of vital signs?** I P N **Obtained a focused history?** I P N **Performed focused physical exam?** I P N **Ordered 2-large bore IVs?** I P N **Recognized abnormal VS?** I P N

PHASE 2: REASSESSMENT AND SECONDARY INTERVENTION				
TIME	**CLINICAL PROMPT**	**EXPECTED MANAGEMENT**	**CONSEQUENCES**	**CRITICAL ACTIONS**
3:01-6:00	Patient still in severe pain, thrashing on bed. Becoming more agitated/diaphoretic **Repeat Vital Signs** BP: 84/52 HR: 152 RR: 24 T: 98.8F O2 sat: 98% on RA	• Order STAT labs • Order STAT EKG • Order STAT CXR • Perform FAST US and rule out tension pneumo, but identify pericardial tamponade • Order IV fluid resuscitation • Prepare for pericardiocentesis	• RN prompts, "Do you want any imaging/ labs?" if not requested • RN prompts, "What do you want to do about his low BP?" if no action • RN prompts, "Do you want me to call anyone for help?" if no consults called	**Ordered STAT labs?** I P N **Ordered STAT CXR?** I P N **Ordered STAT EKG?** I P N **Conducted FAST?** I P N **Ordered IV fluids?** I P N **Prepared for pericardiocentesis?** I P N

PHASE 3: REASSESSMENT, TERTIARY INTERVENTION, RESULTS, RESOLUTION				
TIME	**CLINICAL PROMPT**	**EXPECTED MANAGEMENT**	**CONSEQUENCES**	**CRITICAL ACTIONS**
6:01-10:00	AFTER appropriate intervention (ie, pericardiocentesis), pt begins to calm, BP improves	• Order blood products • Call consultant for definitive management and admission • Complete secondary exam and trauma imaging (eg, CT chest/abd/pelvis)	• After pericardiocentesis, RN to prompt, "Who is admitting this patient?" if no service identified	**Ordered blood products?** I P N **Called consultant?** I P N **Succinct and direct handoff to specialist?** I P N **Interpreted FAST accurately?** I P N **Performed pericardiocentesis correctly?** I P N **Updated patient at any point?** I P N

PHASE 4: CONCLUSION & DEBRIEFING	
TIME	**ACTIONS**
10:00-20:00	Debrief Q&A Session/Teaching Evaluations

DEBRIEFING POINTS

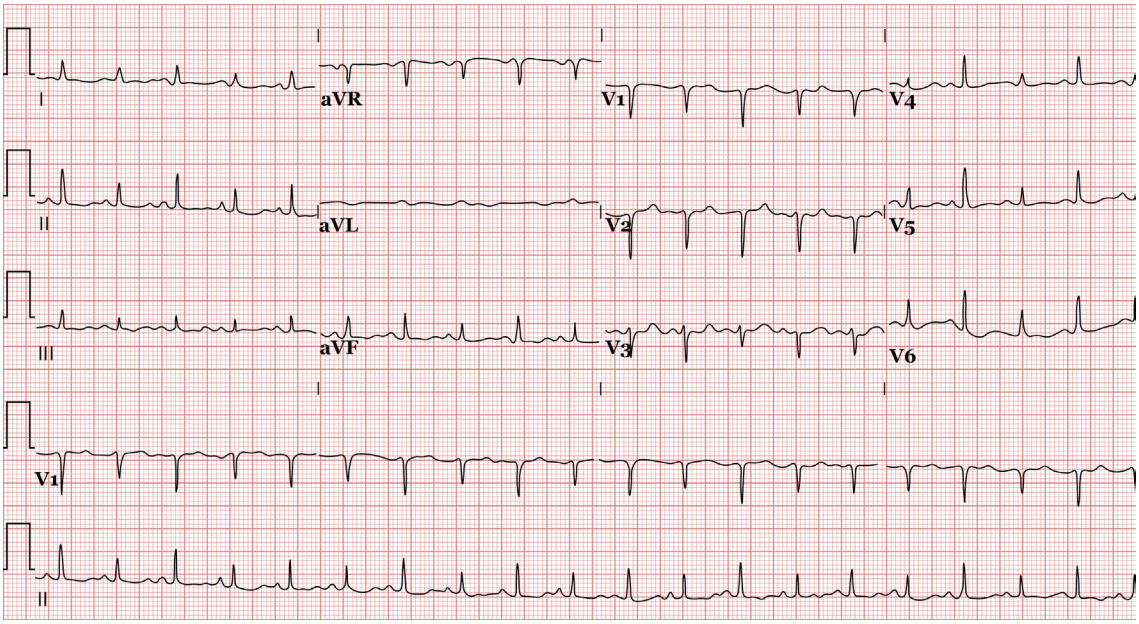
GENERAL POINTS	SCENARIO-SPECIFIC POINTS
• What went well? • What are some opportunities for improvement? • Did you identify any gaps in knowledge? • Was there any delay in treatment? • How was communication between team members?	• Fluid choices in the setting of penetrating trauma • Differential diagnosis of shock in penetrating trauma • Diagnostic adjuncts • How to perform a pericardiocentesis • For advanced learners, consider exploration of ED thoracotomy

SCENARIO STIMULI

Complete Blood Count		Coagulation Profile	
WBC	10.0 (Normal 5.0 - 14.5 x 10^3/mL)	PT	12 (Normal 11-13.5 seconds)
Hemoglobin	13.5 (Normal 11.5-15.5 gm/dL)	PTT	25 (Normal 25-35 seconds)
HCT	39.5 (Normal 35%-45%)	INR	1.0 (Normal 0.8-1.1)
Platelets	240 (Normal 150-450 x 10^3/mL)		
MCV	84 (Normal 76-90 fL/red)		
Basic Metabolic Panel		**Additional Tests**	
Sodium	136 (Normal 136-145 mEQ/L)	Troponin I	< 0.02 (Normal < 0.08 ng/mL)
Potassium	4.0 (Normal 3.5-5.5 mEQ/L)	Type/Cross	Type B Positive
Chloride	105 (Normal 95-105 mEQ/L)		
CO_2	23 (Normal 17-29 mEQ/L)		
BUN	14 (Normal 5-20 mg/dL)		
Creatinine	0.9 (Normal 0.5-1.1 mg/dL)		
Glucose	95 (Normal 70-110 mg/dL)		

IMAGING

Representative EKG



Representative CXR

Representative POCUS

Smoke Inhalation Injury

Updated by Rachel Sobolev, MD; Evan Strobelt, MD

Keywords: Fire, inhalation, smoke, burn, shortness of breath, respiratory
Procedures: Intubation
Additional Equipment: Airway box/cart

LEARNING OBJECTIVES

1. Recognize a critically ill patient and potential for impending conditions
2. Understand the potential medical complications in caring for patients in fires
3. Airway escalation and management in burn victims
4. Fluid resuscitation in burn victims
5. Indications for transfer to a burn center

CRITICAL ACTIONS

- ✓ IV access x2 large bore peripheral IVs
- ✓ Place patient on monitors with continuous oxygen saturation monitoring
- ✓ Place patient on continuous end-tidal capnography
- ✓ Ask for a full set of vital signs including HR, BP, oxygen saturation, and temperature
- ✓ Early intubation for impending respiratory compromise
- ✓ Ask for and interpret appropriate labs (VBG/ABG, co-oximetry)
- ✓ Order a CXR
- ✓ Must examine skin and airway
- ✓ Administration of IV fluids with use of Parkland formula
- ✓ Tdap administration
- ✓ Initiation of transfer to burn center
- ✓ Closed-loop communication
- ✓ Synthesis of the case
- ✓ Disclose appropriate information to the patient/family

CASE ONE-LINER

55-year-old male presents with shortness of breath following a house fire

PRESENTATION

SETTING	Hospital ED
ADDITIONAL ROLES	Sim operator, sim RN, debrief manager **CONSULTANTS:** Burn Center, Anesthesia (optional backup)
PATIENT	55yo male
CHIEF COMPLAINT	Shortness of breath for 1 hour after being in a house fire
Hx of PRESENTING ILLNESS	A 55-year-old male otherwise healthy is brought to the ED by EMS after being in a house fire while asleep. Son is in the waiting room now. EMS Report: Patient was trapped in an upstairs bedroom for 30 minutes before we were able to extricate him from the house fire. We saw a space heater that was left on and looked pretty bad. He's been coughing and complaining he's short of breath. His belly and back have some burns but he just seems to be focused on his breathing. His shirt may have caught fire; hard to say.
ROS	(+) Weakness, cough, dyspnea Denies LOC, trauma, obvious skin burns, abdominal cramps, myalgias
PMH/PSH	None
MEDICATIONS	None
ALLERGIES	None
SOCIAL Hx	Denies alcohol, tobacco, or drug use. Mother has history of DM and HTN

INITIAL VITAL SIGNS

HR	BP	RR	PULSE OXIMETRY	TEMP	WEIGHT
135	112/90	26	88%	100.5F	80 kg

PHYSICAL EXAM

Items in red need to be verbalized

PRIMARY SURVEY

- **AIRWAY:** Soot in nares, moustache, oropharynx; stridor
- **BREATHING:** Tachypnea, gasping
- **CIRCULATION:** 2+ pulses
- **DISABILITY:** Burns on torso

GENERAL: AAOx3, gasping

HEENT: Normocephalic, atraumatic, PERRL, tongue midline. Soot in posterior oropharynx. Singed nasal hairs *(must specifically look for/ask for this finding)*

NECK: No JVD, no crepitus

CV: Tachycardic, regular rhythm, no murmurs

PULM: CTAB in all fields on initial presentation, coughing, tachypnea

ABD: Soft, non-tender/non-distended, +BS

EXT: Warm, well-perfused, no edema, 2+ pulses throughout, no deformities

NEURO: Normal

GU: Normal

SKIN: 2nd and 3rd degree burns on the abdominal wall and upper back (must specifically look for/ask for this finding), insensate

PHASE 1: INITIAL PRESENTATION				
TIME	**CLINICAL PROMPT**	**EXPECTED MANAGEMENT**	**CONSEQUENCES**	**CRITICAL ACTIONS**
00:00-03:00	55-year-old male brought in with shortness of breath from a house fire	• Order full set of vital signs, cardiac monitor, continuous oxygen saturation monitoring • Place pt on continuous end-tidal capnography • Order 2 large bore IVs • Obtain a focused history and physical exam • Assess airway and identify inhalation injury • Prepare for difficult airway • Perform fiberoptic laryngoscopy and intubate (describe procedure). • Request cricothyrotomy set up to be available • Order post-intubation sedation	• RN prompts, "Do you want vitals/patient on the monitor/ IV access?" if not requested • RN prompts, "I'm worried about his breathing" if no intubation conducted; RN grows increasingly insistent on definitive airway • If direct laryngoscopy attempted, no success. If direct laryngoscopy attempted more than 2x, surgical airway will be the only method of securing the airway possible (must be described by candidate) • RN prompts, "Do you want sedation?" if post-intubation sedation not ordered	**Obtained a complete set of vital signs?** I P N **Obtained a focused history?** I P N **Performed a primary survey?** I P N **Applied supplemental O2?** I P N **Placed ETCO2 monitoring?** I P N **Recognized impending airway compromise?** I P N **Performed fiberoptic intubation?** I P N **Requested cricothyrotomy set up as backup?** I P N **Ordered post-intubation sedation?** I P N **Ordered 2-large bore IVs?** I P N **Recognized abnormal VS?** I P N

PHASE 2: REASSESSMENT AND SECONDARY INTERVENTION				
TIME	**CLINICAL PROMPT**	**EXPECTED MANAGEMENT**	**CONSEQUENCES**	**CRITICAL ACTIONS**
3:01-6:00	Patient continues to require management of burn injuries **Repeat Vital Signs (if intubated and IV fluids initiated)** BP: 115/92 HR: 100 RR: 16 Pox: 100% on vent **Repeat Vital Signs (if intubated but NO IV fluids initiated)** BP: 88/65 HR: 145 RR: 16 Pox: 100% on vent **Repeat Vital Signs (if NOT intubated at 3:01)** Cardiac arrest; unable to obtain VS	• Order STAT CXR • Order STAT EKG • Order STAT labs (including blood gas, co-oximetry) • Order tdap • Conduct thorough secondary survey • Administer IV fluids by Parkland formula calculation (must verbalize amount and rate)	• If no intubation conducted by 3:01, only cricothyrotomy possible to secure airway. • RN to prompt, "Did you want to confirm the tube?" if no CXR ordered. • RN to prompt, "Any other labs?" if no blood gas or co-oximetry ordered • RN to prompt, "How much IV fluid should I give?" if no clear order.	**Ordered STAT CXR?** I P N **Ordered STAT EKG?** I P N **Ordered STAT labs?** I P N **Ordered IV fluids?** I P N **Applied Parkland formula appropriately?** I P N **Administered tdap?** I P N

PHASE 3: REASSESSMENT, TERTIARY INTERVENTION, RESULTS, RESOLUTION				
TIME	**CLINICAL PROMPT**	**EXPECTED MANAGEMENT**	**CONSEQUENCES**	**CRITICAL ACTIONS**
6:01-10:00	Patient intubated and sedated **Repeat Vital Signs (if intubated and IV fluids initiated)** BP: 115/92 HR: 100 RR: 16 Pox: 100% on vent	• Call burn center to transfer patient and give hand off to specialist • Formulate a broad set of considerations including: CO toxicity, CN toxicity, requirement of escharotomy, etc. • Update the patient's family	• Labs result at 6:30 • RN to prompt, "Staying or going?" if no clear disposition • RN to prompt, "What did the imaging/labs show?" if no interpretation or no follow up • RN to prompt, "What's the plan with this patient? His son is asking" if no family update provided	**Formulated broad set of considerations?** I P N **Interpreted test results accurately?** I P N **Interpreted imaging correctly?** I P N **Called consultant/burn center?** I P N **Presented case to specialist succinctly and directly?** I P N **Updated patient's family at any point?** I P N

PHASE 4: CONCLUSION & DEBRIEFING	
TIME	**ACTIONS**
10:00-20:00	Debrief Q&A Session/Teaching Evaluations

DEBRIEFING POINTS

GENERAL POINTS	SCENARIO-SPECIFIC POINTS
• What went well? • What are some opportunities for improvement? • Did you identify any gaps in knowledge? • Was there any delay in treatment? • How was communication between team members?	• Airway assessment in burn victims • Airway management and escalation in burn victims • Other medical considerations in the management of burn victims (eg, CO toxicity, cyanide toxicity, etc.) • Parkland formula for fluid resuscitation • Role of antibiotics in burn victims • Transfer criteria for burn center

ORAL BOARDS PEARLS

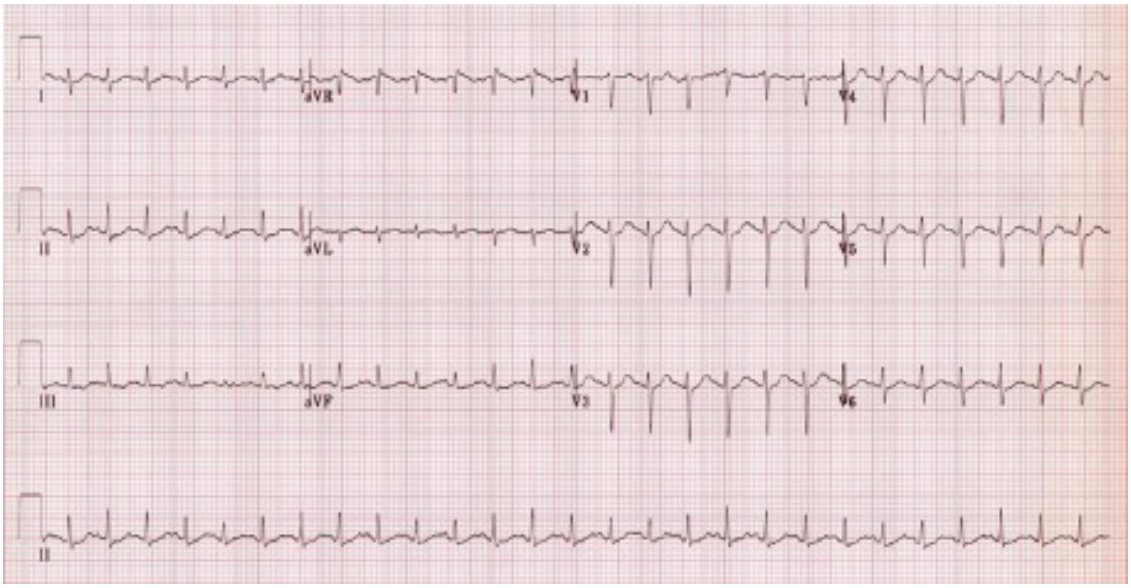
- Have a format for how you would like to approach each case
- Remember to make the patient NPO, re-assess the vital signs, re-assess after each intervention, and follow up on any studies.
- Remember to explain to the patient/family the same way you would in real life
- If the examiner attempts to cue you or ask "anything else", take a moment to synthesize what has been done to help organize your thoughts (this may be your final chance to correct something you forgot!) and ensure the examiner recorded all of your intended actions
- Remember the Tdap, post-intubation sedation, and end-tidal capnography!

SCENARIO STIMULI

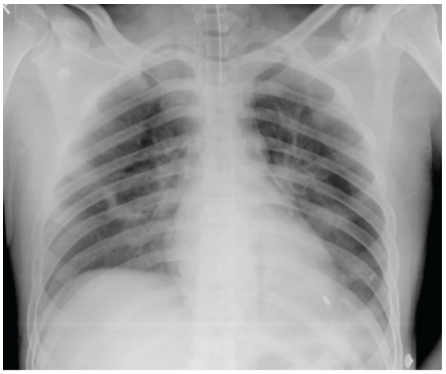
Complete Blood Count		Coagulation Profile	
WBC	10.0 (Normal 5.0 - 14.5 x 10^3/mL)	PT	12 (Normal 11-13.5 seconds)
Hemoglobin	10.5 (Normal 11.5-15.5 gm/dL)	PTT	25 (Normal 25-35 seconds)
HCT	31.5 (Normal 35%-45%)	INR	1.5 (Normal 0.8-1.1)
Platelets	220 (Normal 150-450 x 10^3/mL)		
MCV	84 (Normal 76-90 fL/red)		
Basic Metabolic Panel		**VBG with Lactate**	
Sodium	136 (Normal 136-145 mEQ/L)	pH	7.4
Potassium	4.0 (Normal 3.5-5.5 mEQ/L)	pCO2	30
Chloride	105 (Normal 95-105 mEQ/L)	pO2	62
CO_2	23 (Normal 17-29 mEQ/L)	HCO3	26
BUN	14 (Normal 5-20 mg/dL)	pO2	35
Creatinine	0.9 (Normal 0.5-1.1 mg/dL)	Lactate	1.7
Glucose	95 (Normal 70-110 mg/dL)	ADDITIONAL	
		CO	2.5
		Cyanide	Negative
		Troponin I	<0.02 (Normal <0.08 ng/mL)
		Type/Cross	Type A Negative

IMAGING

Representative EKG



Representative CXR



Anaphylaxis (Pediatric)

Updated by Valentine Alia

Keywords: Anaphylaxis, rash, shortness of breath, pediatrics
Procedures: None
Additional Equipment: Airway box/cart

LEARNING OBJECTIVES

1. Recognize when a child has an immediate life-threatening condition
2. Manage a patient with anaphylaxis
3. Create a broad differential for a patient with shortness of breath
4. Make note of pediatric dosing

CRITICAL ACTIONS

- ✓ Make patient NPO
- ✓ Treat anaphylaxis with appropriate doses of epinephrine, H1-blocker, H2-blocker, steroids
- ✓ Administer a 20 cc/kg bolus of IV fluids
- ✓ Supplemental oxygen
- ✓ Obtain pertinent history to identify anaphylaxis to peanuts
- ✓ Admit patient to pediatric ICU

ALL ACTIONS

- ✓ Obtain IV access with two large bore peripheral IVs
- ✓ Place patient on monitors with continuous oxygen saturation monitoring
- ✓ Place patient on continuous end-tidal capnography
- ✓ Ask for a full set of vital signs including HR, BP, oxygen saturation, and temperature
- ✓ Early supplemental oxygen
- ✓ Obtain history critical for identifying possible anaphylaxis
- ✓ Early administration of epinephrine
- ✓ Early administration of steroids, H1, H2 medications
- ✓ Perform a full physical exam including airway and skin
- ✓ Request airway equipment on standby
- ✓ Request a 20 cc/kg bolus of IV fluids
- ✓ Reassessment of vitals
- ✓ Appropriate disposition (Admission)
- ✓ Closed-loop communication
- ✓ Synthesis of case to admitting physician
- ✓ Disclose appropriate information to the patient/family

CASE ONE-LINER

4-year-old male presents with shortness of breath after eating his friend's wrap at lunch

PRESENTATION

SETTING	Hospital ED
ADDITIONAL ROLES	Sim operator, sim RN, debrief manager **CONSULTANTS:** Admitting physician CONFEDERATES: Mom, EMS
PATIENT	4yo male
CHIEF COMPLAINT	Shortness of breath for 15 min
Hx of PRESENTING ILLNESS	A 4-year-old male with hx of asthma is brought in by EMS from school after developing shortness of breath. EMS Report: Patient was transported from elementary school approximately 15 min after he developed some wheezing and itching of the skin. School nurse reported the child tried a bite of his friend's Thai peanut chicken wrap immediately prior to the onset of symptoms. School nurse noted a diffuse rash on the arms, legs, and trunk. School nurse said he did not have an inhaler in her office for emergency use. The child complained of nausea en route, and 2 mg ondansetron was administered en route. Mom's parking her car and followed us here. Mom: "My son has a peanut allergy. We try to be very careful! Is my son okay?"
ROS	(+) Rash, wheezing, difficulty breathing (-) Cough, nasal congestion, fever, chills
PMH/PSH	Asthma
MEDICATIONS	Albuterol
ALLERGIES	Peanut
SOCIAL Hx	NA

INITIAL VITAL SIGNS

HR	BP	RR	PULSE OXIMETRY	TEMP	WEIGHT
165	60/palp	42	89% on room air	97.8F	17 kg

PHYSICAL EXAM

Items in red need to be verbalized

PRIMARY SURVEY

- **AIRWAY:** Patent, no stridor
- **BREATHING:** Wheezing throughout, no retractions, no cyanosis
- **CIRCULATION:** 1+ distal pulses throughout, tachycardia

GENERAL: AOx3, coughing, crying, and scratching arms/legs
HEENT: PERRL/TM physiologic, no angioedema, no tongue edema)
NECK: No JVD, no crepitus
CV: Phys S1/S2. tachycardic rate, rhythm. No murmur, rubs, gallops
PULM: Diffuse wheezes. no rales/ronchi. +tachypnea
ABD: Soft, non-tender/non-distended
EXT: No edema
SKIN: Diffuse, erythematous urticarial rash on trunk and extremities

PHASE 1: INITIAL PRESENTATION				
TIME	**CLINICAL PROMPT**	**EXPECTED MANAGEMENT**	**CONSEQUENCES**	**CRITICAL ACTIONS**
00:00-03:00	4-year old male presents with SOB after eating a friend's Thai chicken peanut wrap at lunch 15 min prior	• NPO • Order full set of vital signs, cardiac monitors, continuous oxygen saturation monitoring • Order IV access • Obtain a focused history and physical examination • Supplemental oxygen • Request airway equipment to bedside in preparation • Administer IM epinephrine 0.5mg IM • Request Child Life or provide attention and care for child's concerns in a new environment	• RN prompts, "Do you want vitals/patient on the monitor/ IV access?" if not requested • RN prompts, "The child seems scared. Want me to get someone to make him feel comfortable until parents get here?" if child not addressed directly	**Obtained a complete set of vital signs?** I P N **Obtained a focused history?** I P N **Performed a focused physical exam?** I P N **Ordered 2-large bore IVs?** I P N **Recognized abnormal VS?** I P N **Applied supplemental O2?** I P N **Got airway cart for backup?** I P N **Administered epinephrine IM early?** I P N

PHASE 2: REASSESSMENT AND SECONDARY INTERVENTION				
TIME	**CLINICAL PROMPT**	**EXPECTED MANAGEMENT**	**CONSEQUENCES**	**CRITICAL ACTIONS**
3:01-6:00	**Repeat Vital Signs (if epinephrine given)** BP: 70/48 HR: 123 RR: 20 T: 97.9F Pox: 100% on NRB or 4L (otherwise sat lower) **Repeat Vital Signs (if no epi given)** BP: 40/palp HR: 55 RR: 20 T: 97.9F Pox: Undetectable	• Reassess vitals • Order IV fluids • Meds: albuterol neb, H1 blocker, H2 blocker, steroids • Administer 2nd dose of IM epinephrine	• RN to prompt, "Did you want to give any additional meds?" if no steroids or H1/H2 blockers ordered. • RN to prompt, "Did you want to give epi? Looks like he may be having an allergic reaction" if no epinephrine ordered	**Ordered adjunctive medications?** I P N **Ordered 2nd dose of epi?** I P N **Ordered IV fluids?** I P N

PHASE 3: REASSESSMENT, TERTIARY INTERVENTION, RESULTS, RESOLUTION				
TIME	**CLINICAL PROMPT**	**EXPECTED MANAGEMENT**	**CONSEQUENCES**	**CRITICAL ACTIONS**
6:01-10:00	**Repeat Vital Signs (after 2 doses epi; otherwise use previous VS)** BP: 105/72 HR: 98 RR: 18 T: 97.9F Pox: 100% on NRB	• Reassessment of vital signs and clinical status • Update parent • Call admit to PICU	• RN to prompt, "Parents are here" at 6:30 • RN to prompt, "Do we have any vital sign goals?" if no interventions • RN to prompt, "Who's admitting the patient?" if no admit called	**Ordered appropriate medications?** I P N **Presented case to specialist succinctly and directly?** I P N **Updated patient's family at any point?** I P N

PHASE 4: CONCLUSION & DEBRIEFING	
TIME	**ACTIONS**
10:00-20:00	Debrief Q&A Session/Teaching Evaluations

DEBRIEFING POINTS

GENERAL POINTS	SCENARIO-SPECIFIC POINTS
• What went well? • What are some opportunities for improvement? • Did you identify any gaps in knowledge? • Was there any delay in treatment? • How was communication between team members?	• Medication choices and delivery in anaphylaxis • Appropriate escalation of care in anaphylaxis • Differential diagnosis

ORAL BOARDS PEARLS

- Have a format for how you would like to approach each case
- Remember how to dose pediatric medications
- Remember to make the patient NPO, re-assess the vital signs, re-assess after each intervention, and follow up on any studies.
- Remember to explain to the patient/family the same way you would in real life
- If the examiner attempts to cue you or ask "anything else", take a moment to synthesize what has been done to help organize your thoughts (this may be your final chance to correct something you forgot!) and ensure the examiner recorded all of your intended actions

Asthma Exacerbation

Updated by Christopher Phillips, MD

Keywords: Asthma, respiratory distress, pulmonary, SOB
Procedures: None

LEARNING OBJECTIVES

1. Recognize when an adult has an immediate life-threatening condition
2. Diagnose asthma exacerbation
3. Manage a severe asthma exacerbation
4. Create a broad differential for a patient with shortness of breath

CRITICAL ACTIONS

- ✓ Establish large bore IV access
- ✓ Place patient on monitors with continuous oxygen saturation and vitals
- ✓ Place patient on continuous end-tidal CO2 monitoring
- ✓ Procure a detailed patient asthma history, including previous intubations
- ✓ Ask for and interpret appropriate labs (eg, CBC, blood gas, etc.)
- ✓ Request a CXR
- ✓ Administer appropriate escalating interventions for severe asthma exacerbation
- ✓ Reassess pain and vital signs
- ✓ Call appropriate consultations (pulmonary/MICU)
- ✓ Closed loop communication
- ✓ Summarize the case
- ✓ Disclose appropriate information to the patient/family

CASE ONE-LINER

28-year-old female with a history of asthma presents with acute shortness of breath

PRESENTATION

SETTING	Hospital ED
ADDITIONAL ROLES	Sim operator, sim RN, debrief manager **CONSULTANTS:** MICU, Pulmonary
PATIENT	28yo female
CHIEF COMPLAINT	"I can't breathe well!"
Hx of PRESENTING ILLNESS	A 28-year-old female history of asthma presenting to ED with SOB for 3 days. Spouse reports patient developing a "cold" that has symptoms of rhinorrhea, cough, and wheezing. She has been using her albuterol inhaler 5 times daily in addition to her nebulized treatment 3 times daily without any benefit. She has had 2 nighttime awakenings, which is unusual for her. Has previously been intubated.
ROS	(+) Dyspnea, cough, nasal congestion, increase from baseline asthma hx (-) Chest pain, orthopnea, PND, fevers, chills
PMH/PSH	Asthma
MEDICATIONS	Albuterol
ALLERGIES	NKDA
SOCIAL Hx	Dancer; does not smoke; social alcohol use; no drugs

INITIAL VITAL SIGNS

HR	BP	RR	PULSE OXIMETRY	TEMP	WEIGHT
124	133/90	35	85% on room air	98.9F	80 kg

PHYSICAL EXAM

Items in red need to be verbalized

PRIMARY SURVEY

- **AIRWAY:** Patent, able to speak some words
- **BREATHING:** Tachypnea, extracostal muscle use, no cyanosis
- **CIRCULATION:** 2+ pulses

GENERAL: AAOx3, respiratory distress
HEENT: Normal
NECK: No JVD, no crepitus
CV: Tachycardic; no murmurs, rubs, or gallops
PULM: Tachypnea, diffuse inspiratory and expiratory wheezes , shallow respirations, extracostal muscle use
ABD: Soft, non-tender/non-distended, +BS
EXT: No edema, moving symmetrically
SKIN: No rashes, mottled
NEURO: Normal

PHASE 1: INITIAL PRESENTATION				
TIME	**CLINICAL PROMPT**	**EXPECTED MANAGEMENT**	**CONSEQUENCES**	**CRITICAL ACTIONS**
00:00-03:00	28-year-old female presents to the ED with acute shortness of breath	• Order full set of vital signs, cardiac monitors, continuous pulse oximetry • Order large bore IV access • Conduct a primary survey • Place on BiPAP • Obtain a focused history and physical examination • Introduce self to the patient • Order duonebs (albuterol and ipratropium), steroids, magnesium • Place on continuous end-tidal capnography	• RN prompts, "Do you want vitals/patient on the monitor/ IV access?" if not requested • RN prompts, "Did you want to do anything for the O2 sat?" if no BiPAP ordered • RN prompts, "Did you want any other treatment?" if no magnesium ordered	**Obtained a complete set of vital signs?** I P N **Ordered 2-large bore IVs?** I P N **Recognized abnormal VS?** I P N **Placed on BiPAP?** I P N **Placed on EtCO2 monitoring?** I P N **Obtained a focused history?** I P N **Performed a focused physical exam?** I P N **Ordered albuterol/ ipratropium?** I P N **Ordered steroids?** I P N **Ordered magnesium?** I P N

PHASE 2: REASSESSMENT AND SECONDARY INTERVENTION				
TIME	**CLINICAL PROMPT**	**EXPECTED MANAGEMENT**	**CONSEQUENCES**	**CRITICAL ACTIONS**
3:01-6:00	Tachypnea continues **Repeat Vital Signs (after Mg + steroids + nebs)** BP: 125/85 HR: 128 RR: 22 Pox: 98% on BiPAP **Repeat Vital Signs (if no Mg)** BP: 100/60 HR: 124 RR: 35 Pox: 98% on BiPAP **Repeat Vital Signs (if no BiPAP)** BP: 100/60 HR: 128 RR: 40 Pox: 82% on NC/NRB	• Order STAT labs (CBC, BMP, troponin, VBG, UPT) • Order STAT EKG • Order STAT CXR • Order IV fluids • Make patient NPO • Discuss code status	• RN to prompt, "Did you want any imaging/labs?" if none ordered. • RN to prompt, "Do you want repeat vitals?" if not rechecked after treatment	**Ordered STAT labs?** I P N **Ordered STAT EKG?** I P N **Ordered STAT CXR?** I P N **Reassessed vitals after treatment?** I P N **Ordered IV fluids?** I P N **Made patient NPO?** I P N **Discussed possibility of intubation?** I P N

PHASE 3: REASSESSMENT, TERTIARY INTERVENTION, RESULTS, RESOLUTION				
TIME	**CLINICAL PROMPT**	**EXPECTED MANAGEMENT**	**CONSEQUENCES**	**CRITICAL ACTIONS**
6:01-10:00	Patient now more comfortable on BiPAP	• Call consultant • Formulate differential including: anaphylaxis, pulmonary embolus, pulmonary edema, pneumothorax, ACS, foreign body, pneumonia • Update the patient/family on results and plan • Made disposition clear (ADMIT ICU)	• Labs result at 6:30 • RN to prompt, "What did the imaging/labs show?" if no interpretation shared • RN to prompt, "Who's admitting the patient?" if no consult called • Dr. MICU to request a CXR if none ordered	**Called consultant?** I P N **Presented case to specialist succinctly and directly?** I P N **Formulated broad DDx?** I P N **Interpreted test results accurately?** I P N **Updated patient at any point?** I P N **Admitted to appropriate level of service?** I P N

PHASE 4: CONCLUSION & DEBRIEFING	
TIME	**ACTIONS**
10:00-20:00	Debrief Q&A Session/Teaching Evaluations

DEBRIEFING POINTS

GENERAL POINTS	SCENARIO-SPECIFIC POINTS
• What went well? • What are some opportunities for improvement? • Did you identify any gaps in knowledge? • Was there any delay in treatment? • How was communication between team members?	• Differential diagnosis for shortness of breath • Pharmacologic management for asthma exacerbation. • Airway adjuncts and appropriate escalation in asthma exacerbation • What to consider if intubation required for asthma exacerbation • Blood gas interpretation in asthmatics

ORAL BOARDS PEARLS

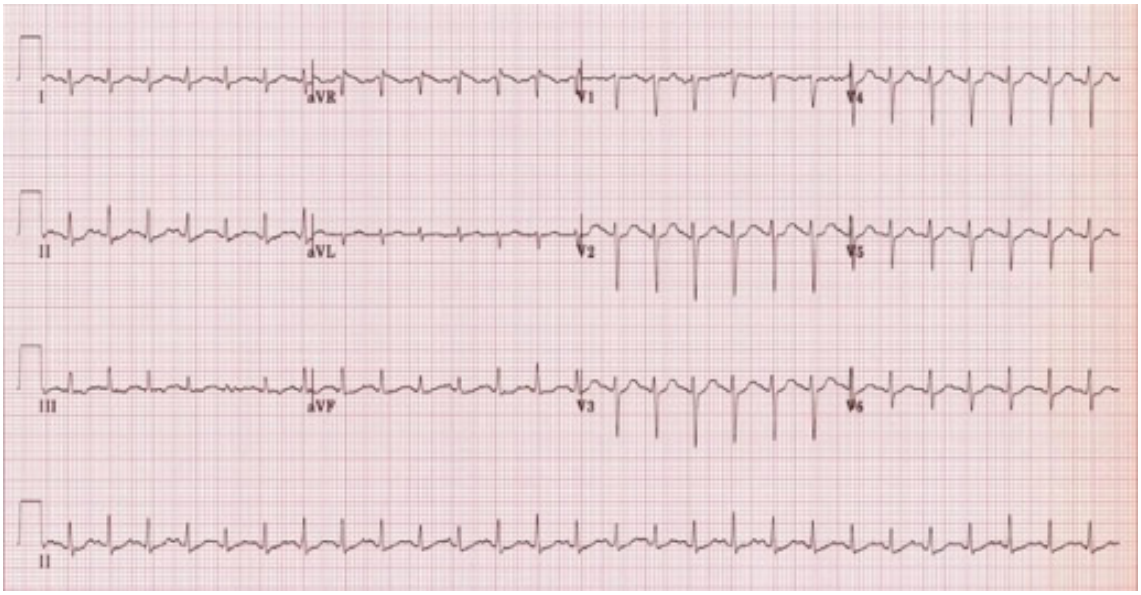
- Have a format for how you would like to approach each case
- Remember to make the patient NPO, re-assess the vital signs, re-assess after each intervention, and follow up on any studies
- Remember to explain to the patient/family the same way you would in real life
- Make sure you conduct a thorough skin and extremity exam. You don't want to miss an anaphylaxis or pulmonary embolism case
- If the examiner attempts to cue you or ask "anything else", take a moment to synthesize what has been done to help organize your thoughts (this may be your final chance to correct something you forgot!) and ensure the examiner recorded all of your intended actions

SCENARIO STIMULI

Complete Blood Count		Coagulation Profile	
WBC	10.0 (Normal 5.0 - 14.5 x 10^3/mL)	PT	12 (Normal 11-13.5 seconds)
Hemoglobin	12 (Normal 11.5-15.5 gm/dL)	PTT	30 (Normal 25-35 seconds)
HCT	36 (Normal 35%-45%)	INR	1.0 (Normal 0.8-1.1)
Platelets	220 (Normal 150-450 x 10^3/mL)		
MCV	84 (Normal 76-90 fL/red)		
Basic Metabolic Panel		**VBG**	
Sodium	140 (Normal 136-145 mEQ/L)	pH	7.29
Potassium	3.2 (Normal 3.5-5.5 mEQ/L)	pCO2	14
Chloride	100 (Normal 95-105 mEQ/L)	pO2	82
CO_2	23 (Normal 17-29 mEQ/L)	HCO3	26
BUN	14 (Normal 5-20 mg/dL)	pO2	35
Creatinine	0.9 (Normal 0.5-1.1 mg/dL)	SO2	37
Glucose	95 (Normal 70-110 mg/dL)	Lactate	2.7
		ADDITIONAL	
		Troponin I	<0.02 (Normal <0.08 ng/mL)

IMAGING

Representative EKG



Interpretation: sinus tachycardia

Representative CXR

COPD Exacerbation

Updated by Matthew Alfarano, MD

Keywords: COPD, tachypnea, respiratory distress, shortness of breath
Procedures: Intubation

LEARNING OBJECTIVES

1. Recognize when an adult has an immediate life-threatening condition
2. Manage a patient with impending respiratory distress
3. Create a broad differential for a patient with shortness of breath
4. Order appropriate studies in a short of breath patient
5. Recognize what imaging is most appropriate for the unstable patient

CRITICAL ACTIONS

- ✓ Establish large bore IV access
- ✓ Place patient on monitors with continuous oxygen saturation and vitals
- ✓ Place patient on continuous end-tidal CO2 monitoring
- ✓ Procure a detailed patient COPD history including previous intubations
- ✓ Ask for and interpret appropriate labs (e.g. CBC, blood gas, etc.)
- ✓ Request a CXR
- ✓ Administration of appropriate escalating interventions for severe COPD exacerbation
- ✓ Reassessment of patient's pain and vital signs
- ✓ Appropriate consultations called
- ✓ Closed loop communication
- ✓ Synthesis of the case
- ✓ Disclose appropriate information to the patient/family

CASE ONE-LINER

67-year-old male presents with progressive SOB

PRESENTATION

SETTING	Hospital ED
ADDITIONAL ROLES	Sim operator, sim RN, debrief manager **CONSULTANTS:** MICU, Pulmonary
PATIENT	67yo male
CHIEF COMPLAINT	Shortness of breath
Hx of PRESENTING ILLNESS	A 67-year-old man history of HFrEF (EF 35%), COPD (on 2L NC at baseline), and 80-pack year smoking history who presents to the EC with progressive SOB over 2 weeks. Associated with cough productive of thick yellow sputum. O2 requirement has increased to 4-6L NC. No sick contacts or recent travel. Denies chest pain, fevers, chills, orthopnea, PND. Brought in by son.
ROS	(+) Productive cough, change in sputum, dyspnea, increasing oxygen requirement (-) Chest pain, fevers, chills, PND, orthopnea, leg swelling, sick contacts, recent travel
PMH/PSH	COPD and HFrEF (EF 35%)
MEDICATIONS	Tiotropium Budesonide Formoterol Albuterol prn Furosemide
ALLERGIES	Penicillin (hives)
SOCIAL Hx	Denies drugs; social alcohol use 80 pack/year former smoker Fully immunized against COVID-19 (Pfizer) and influenza

INITIAL VITAL SIGNS					
HR	BP	RR	PULSE OXIMETRY	TEMP	WEIGHT
74	100/67	40	84% on 2LNC	99.8F	80 kg

PHYSICAL EXAM	
Items in red need to be verbalized	**PRIMARY SURVEY** • **AIRWAY:** Patent, unable to speak in full sentences • **BREATHING:** Tachypnea, extracostal muscle use • **CIRCULATION:** 2+ pulses, cap refill delayed **GENERAL:** AAOx3, respiratory distress, agitation **HEENT:** PERRL, normocephalic, atraumatic **NECK:** No JVD, no crepitus **CV:** Tachycardic; phys S1/S2, no murmurs, rubs, or gallops **PULM:** Diffuse wheezes throughout, shallow respirations, no rales. Using accessory muscles to breathe **ABD:** Soft, non-tender/non-distended, +BS **EXT:** 2+ pulses throughout, no edema or cyanosis **SKIN:** No rashes, no wounds **NEURO:** Normal

PHASE 1: INITIAL PRESENTATION				
TIME	**CLINICAL PROMPT**	**EXPECTED MANAGEMENT**	**CONSEQUENCES**	**CRITICAL ACTIONS**
00:00-03:00	67-year-old male presents with shortness of breath	• Order full set of vital signs, cardiac monitors, continuous pulse oximetry • Order end-tidal CO2 monitoring • Order large bore IV access • Obtain a focused history and physical examination • Initiate BiPAP • Administer duonebs • Administer steroid	• RN prompts, "Do you want vitals/patient on the monitor/ IV access?" if not requested • RN prompts, "Did you want to give any meds?" if none ordered • RN prompts, "Should I call respiratory therapy?" if no BiPAP ordered	**Obtained a complete set of vital signs?** I P N **Obtained a focused history?** I P N **Performed a focused physical exam?** I P N **Ordered 2-large bore IVs?** I P N **Recognized abnormal VS?** I P N

PHASE 2: REASSESSMENT AND SECONDARY INTERVENTION				
TIME	**CLINICAL PROMPT**	**EXPECTED MANAGEMENT**	**CONSEQUENCES**	**CRITICAL ACTIONS**
3:01-6:00	Respiratory distress continues **Repeat Vital Signs (after BiPAP)** BP: 110/70 HR: 70 RR: 36 Pox: 90% on BiPAP; agitated and fighting BiPAP **Repeat Vital Signs (if no BiPAP)** BP: 85/30 HR: 35 RR: 52 Pox: 84% on NRB; tiring and agitated	• Order STAT labs • Order STAT EKG • Order STAT VBG • Order STAT CXR • Prepare for RSI including asking for medications and equipment • Confirm code status (FULL) • Cover for possible CAP with antibiotics. Obtain cultures	• RN to prompt, "Did you want any imaging/labs?" if none ordered. • RN to prompt, "I'm worried about his breathing; what should we do if BiPAP doesn't work?" if no RSI set up • RN to prompt, "Does he need antibiotics?" if none ordered	**Ordered STAT labs/cultures?** I P N **Ordered STAT EKG?** I P N **Ordered STAT CXR?** I P N **Prepared for RSI?** I P N **Ordered antibiotics?** I P N **Confirmed code status?** I P N

PHASE 3: REASSESSMENT, TERTIARY INTERVENTION, RESULTS, RESOLUTION				
TIME	**CLINICAL PROMPT**	**EXPECTED MANAGEMENT**	**CONSEQUENCES**	**CRITICAL ACTIONS**
6:01-10:00	Patient tiring on BiPAP; worsening respiratory failure **Repeat Vital Signs (post-intubation)** BP: 115/75 HR: 70 RR: 20 Pox: 100% sat on 100% FiO2	• Perform RSI • Post-intubation sedation • Post-intubation CXR • Call consultant • Formulate differential including: COPD exacerbation, infectious, pulmonary embolism, pneumothorax, pleural effusion, pulmonary edema, anaphylaxis, etc. • Update the patient's family of plan of care • Make disposition clear (ADMIT)	• Labs result at 6:30 • RN to prompt, "Anything to help keep the patient comfortable after intubation?" if no interventions ordered • RN to prompt, "What did the imaging/labs show?" if no interpretation shared • RN to prompt, "Who's admitting the patient?" if no consult called • RN to prompt, "Do you want me to get the son from the waiting room?" if no family update provided	**Recognized impending respiratory failure and performed RSI?** I P N **Called MICU consultant?** I P N **Presented case to specialist succinctly and directly?** I P N **Formulated broad DDx?** I P N **Interpreted test results accurately?** I P N **Updated patient at any point?** I P N

PHASE 4: CONCLUSION & DEBRIEFING	
TIME	**ACTIONS**
10:00-20:00	Debrief Q&A Session/Teaching Evaluations

DEBRIEFING POINTS

GENERAL POINTS	SCENARIO-SPECIFIC POINTS
• What went well? • What are some opportunities for improvement? • Did you identify any gaps in knowledge? • Was there any delay in treatment? • How was communication between team members?	• Differential for shortness of breath • Pharmacologic management of COPD • Airway adjuncts and management in severe COPD exacerbation • Interpretation of end-tidal CO2

ORAL BOARDS PEARLS

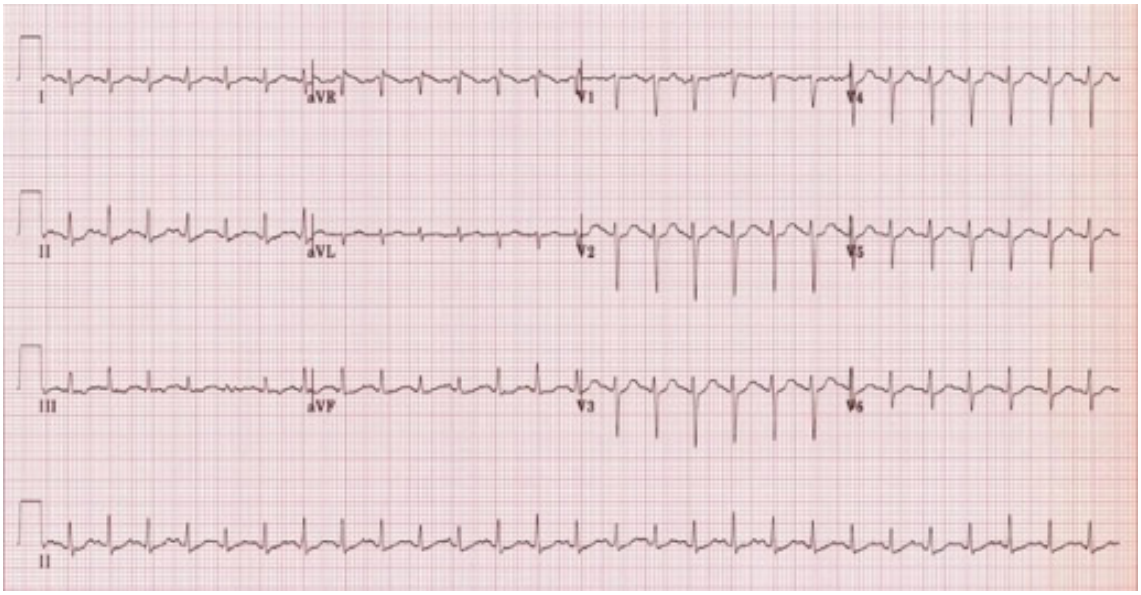
- Have a format for how you would like to approach each case
- Remember to make the patient NPO, re-assess the vital signs, re-assess after each intervention, and follow up on any studies
- Remember to explain to the patient/family the same way you would in real life
- Ensure a thorough skin and extremity exam is conducted to rule out alternative causes of respiratory distress
- If the examiner attempts to cue you or ask "anything else", take a moment to synthesize what has been done to help organize your thoughts (this may be your final chance to correct something you forgot!) and ensure the examiner recorded all of your intended actions

SCENARIO STIMULI

Complete Blood Count		Coagulation Profile	
WBC	14.0 (Normal 5.0 - 14.5 x 10^3/mL)	PT	12 (Normal 11-13.5 seconds)
Hemoglobin	11 (Normal 11.5-15.5 gm/dL)	PTT	25 (Normal 25-35 seconds)
HCT	34.5 (Normal 35%-45%)	INR	1.0 (Normal 0.8-1.1)
Platelets	220 (Normal 150-450 x 10^3/mL)		
MCV	80 (Normal 76-90 fL/red)		
Basic Metabolic Panel		**VBG**	
Sodium	136 (Normal 136-145 mEQ/L)	pH	7.21
Potassium	4.0 (Normal 3.5-5.5 mEQ/L)	pCO2	165
Chloride	105 (Normal 95-105 mEQ/L)	pO2	55
CO_2	67 (Normal 17-29 mEQ/L)	HCO3	35
BUN	14 (Normal 5-20 mg/dL)	pO2	35
Creatinine	0.9 (Normal 0.5-1.1 mg/dL)	Lactate	3.2
Glucose	95 (Normal 70-110 mg/dL)	**ADDITIONAL**	
		Troponin I	<0.02
		Type/Cross	Type A Negative
		D-dimer	Pending
		Cultures	Pending (blood, sputum, urine)

IMAGING

Representative EKG



Interpretation: sinus tachycardia

Representative CXR

Sepsis of Urinary Origin

Updated by Katie Langley, MD

Keywords: Altered mental status, urosepsis, sepsis, infection, shock
Procedures: Foley catheter, central line

LEARNING OBJECTIVES

1. Recognize when an adult has an immediate life-threatening condition
2. Manage a patient with impending shock
3. Create a broad differential for a patient with altered mental status
4. Order appropriate studies to elucidate the cause of patient's clinical deterioration
5. Recognize what imaging and labs are most appropriate for the chief complaint of altered mental status
6. Understand the treatment for sepsis

CRITICAL ACTIONS

- ✓ Obtain IV access with two large bore peripheral IVs
- ✓ Place patient on monitors with continuous oxygen saturation monitoring
- ✓ Ask for a full set of vital signs including HR, BP, oxygen saturation, and temperature
- ✓ Obtain EKG, CXR
- ✓ Recognize urinary retention and place urinary catheter
- ✓ Ask for and interpret appropriate labs (CBC, BMP, Cardiac biomarkers, UA, Urine Culture, Blood Cultures, VBG w/ lactate, procalcitonin)
- ✓ Administration of IV fluids
- ✓ Administration of antibiotics
- ✓ Recognize need for central venous catheter placement and describe procedure correctly.
- ✓ Obtain post-procedure CXR
- ✓ Reassessment of patient and vital signs
- ✓ Appropriate consultations called (MICU)
- ✓ Closed loop communication
- ✓ Synthesis of the case
- ✓ Disclose appropriate information to the patient/family

CASE ONE-LINER

87-year-old female presents with altered mental status from the nursing home with EMS

PRESENTATION

SETTING	Hospital ED
ADDITIONAL ROLES	Sim operator, sim RN, debrief manager **CONSULTANTS:** MICU
PATIENT	87yo female
CHIEF COMPLAINT	Altered mental status at nursing home
Hx of PRESENTING ILLNESS	An 87-year-old female with history of dementia brought from nursing home by EMS for altered mental status noted this morning. EMS REPORT: She reported chills, lower abdominal pain, inability to urinate, and weakness last night before bed. This morning, she did not report to breakfast. When staff went to investigate they found her still in bed, disoriented. EMS was called and transported the patient to the ED.
ROS	Unable to obtain due to AMS
PMH/PSH	Dementia, allergic rhinitis
MEDICATIONS	Donepezil, "something for allergies"
ALLERGIES	None
SOCIAL Hx	Never smoker, no drugs, no alcohol

INITIAL VITAL SIGNS

HR	BP	RR	PULSE OXIMETRY	TEMP	WEIGHT
123	80/40	28	98% on room air	101.5F	59 kg

PHYSICAL EXAM

Items in red need to be verbalized

GENERAL: Disoriented, poor skin turgor
HEENT: Normocephalic, atraumatic, PERRL/TM physiologic, dry mucous membranes
NECK: No JVD, no crepitus
CV: Tachycardic, regular rhythm, no murmurs, rubs, or gallops
PULM: CTAB in all fields, equal spontaneous respirations
ABD: Soft, suprapubic distension and tenderness, no rebound
EXT: No edema, moving all symetrically
SKIN: Mottled, delayed capillary refill, no decubitus ulcers, no rash
NEURO: Gross motor normal, CN exam normal. Does not follow commands or answer questions appropriately. Not oriented to self

PHASE 1: INITIAL PRESENTATION				
TIME	**CLINICAL PROMPT**	**EXPECTED MANAGEMENT**	**CONSEQUENCES**	**CRITICAL ACTIONS**
00:00-03:00	87-year-old female presents with altered mental status noticed by nursing home caregivers	• Order full set of vital signs, cardiac monitors, continuous pulse oximetry • Order 2 large-bore IVs • Obtain a focused history and physical examination • Introduce self to patient and EMS team • Confirm allergies • Conduct bedside US or order bladder scan to evaluation for urinary retention	• RN prompts, "Do you want vitals/patient on the monitor/ IV access?" if not requested • RN prompts, "I wonder if she's holding her urine. Looks pretty distended. Want me to bladder scan?" if none ordered or conducted	**Obtained a complete set of vital signs?** I P N **Obtained a focused history?** I P N **Performed a focused physical exam?** I P N **Ordered 2-large bore IVs?** I P N **Recognized abnormal VS?** I P N **Recognized possible urinary retention?** I P N

PHASE 2: REASSESSMENT AND SECONDARY INTERVENTION				
TIME	**CLINICAL PROMPT**	**EXPECTED MANAGEMENT**	**CONSEQUENCES**	**CRITICAL ACTIONS**
3:01-6:00	Pt remains in severe pain, groaning, disoriented **Repeat Vital Signs (after IVF bolus)** BP: 88/50 HR: 100 RR: 20 Pox: 99% on RA or 2LNC **Repeat Vital Signs (if no IV fluids)** BP: 60/40 HR: 148 RR: 28 Pox: 97% on RA or 2LNC If acetaminophen administered, repeat temp 99.0F	• Order STAT labs (CBC, BMP, urinalysis, urine culture, blood cultures x 2, VBG, procalcitonin, troponin, etc.) • Order STAT EKG • Order STAT CXR • Order STAT head CT w/o contrast • Order IV fluid resuscitation • Place Foley catheter • Order IV antibiotics (vancomycin + cefepime or equivalent) • Confirm code status (patient is FULL code)	• RN to prompt, "Did you want any imaging/ labs?" if none ordered. • RN to prompt, "I saw Dr. EMRA place a Foley catheter for this once" if no Foley placed • RN to prompt, "Did you want any treatment for the BP?" if no IV fluids ordered • RN to prompt, "Seems like there is a lot going on. Is she full code?" if no code status discussion or confirmation conducted	**Ordered STAT labs?** I P N **Ordered STAT EKG?** I P N **Ordered STAT CXR?** I P N **Ordered STAT head CT?** I P N **Placed Foley catheter?** I P N **Ordered IV fluids?** I P N **Ordered appropriately broad-spectrum antibiotics?** I P N **Confirmed code status?** I P N

PHASE 3: REASSESSMENT, TERTIARY INTERVENTION, RESULTS, RESOLUTION				
TIME	**CLINICAL PROMPT**	**EXPECTED MANAGEMENT**	**CONSEQUENCES**	**CRITICAL ACTIONS**
6:01-10:00	Patient disoriented; grows more alert after ABx begin but still disoriented **Repeat Vital Signs (after norepinephrine)** BP: 100/50 HR: 105 RR: 20 Pox: 99% sat on RA or 2LNC	• Formulate differential including: infectious, toxidrome, neurological, endocrine, etc. • Place central venous catheter (must describe procedure) • Start appropriate vasopressor (norepinephrine) • Ordered post-procedure CXR • Call appropriate consultants • Provide update to family/ nursing home	• Labs result at 7:00 • RN to prompt, "What did the imaging/ labs show?" if no interpretation shared • RN to prompt, "I wonder if infection could cause her AMS?" if DDx does not include sepsis • RN to prompt, "Do you want any medications?" if no ABx or vasopressor ordered • RN to prompt, "Doesn't seem like she's getting better with the fluids" if no CVC placed • RN to prompt, "How can we verify the location of the line?" if no post-procedure imaging ordered • RN to prompt, "Who's admitting the patient?" if no consult called	**Formulated broad DDx?** I P N **Interpreted test results accurately?** I P N **Ordered broad-spectrum IV antibiotics?** I P N **Accurately described central line placement?** I P N **Central line placed?** I P N **Ordered post-procedure CXR?** I P N **Updated patient/family/ nursing home at any point?** I P N **Called MICU?** I P N **Presented case to specialist succinctly and directly?** I P N

PHASE 4: CONCLUSION & DEBRIEFING	
TIME	**ACTIONS**
10:00-20:00	Debrief Q&A Session/Teaching Evaluations

DEBRIEFING POINTS

GENERAL POINTS	SCENARIO-SPECIFIC POINTS
• What went well? • What are some opportunities for improvement? • Did you identify any gaps in knowledge? • Was there any delay in treatment? • How was communication between team members?	• Differential for altered mental status in a geriatric patient • Management of sepsis in terms of IV fluids, antibiotics, and vasopressors • Central line placement and troubleshooting • Discuss role of POCUS

ORAL BOARDS PEARLS

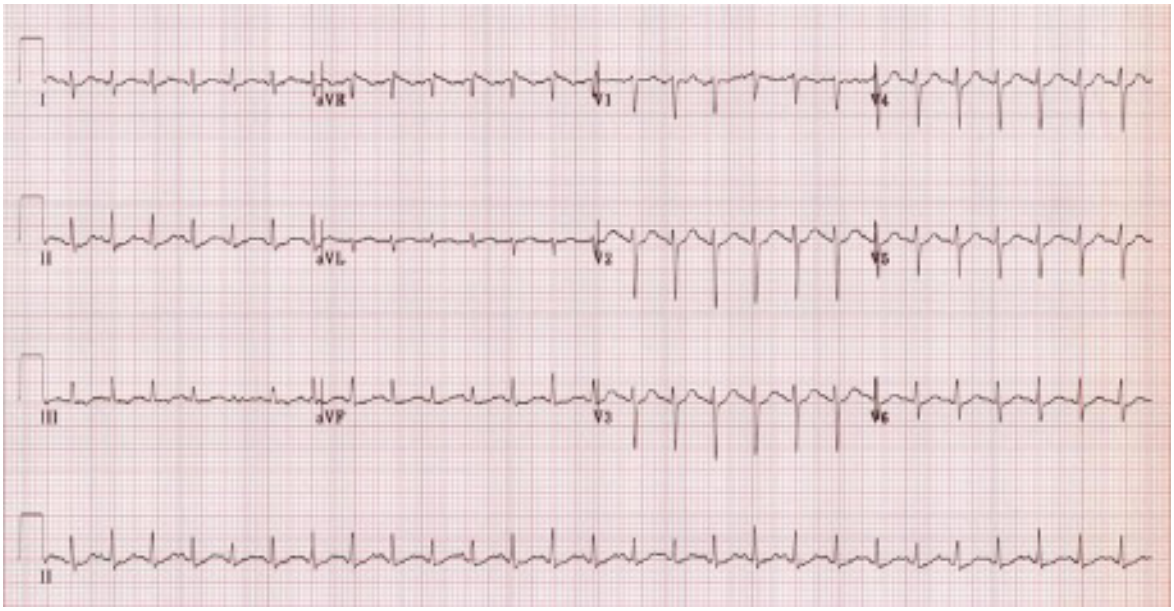
- Have a format for how you would like to approach each case
- Remember to make the patient NPO, re-assess the vital signs, re-assess after each intervention, and follow up on any studies
- Remember to explain to the patient/family the same way you would in real life
- Ensure a thorough skin and extremity exam is conducted for any sources of infection (eg, decubitus ulcer)
- If the examiner attempts to cue you or ask "anything else", take a moment to synthesize what has been done to help organize your thoughts (this may be your final chance to correct something you forgot!) and ensure the examiner recorded all of your intended actions

SCENARIO STIMULI

Complete Blood Count		VBG	
WBC	24.0 (Normal 5.0 - 14.5 x 10^3/mL)	pH	7.20
Hemoglobin	12.5 (Normal 11.5-15.5 gm/dL)	pCO2	32
HCT	40.5 (Normal 35%-45%)	pO2	82
Platelets	220 (Normal 150-450 x 10^3/mL)	SO2	57
MCV	84 (Normal 76-90 fL/red)	Lactate	3.7
Basic Metabolic Panel		**Urinalysis**	
Sodium	136 (Normal 136-145 mEQ/L)	Color	Yellow, hazy (Normal: Yellow)
Potassium	4.0 (Normal 3.5-5.5 mEQ/L)	Specific Gravity	1.005 (Normal 1.005-1.030)
Chloride	105 (Normal 95-105 mEQ/L)	pH	6 (Normal 5.5 - 7.5)
CO_2	14 (Normal 17-29 mEQ/L)	Blood	Negative (Normal: Negative)
BUN	89 (Normal 5-20 mg/dL)	Nitrate	2+ (Normal: Negative)
Creatinine	2.14 (Normal 0.5-1.1 mg/dL)	Leukocyte Esterase	3+ (Normal: Negative)
Glucose	125 (Normal 70-110 mg/dL)	Bacteria	3+ (Normal: None)
Fingerstick Glucose	139 (Normal: 70-110 mg/dL)	Troponin I	<0.02
Troponin I	<0.03 (Normal: <0.08 ng/mL)	WBC	1164
Acetaminophen	Negative	RBC	25
Salicylate	Negative		

IMAGING

Representative EKG



Interpretation: Sinus tachycardia

Representative CXR

Representative CT

Obstructive Nephrolithiasis

Updated by Michelle Hughes, MD

Keywords: Nephrolithiasis, kidney stone, flank pain
Procedures: None

LEARNING OBJECTIVES

1. Create a differential for flank pain
2. Order appropriate studies to elucidate the cause of the patient's flank pain
3. Recognize what imaging is most appropriate for diagnosis of obstructive nephrolithiasis
4. Discuss management of obstructive nephrolithiasis

CRITICAL ACTIONS

- ✓ Obtain IV access with a large-bore peripheral IV
- ✓ Place patient on monitors with continuous oxygen saturation and vital monitoring
- ✓ Ask for a full set of vital signs including HR, BP, oxygen saturation, and temperature
- ✓ Obtain EKG
- ✓ Ask for and interpret appropriate labs (CBC, Cardiac Biomarkers, Chemistry, LFTs, Lipase, UA, and Urine Culture)
- ✓ Administration of IV fluids
- ✓ Administration of analgesics
- ✓ Request imaging- CT or US
- ✓ Reassessment of patient's pain and vital signs
- ✓ Appropriate consultations called (urology)
- ✓ Closed loop communication
- ✓ Synthesis of the case
- ✓ Disclose appropriate information to the patient/family
- ✓ Summary of case to team or consultant

CASE ONE-LINER

45-year-old male presents with flank pain

PRESENTATION

SETTING	Hospital ED
ADDITIONAL ROLES	Sim operator, sim RN, debrief manager **CONSULTANTS:** Urology, Cardiology (for preclinical students)
PATIENT	45yo male
CHIEF COMPLAINT	Left-sided flank pain
Hx of PRESENTING ILLNESS	A 45-year-old male, otherwise healthy, presents to the ED with sudden onset 10/10 sharp left flank pain radiating to the right groin that started 1 hour ago. It varies in intensity, "comes in waves," and he has associated nausea and vomiting. Patient also notes 1 episode of hematuria. Has never had a similar episode before.
ROS	(+) Flank pain, nausea and vomiting, hematuria (-) Diarrhea, constipation, CP, dyspnea, fever or chills.; no dysuria
PMH/PSH	Laparoscopic cholecystectomy
MEDICATIONS	None
ALLERGIES	None
SOCIAL Hx	Father with DM; married; no smoking, no drugs, occasional alcohol

INITIAL VITAL SIGNS

HR	BP	RR	PULSE OXIMETRY	TEMP	WEIGHT
122	150/90	22	98% on room air	98.7F	80 kg

PHYSICAL EXAM

Items in red need to be verbalized

GENERAL: AAOX3,laying down clutching left side
HEENT: PERRL, normocephalic, atraumatic, tongue midline
NECK: No JVD, no crepitus
CV: Tachycardic, regular rhythm, no murmurs, rubs, or gallops
PULM: CTAB in all fields, no tachypnea
ABD: Soft, nontender/non-distended. L CVA TTP. +BS
GU: Physiologic scrotum, penis, and perineum; no testicular tenderness
EXT: No edema. 2+ pulses throughout, strength 5/5 and equal throughout
SKIN: No rashes or ecchymosis
NEURO: Normal

PHASE 1: INITIAL PRESENTATION				
TIME	**CLINICAL PROMPT**	**EXPECTED MANAGEMENT**	**CONSEQUENCES**	**CRITICAL ACTIONS**
00:00-03:00	45-year old male presents with sudden onset L flank pain	• Order full set of vital signs, cardiac monitors, continuous pulse oximetry • Order large-bore IVs • Obtain a focused history and physical examination • Introduce self to patient and EMS team • Ask pt about social history and allergies • Introduce self to pt	• RN prompts, "Do you want vitals/patient on the monitor/ IV access?" if not requested	**Obtained a complete set of vital signs?** I P N **Obtained a focused history?** I P N **Performed a focused physical exam?** I P N **Ordered large bore IV?** I P N **Recognized abnormal VS?** I P N **Confirmed pt allergies?** I P N

PHASE 2: REASSESSMENT AND SECONDARY INTERVENTION				
TIME	**CLINICAL PROMPT**	**EXPECTED MANAGEMENT**	**CONSEQUENCES**	**CRITICAL ACTIONS**
3:01-6:00	Pt remains in severe pain, groaning **Repeat Vital Signs (with analgesia)** BP: 130/80 HR: 104 RR: 18 T: 98.8F Pox: 98% on RA	• Order STAT labs including UA • Order STAT EKG • Order IV fluid resuscitation • Order analgesia • Order antiemetics • Order imaging for diagnosis of kidney stones (CT or US)	• RN to prompt, "Did you want any imaging/ labs?" if none ordered. • RN to prompt, "Did you want any treatment for the HR, his nausea, or his pain?" if no IVF, antiemetics, or analgesia ordered	**Ordered STAT labs?** I P N **Ordered STAT UA?** I P N **Ordered STAT EKG?** I P N **Ordered IV fluids?** I P N **Ordered analgesia and antiemetic?** I P N **Ordered appropriate diagnostic imaging?** I P N

PHASE 3: REASSESSMENT, TERTIARY INTERVENTION, RESULTS, RESOLUTION				
TIME	**CLINICAL PROMPT**	**EXPECTED MANAGEMENT**	**CONSEQUENCES**	**CRITICAL ACTIONS**
6:01-10:00	Patient slightly more comfortable with interventions *If no interventions conducted, patient should grow angry*	• Call consultant (Urologist to ask if this patient can go home) • Formulate differential including: obstructive nephrolithiasis, pyelonephritis, aortic pathology, torsion, ACS, MSK back pain, etc. • Update the patient of results and plan • Make disposition clear (ADMIT)	• Labs result at 6:30 • RN to prompt, "Staying or going?" if no clear disposition • RN to prompt, "What did the imaging/labs show?" if no interpretation shared • RN to prompt, "What's the plan?" if no consult called • RN to prompt, "Could this be a kidney stone?" if DDx does not include kidney stone	**Formulated broad DDx?** I P N **Interpreted test results accurately?** I P N **Called consultant?** I P N **Presented case to specialist succinctly and directly?** I P N **Updated patient at any point?** I P N **Made disposition clear?** I P N

PHASE 4: CONCLUSION & DEBRIEFING	
TIME	**ACTIONS**
10:00-20:00	Debrief Q&A Session/Teaching Evaluations

DEBRIEFING POINTS

GENERAL POINTS	SCENARIO-SPECIFIC POINTS

• What went well?
• What are some opportunities for improvement?
• Did you identify any gaps in knowledge?
• Was there any delay in treatment?
• How was communication between team members?
	• Differential for flank/back pain
	• Medication choices in suspected obstructive nephrolithiasis
	• Appropriate imaging and lab diagnostics. Include a discussion of POCUS
	• Treatment and management options for obstructive nephrolithiasis
	  • When do patients need to be admitted and when can they be discharged home?
	  • What is the likelihood of stones passing on their own?

ORAL BOARDS PEARLS

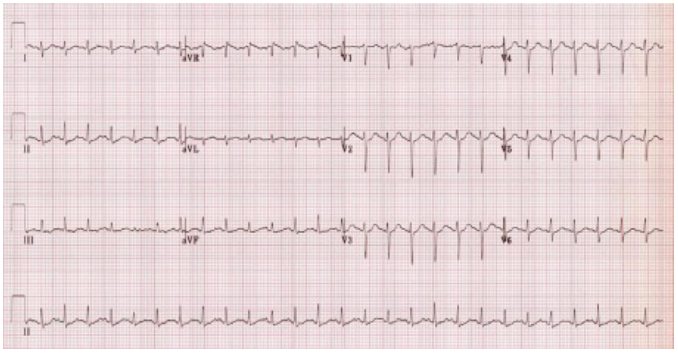
- Have a format for how you would like to approach each case
- Remember to make the patient NPO, re-assess the vital signs, re-assess after each intervention, and follow up on any studies
- Remember to explain to the patient/family the same way you would in real life
- If the examiner attempts to cue you or ask "anything else", take a moment to synthesize what has been done to help organize your thoughts (this may be your final chance to correct something you forgot!) and ensure the examiner recorded all of your intended actions
- Make sure you consider GU pathology such as testicular torsion and perform the associated GU exam

SCENARIO STIMULI

Complete Blood Count		Coagulation Profile	
WBC	10.0 (Normal 5.0 - 14.5 x 10^3/mL)	PT	12 (Normal 11-13.5 seconds)
Hemoglobin	13.8 (Normal 11.5-15.5 gm/dL)	PTT	25 (Normal 25-35 seconds)
HCT	41 (Normal 35%-45%)	INR	1.0 (Normal 0.8-1.1)
Platelets	220 (Normal 150-450 x 10^3/mL)	SO2	57
MCV	84 (Normal 76-90 fL/red)		
Basic Metabolic Panel		**Urinalysis**	
Sodium	137 (Normal 136-145 mEQ/L)	Hemoglobin	Positive
Potassium	4.0 (Normal 3.5-5.5 mEQ/L)	RBC	> 50
Chloride	105 (Normal 95-105 mEQ/L)	LE	Negative
CO_2	23 (Normal 17-29 mEQ/L)	Nitrites	Negative
BUN	15 (Normal 5-20 mg/dL)	WBC	11
Creatinine	2.2 (Normal 0.5-1.1 mg/dL)	Bacteria	None
Glucose	97 (Normal 70-110 mg/dL)		

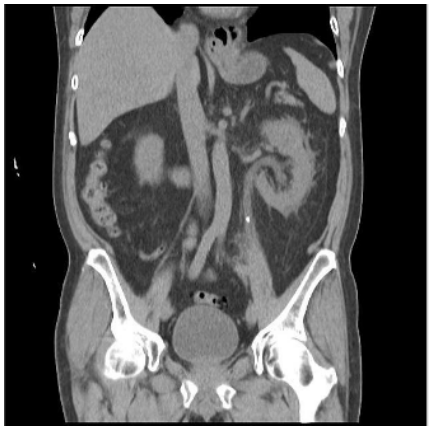
IMAGING

Representative EKG

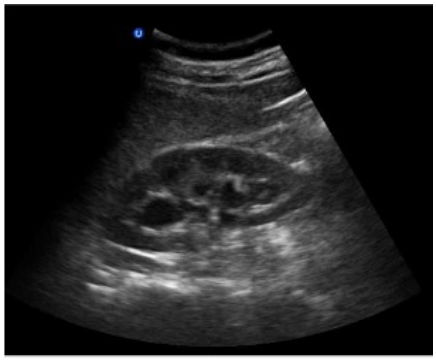


Interpretation: Sinus tachycardia

Representative CT



Representative US



Ethylene Glycol Toxicity

Updated by Emily Ollmann, MD

Keywords: Ingestion, ethylene glycol, altered mental status, anion gap acidosis, toxicology
Procedures: None

LEARNING OBJECTIVES

1. Recognize when an adult has an immediate life-threatening condition
2. Manage an altered patient with unknown ingestion
3. Create a broad differential for a patient with unknown ingestion
4. Order appropriate studies to elucidate the cause of patient's clinical condition
5. Be able to calculate and interpret anion and osmolar gap

CRITICAL ACTIONS

- ✓ Obtain IV access with two large bore peripheral IVs
- ✓ Supplemental oxygen
- ✓ Place patient on monitors with continuous oxygen saturation monitoring
- ✓ Ask for a full set of vital signs including HR, BP, oxygen saturation, and temperature
- ✓ Obtain EKG
- ✓ Ask for and interpret appropriate labs including acetaminophen, salicylate, and toxic alcohols.
- ✓ Administer IV fluids
- ✓ Administer fomepizole IV
- ✓ Reassess patient and vital signs
- ✓ Call appropriate consultations: poison center/toxicology, admitting physician
- ✓ Closed loop communication
- ✓ Synthesis of the case
- ✓ Disclose appropriate information to the patient/family

CASE ONE-LINER

41-year-old male brought in with altered mental status and shortness of breath

PRESENTATION

SETTING	Hospital ED
ADDITIONAL ROLES	Sim operator, sim RN, debrief manager **CONSULTANTS:** Poison Control/Toxicology, Admitting Physician
PATIENT	41yo male
CHIEF COMPLAINT	Shortness of breath
Hx of PRESENTING ILLNESS	A 41-year-old male is brought to the EC after his co-worker found him breathing rapidly in an auto mechanic shop. EMS REPORT: 41-year-old male who is a recovering alcoholic was found laying on the ground disoriented and short of breath. His co-worker found him on scene with a bottle of something sweet next to him. He has not vomited.
ROS	Unable to obtain due to AMS
PMH/PSH	Schizophrenia
MEDICATIONS	Oxycodone
ALLERGIES	Penicillin - hives
SOCIAL Hx	Alcohol – Former heavy use – three 16-pack of beers daily – stopped 1 month prior Former smoker – 30-pack/year history Former prescription drug abuse – oxycodone – has recently stopped 1 month prior

INITIAL VITAL SIGNS

HR	BP	RR	PULSE OXIMETRY	TEMP	WEIGHT
73	105/68	24	91% on room air	97.8F	85 kg

PHYSICAL EXAM

Items in red need to be verbalized

PRIMARY SURVEY

- **AIRWAY:** Patent, + gag reflex
- **BREATHING:** + Spontaneous respirations, mild tachypnea, no cyanosis
- **CIRCULATION:** 2+ distal pulses, dry skin

GENERAL: AAOX0, distracted, nonsensical statements

HEENT: Normocephalic, atraumatic, PERRL/TM physiologic, no nystagmus, tongue midline, no tongue fasciculations

NECK: No JVD, no crepitus

CV: RRR. Phys S1/S2. No murmurs, rubs, gallops

PULM: Tachypneic, CTAB in all fields

ABD: Soft, nontender/non-distended, +BS

EXT: No edema, moving symetrically

SKIN: No rashes, warm, dry

NEURO: No clonus, no rigidity; strength and sensation normal

PHASE 1: INITIAL PRESENTATION				
TIME	**CLINICAL PROMPT**	**EXPECTED MANAGEMENT**	**CONSEQUENCES**	**CRITICAL ACTIONS**
00:00-03:00	41-year-old male presents to the EC with altered mental status and shortness of breath	• Order full set of vital signs, cardiac monitors, continuous pulse oximetry • Order large-bore IVs • Obtain a focused history and physical examination • Start pt on supplemental oxygen • Determine that a potentially toxic ingestion has taken place • Obtained early fingerstick glucose	• RN prompts, "Do you want vitals/patient on the monitor/ IV access?" if not requested • RN prompts, "Do you want to start supplemental oxygen?" if not conducted • RN prompts, "Was he drinking alcohol again? I've seen this patient before!" if toxicological ingestion not identified on differential	**Obtained a complete set of vital signs?** I P N **Obtained a focused history?** I P N **Performed a focused physical exam?** I P N **Ordered large bore IVs?** I P N **Recognized abnormal VS?** I P N **Initiated supplemental O2?** I P N **Considered toxidrome on differential diagnosis?** I P N **Obtained early fingerstick glucose?** I P N

PHASE 2: REASSESSMENT AND SECONDARY INTERVENTION				
TIME	**CLINICAL PROMPT**	**EXPECTED MANAGEMENT**	**CONSEQUENCES**	**CRITICAL ACTIONS**
3:01-6:00	Persisten altered mental state **Repeat Vital Signs (with NRB and IVF** BP: 123/70 HR: 80 RR: 16 T: 98.3F Pox: 99% on NRB	• Order STAT labs (must include acetaminophen, salicylate, serum osm, ethanol level, and toxic alcohol panel) • Order STAT EKG • Order STAT CXR • Order IV fluid resuscitation • Order thiamine, pyridoxine, magnesium IV • Ordered CT head given "found down"	• RN to prompt, "Did you want any imaging/ labs?" if none ordered. • RN to prompt, "Do we need ingestion labs?" if toxidrome labs not ordered	**Ordered appropriate STAT labs?** I P N **Ordered STAT EKG?** I P N **Ordered STAT CXR?** I P N **Ordered IV fluids?** I P N **Ordered CT head?** I P N **Ordered thiamine, pyridoxine, magnesium?** I P N

PHASE 3: REASSESSMENT, TERTIARY INTERVENTION, RESULTS, RESOLUTION				
TIME	**CLINICAL PROMPT**	**EXPECTED MANAGEMENT**	**CONSEQUENCES**	**CRITICAL ACTIONS**
6:01-10:00	Patient still disoriented	• Calculate anion gap • Calculate osmolar gap • Order IV fomepizole • Call consultant • Formulate differential including: toxic alcohol ingestion, intracranial process, neurologic, infectious, metabolic, etc. • Either poison control or toxicology called • MICU called for admit	• Labs result at 6:30 • RN to prompt, "Do we have any reversal meds?" if no interventions • RN to prompt, "What did the imaging/ labs show?" if no interpretation shared • RN to prompt, "Who's admitting this patient?" if no consult called	**Calculated anion gap?** I P N **Calculated osmolar gap?** I P N **Ordered appropriate IV meds?** I P N **Called consultant?** I P N **Presented case to specialist succinctly and directly?** I P N **Formulated broad DDx?** I P N **Interpreted test results accurately?** I P N **Appropriate disposition?** I P N

PHASE 4: CONCLUSION & DEBRIEFING	
TIME	**ACTIONS**
10:00-20:00	Debrief Q&A Session/Teaching Evaluations

DEBRIEFING POINTS

GENERAL POINTS	SCENARIO-SPECIFIC POINTS
• What went well? • What are some opportunities for improvement? • Did you identify any gaps in knowledge? • Was there any delay in treatment? • How was communication between team members?	• Indications for hemodialysis • Pharmacologic management of ethylene glycol toxicity • Differential diagnosis in the disoriented ingestion patient • Calculation of anion gap and osmolar gap

ORAL BOARDS PEARLS

- Have a format for how you would like to approach each case
- Make sure you consider alternate causes of AMS
- Make sure you order co-ingestion workup
- Remember to administer the co-factors along with the antidote
- Remember to make the patient NPO, re-assess the vital signs, re-assess after each intervention, and follow up on any studies
- Remember to explain to the patient/family the same way you would in real life
- If the examiner attempts to cue you or ask "anything else", take a moment to synthesize what has been done to help organize your thoughts (this may be your final chance to correct something you forgot!) and ensure the examiner recorded all of your intended actions

SCENARIO STIMULI

Complete Blood Count		Coagulation Profile	
WBC	10.0 (Normal 5.0 - 14.5 x 10^3/mL)	PT	12 (Normal 11-13.5 seconds)
Hemoglobin	12.5 (Normal 11.5-15.5 gm/dL)	PTT	27 (Normal 25-35 seconds)
HCT	38 (Normal 35%-45%)	INR	1.0 (Normal 0.8-1.1)
Platelets	150 (Normal 150-450 x 10^3/mL)		
MCV	84 (Normal 76-90 fL/red)		
Basic Metabolic Panel		**VBG**	
Sodium	132 (Normal 136-145 mEQ/L)	pH	7.29
Potassium	4.0 (Normal 3.5-5.5 mEQ/L)	pCO2	63
Chloride	87 (Normal 95-105 mEQ/L)	pO2	60
CO_2	28 (Normal 17-29 mEQ/L)	Lactate	2.5
BUN	40 (Normal 5-20 mg/dL)	**Liver Function Tests**	
Creatinine	0.9 (Normal 0.5-1.1 mg/dL)	ALT	50 (Normal 10-130 U/L)
Glucose	80 (Normal 70-110 mg/dL)	AST	58 (Normal 10-34)
Posm	310	Alk Phos	130 (Normal 24-147 U/L)
UDS		Bilirubin	0.2 (Normal 0-0.8 mg/dL)
THC	Negative	Albumin	2.5 (Normal 2.4-4 g/dL)
Cocaine	Negative	**Additional**	
Opioids	Positive	Acetaminophen	Undetectable
Amphetamines	Negative	Salicylate	Undetectable
PCP	Negative	Ethanol	Undetectable
Urinalysis		**Toxic Alcohol Panel**	
Color	Yellow	Methanol	Undetectable
Clarity	Hazy	Isopropyl alcohol	Undetectable
Specific grav	1.008	Ethylene glycol	65 mg/dL
pH	7.0		
Leukoesterase	Negative		
Nitrates	Negative		
Protein	0		
Glucose	0		
Ketones	Negative		
Urobilinogen	Negative		
Bilirubin	Negative		
Hemoglobin	Negative		
WBC	0		
RBC	0		
Bacteria	Not seen		
Squam epi cells	Not seen		
Other	+ Envelope crystals, UV fluorescent urine		

IMAGING

Representative EKG