SIMULATION

In-Flight Emergency: Altered Mental Status Secondary to Hypoglycemia

Nichole Niknafs, DO*, Robert Katzer, MD^ and Alisa Wray, MD^

*Arrowhead Regional Medical Center, Department of Emergency Medicine, Colton, CA

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

Correspondence should be addressed to Alisa Wray, MD at awray@uci.edu

Submitted: May 14, 2018; Accepted: June 22, 2018; Electronically Published: July 15, 2018; https://doi.org/10.21980/J84M01

ABSTRACT:

Audience: This simulation is appropriate for all emergency medicine learners from medical students to senior residents.

Introduction: It has been reported that 1 in every 10,000 to 40,000 passengers on board of a commercial airline will have a medical emergency while in- flight.[1] That is roughly 1 out of every 600 flights.[2] Many healthcare providers are unaware of the available medical equipment, effects of cabin pressure, and resulting opportunities for medical intervention. But physicians on board may be asked to render medical care for passengers experiencing medical emergencies in-flight. It is important for healthcare providers to be familiar with the most common in-flight medical emergencies and how to best address them.

One common emergency that occurs during air travel is hypoglycemia in insulin dependent diabetic patients.[3] It has been noted that changes in air and cabin pressures affect the amount of insulin secreted from insulin pumps. One article explains that as the airplane ascends, ambient pressure decreases and air comes out of solution, forming bubbles.[3] These bubbles displace insulin in a pump, causing excess delivery.[3] Excess insulin delivered during ascent in an airplane may cause hypoglycemia 1-2 hours later while in flight.[1,3] The United States Food and Drug Administration states that it addresses such malfunction during the manufacturing of insulin pumps.[3,4] However, there have still been reported malfunctions, which occur 40-50 times worldwide per year while in-flight.[3]

Objectives: By the end of this simulation session, learners will be able to: 1) Discuss the challenges associated with in-flight emergencies. 2) List what is available in United States (US) commercial airline medical kits. 3) Discuss an appropriate differential diagnosis for a patient with altered mental status (AMS). 4) Demonstrate appropriate treatment of hypoglycemia. 5) Describe possible complications in diabetic patients with insulin pumps when flying. 6) Review the legal ramifications of responding to an in-flight emergency.

Methods: This case can use a high, medium or low-fidelity simulation mannequin or a standardized patient; alternatively, this case can also be used as an oral boards case.

Topics: Simulation, diabetes, hypoglycemia, altered mental status, seizure, endocrinology.

USER GUIDE

List of Resources:

Learner Audience:
Medical students, interns, junior residents, senior residents

Time Required for Implementation:
Instructor Preparation: 20-30 minutes
Time for case: 10-15 minutes
Time for debriefing: 10-30 minutes

Recommended Number of Learners per Instructor:
5

Topics:
Simulation, diabetes, hypoglycemia, altered mental status, seizure, endocrinology.

Objectives:
By the end of this simulation session, learners will be able to:

1. Discuss the challenges associated with in-flight emergencies.
2. List what is available in United States (US) commercial airline medical kits.
3. Review the differential diagnoses for a patient with altered mental status (AMS).
4. Demonstrate appropriate treatment of hypoglycemia.
5. Describe possible complications in diabetic patients with insulin pumps when flying.
6. Review the legal ramifications of responding to an in-flight emergency.

Linked objectives and methods:
Simulation is an ideal method to meet these goals and objectives because it allows participants to have hands-on experience using available equipment within in-flight emergency kits. Participants are able to familiarize themselves with utilizing limited resources in an atypical clinical environment. The subsequent debriefing allows participants to discuss the challenges they faced (objective 1) and review the standard for US commercial airline kits (objective 2).

During the simulation, participants must consider the differential for altered mental status, seek additional information, recognize the insulin pump as the likely etiology, and treat the hypoglycemia (objectives 3 and 4). Debriefing should cover the possible insulin pump complications (objective 5), legal ramifications of responding to in-flight emergencies (objective 6) and review other possible causes of altered mental status (objective 3).

Recommended pre-reading for instructor:
It is recommended that the instructor read:

- Nable J, Tupe C, Gehle B, Brady W. In-flight medical emergencies during commercial travel. *N Engl J Med* 2015;373(10):939-945. doi: 10.1056/NEJMra1409213
- Graf J, Stüben U, Pump S. In flight medical emergencies. Continuing medical education. *Deutsches Ärzteblatt International.* 2012;109(37):591-602. doi: 10.3238/arztebl
- King B, Goss P, Paterson M, Crock P, Anderson D. Changes in altitude cause unintended insulin delivery from insulin pumps: mechanisms and implications. *Diabetes Care*. 2011;34(9):1932-1933. doi: 10.2337/dc11-0139
- Chandra A, Conry S. Be prepared for in-flight medical emergencies. *ACEPNow.* 2010;29(8). https://www.acepnow.com/article/prepared-flight-medical-emergencies/. Published August 1, 2010. Accessed July 7, 2018.

Results and tips for successful implementation:
This case can use a high, medium, or low-fidelity simulation mannequin or a standardized patient; alternatively, this case can also be used as an oral boards case. The main objective of the case is to expose the learner to in-flight emergencies, and allow the learner to experience an in-flight emergency from the safety of the ground.

The case itself is straightforward, focusing on hypoglycemia, an easily treatable cause of altered mental status. However, this can be difficult to diagnose and treat in the non-clinical setting of a flight. If the participants are having difficulty identifying the diagnosis, then a confederate (a fellow passenger or flight attendant), can prompt the learner that the patient mentioned being diabetic, or requested juice earlier in the flight, or point out that there is a medical kit available.

To create a more life-like situation the simulation can be set up utilizing several rows of 6 chairs with an aisle in-between to represent airline seats and aisle. Additionally, since "imagineering" has been shown to increase realism and improve participant suspension of disbelief and buy-in, airplane noise tracks can be played overhead to simulate airplane noise. Lastly, when piloting this case, learners were seated and then offered a free "alcoholic" beverage. About half the learners

accepted their alcoholic beverage and subsequently had to decide if they could safely participate in the care of the patient or not. It provides an opportunity for additional discussion regarding when a physician can or cannot respond to an in-flight medical emergency.

This case was initially piloted with 18 emergency medicine residents and students. The participants had very positive responses to the case and felt that the case was an important learning opportunity since none of them had previous experience with in-flight emergencies. Students verbally reported feeling more comfortable with the possibility of an in-flight emergency.

References/suggestions for further reading:

1. Nable J, Tupe C, Gehle B, Brady W. In-flight medical emergencies during commercial travel. *N Engl J Med* 2015;373(10):939-945. doi: 10.1056/NEJMra1409213
2. Graf J, Stüben U, Pump S. In flight medical emergencies. Continuing medical education. *Deutsches Ärzteblatt International.* 2012;109(37):591-602. doi: 10.3238/arztebl
3. King B, Goss P, Paterson M, Crock P, Anderson D. Changes in altitude cause unintended insulin delivery from insulin pumps: mechanisms and implications. *Diabetes Care*. 2011;34(9):1932-1933. doi: 10.2337/dc11-0139
4. Chandra A, Conry S. Be Prepared for in-flight medical emergencies. *ACEPNow.* 2010;29(8). https://www.acepnow.com/article/prepared-flight-medical-emergencies/. Published August 1, 2010. Accessed July 7, 2018.

INSTRUCTOR MATERIALS

Case Title: In-Flight Emergency: Altered Mental Status Secondary to Hypoglycemia

Case Description & Diagnosis (short synopsis): The patient is a 56-year-old male who is traveling on a transcontinental flight. Approximately 1.5 hours after takeoff, the patient becomes altered with stroke-like symptoms. The flight attendant will ask if there are any medical personal on board. On examination, the patient will have slurred speech with stroke-like symptoms. If a thorough exam is done, participants will identify an insulin pump on his abdomen. If participants search the patient's belongings for collateral information, they will find test strips in his back pack or a list of medications including insulin. Participants should treat for presumed hypoglycemia with candy/juice/soda if the patient is protecting his airway, or intravenous (IV) dextrose. Participants must also recognize the presence of his insulin pump and remove it. If the patient receives glucose but the pump is not removed, he will initially improve, but will have recurrent symptoms. If the patient does not receive glucose (juice or dextrose) he will decompensate and seize. If the patient doesn't receive any glucose when seizing, the patient can either code or the flight attendant can prompt the participants by either pointing out his belongings for collateral information or asking what they think is the problem. If participants request diversion of the plane, they will be prompted to discuss the case with the airline medical director, who will decline to redirect the flight.

Equipment or Props Needed:
High, moderate, or low fidelity mannequin
Simulated insulin pump (if possible a real insulin pump will allow residents to see how to remove it)
Patient backpack
Flight Kit: (recommend all items be in a single box or pack)

- **Assessment Supplies**
  - Sphygmomanometer
  - Stethoscope
  - Gloves
- **Airway and Breathing**
  - Oropharyngeal airways
  - Bag-valve masks (3 sizes)
  - CPR masks (3 sizes)
- **Intravenous Access**
  - Intravenous administration set
  - Saline solution, 500 ml

  - Needles
  - Syringes
- **Medications**
  - Analgesic tablets, nonnarcotic
  - Antihistamine tablets
  - Antihistamine, injectable
  - Aspirin
  - Atropine
  - Bronchodilator inhaler
  - Dextrose, 50%
  - Epinephrine, 1:1000 solution
  - Epinephrine, 1:10,000 solution
  - Intravenous lidocaine
  - Nitroglycerin tablets

Confederates needed:
Flight attendant to provide medical kit when requested and assist with the case.
If no simulation mannequin is available, a standardized patient or faculty member could be used as the patient.

Stimulus Inventory:
#1 Blood Sugar

Background and brief information: The scenario takes place aboard a transcontinental flight. The patient is a 56-year-old male who becomes altered approximately 1.5 hours after take-off.

Initial presentation: The patient is traveling alone and is seated in a row of seats by himself. The flight attendant requests medical assistance after noting the patient is confused, has slurred speech, and has a right-sided facial droop.

How the scenario unfolds: The patient is a 56-year-old male who is traveling on a transcontinental flight. Approximately 1.5 hours after takeoff the patient becomes confused, with slurred speech and weakness. The flight attendant will ask if there are any medical personal on board.

INSTRUCTOR MATERIALS

The patient has slurred speech and is confused (and unable to provide a history) but is protecting his airway. He has right-sided facial droop and right upper and lower extremity weakness. If participants complete a full exam, they will discover the insulin pump on his abdomen and should remove it. If participants search the patient's belongings for collateral information, the patient's back pack will have glucose test strips but no glucometer (additionally the instructor could put a smartphone with emergency medical information filled out in the patient's back pocket or backpack). If the participants ask if anyone on board has a glucometer, a near-by passenger will have one and the patient's blood glucose will read low. Participants should request the emergency medical kit. If they do not request it after a few minutes, the flight attendant can prompt them by asking if they need the emergency medical kit.

Participants should recognize hypoglycemia as the likely cause of the patient's symptoms and the patient should be given juice/soda/candy or participants can start an IV and give dextrose. An intravenous (IV) line start kit and dextrose will be available in the medical kit. If the patient is given a glucose source he will improve. Participants should then offer the patient a more substantial meal/food to ensure his hypoglycemia does not recur.

However, if the insulin pump is not removed, the patient will have recurrence of symptoms which will be worse, and the patient will not be protecting his airway appropriately for oral glucose sources. If IV dextrose was previously given, there will not be any additional dextrose available. If IV dextrose was not previously given, then participants may place an IV and give IV dextrose. If no further dextrose is given (either because there is no more available or because participants are not appropriately recognizing the problem), then the patient will decompensate and seize. If the patient doesn't receive any glucose when seizing, the patient can either code or the flight attendant can prompt the participants by either pointing out his belongings for collateral information or asking what they think is the problem.

If participants request diversion of the plane, they will be prompted to discuss the case with the airline medical director, who will decline to divert the flight.

Critical Actions:

1. Assess airway, breathing, circulation.
2. Request in-flight medical kit.
3. Examine the patient.
4. Obtain collateral information from patient's wallet, phone, or backpack.

5. Give oral or IV dextrose.
6. Disconnect insulin pump.
7. Encourage more complex foods or liquids (PO) to avoid recurrence.

INSTRUCTOR MATERIALS

Case title: In-Flight Emergency: Altered Mental Status Secondary to Hypoglycemia

Chief Complaint: Altered mental status

Vitals: *Heart Rate (HR)* 60's *Blood Pressure (BP)* 110/45 *Respiratory Rate (RR)* 12
Temperature (T) unable to obtain *Oxygen Saturation (O_2Sat)* unable to obtain

General Appearance: Confused

Primary Survey:

- **Airway:** Patent
- **Breathing:** Clear bilaterally
- **Circulation:** Delayed capillary refill

History:

- **History of present illness:** The patient is a 56-year-old male who is traveling on a transcontinental flight. Approximately 1.5 hours after takeoff the patient becomes altered with slurred speech, right-sided facial drop, and right upper and lower extremity weakness. The flight attendant will ask if there are any medical personal on board.

  On history the patient has slurred speech and is making incomprehensible sounds. He is unable to provide additional information.
- **Past Medical history:** unknown (patients backpack reveals glucose test strips, and patient has insulin pump on)
- **Past Surgical history:** unknown
- **Patients Medications:** insulin (only available if participants find patient's insulin pump on patient's abdomen, medication list in patient's pocket/wallet or on patient's phone)
- **Allergies:** unknown
- **Social history:** unknown
- **Family history:** unknown

Secondary Survey/Physical Examination:

- **General Appearance:** Confused, mild distress, diaphoretic
- **HEENT:**
  - **Head:** within normal limits
  - **Eyes:** within normal limits

  - **Ears:** within normal limits
  - **Nose:** within normal limits
  - **Throat:** within normal limits
- **Neck:** within normal limits
- **Heart:** regular rhythm, no murmurs
- **Lungs:** clear to auscultation, no wheezes, no crackles; protecting his airway
- **Abdominal/GI:** soft, nontender, no rebound, insulin pump in place on right side of abdomen
- **Genitourinary:** within normal limits
- **Rectal:** within normal limits
- **Extremities:** delayed capillary refill, otherwise within normal limits
- **Back:** within normal limits
- **Neuro:** awake, confused but cooperative, slurred speech, right-sided facial droop, strength 2/5 right upper and lower extremity (if right arm raised and dropped will hit the patient in the head). 5/5 in left upper and left lower extremity. Unable to provide history.
- **Skin:** diaphoretic
- **Lymph:** within normal limits
- **Psych:** within normal limits

Results:

Blood Sugar

Glucometer read: Low

Only if participant asks if other passengers have a glucometer.

OPERATOR MATERIALS

SIMULATION EVENTS TABLE:

Minute (state)	Participant action/ trigger	Patient status (simulator response) & operator prompts	Monitor display (vital signs)
0:00 (Baseline)	Flight attendant asks if there are any medical personal on board Evaluate airway, breathing and circulation	Flight attendant tells learner(s) that there is a passenger who is altered. Patient is breathing comfortably with good peripheral pulses but is altered.	No monitor available. If participants take their own vital signs: HR 60s BP 110/45 RR 12
02:00	Attempt to take history Perform physical exam	Patient confused and unable to provide historical information. Patient has right facial droop and right upper and lower extremity weakness. He is protecting his airway. An insulin pump is on his right lower abdomen.	If participants take their own vital signs: HR 120s BP 110/45 RR 22
04:00	Request in-flight medical bag Go through patient's belongings for collateral information. Ask other passengers if anyone has a glucometer	If requested emergency medical kit will be provided to participants. If the patient is searched they may find glucometer test strips, a medication list in the patient's pocket or wallet or a phone with medication list or medical issues. If asked, Blood glucose reads "Low."	
07:00	Provide patient with glucose source (give juice or place IV and push dextrose)	If IV dextrose is given patient will gradually improve and return to baseline. Of note, there will be only one amp of D50 in the flight kit (since this is standard on US commercial flights).	If participants take their own vital signs: Patient given glucose source HR 110s

OPERATOR MATERIALS

Minute (state)	Participant action/ trigger	Patient status (simulator response) & operator prompts	Monitor display (vital signs)
		If participants attempt to give patient juice, patient will be able to drink it and will return to baseline. If no dextrose is given, the patient will become less responsive and will seize until he is given IV dextrose or pump is removed.	BP 110/45 RR 18 If no glucose given and patient seizes HR 140s BP 90/45 RR 26
09:00	Insulin pump removed and patient fed	If insulin pump is removed and patient was provided with glucose source, the patient will remain at baseline; patient should be provided with food. If insulin pump is not removed and patient was given glucose source (orally or IV), the patient will have recurrence of symptoms, return to 07:00. Of note, only 1 amp of D50 is available in the kit. If insulin pump is not removed and patient is not given glucose source, patient will seize until he is given IV glucose source or pump is removed.	If participants take their own vital signs: Patient given glucose source HR 110s BP 110/45 RR 18 If no glucose given and patient seizes HR 140s BP 90/45 RR 26
(Case Completion)		If patient is managed appropriately, he should request a meal. If the patient is not managed appropriately, the patient will seize and then will degrade into pulseless electrical activity and code.	If participants take their own vital signs: HR 60s BP 110/45 RR 12 HR pulseless BP unattainable RR 0

OPERATOR MATERIALS

Diagnosis:
Hypoglycemia.

Disposition:
Continue flight.

DEBRIEFING AND EVALUATION PEARLS

In-Flight Emergency: Altered Mental Status Secondary to Hypoglycemia

In-flight emergencies:

- There is no mandatory response for in-flight emergencies in the United States (US).
- Estimated 1 emergency in every 604 flights; roughly 1 in 10,000 passengers.
- Most airlines contract with ground-based medical consultation services. Providers can ask to be connected for assistance in caring for patients or regarding flight diversion.
- The pilot is in charge. It is the pilot's job to ensure the safety of all passengers so ultimately it is the pilot's decision whether to divert or maintain flight course.

- **On-board medical resources:**
    - US commercial flight attendants and pilots are required to have automated external defibrillator (AED) and cardiopulmonary resuscitation (CPR) training every two years. Additionally, planes are required to have at least one AED and an emergency medical kit (which is not comprehensive: there are no obstetrical or pediatric materials). The standard United States (US) domestic kit is listed below; however, international regulations do not require any specific kit.
    - Standard US Domestic Flight Kit:
        - Assessment supplies
            - Sphygmomanometer
            - Stethoscope
            - Gloves
        - Airway and breathing
            - Oropharyngeal airways
            - Bag-valve masks (3 sizes)
            - CPR masks (3 sizes)
        - Intravenous access
            - Intravenous administration set
            - Saline solution, 500 ml
            - Needles
            - Syringes
        - Medications
            - Analgesic tablets, nonnarcotic
            - Antihistamine tablets
            - Antihistamine, injectable

- Aspirin
- Atropine
- Bronchodilator inhaler
- Dextrose, 50%
- Epinephrine, 1:1000 solution
- Epinephrine, 1:10,000 solution
- Intravenous lidocaine
- Nitroglycerin tablets

- **Legal ramifications**
  - Liability is generally determined by the country to which the plane is registered.
  - In the US:
    - Medical providers have no legal obligation to help (but providers may decide they have an ethical obligation to do so).
    - In 1998, Congress passed the Aviation Medical Assistance Act (AMAA)
      - This act protects providers who respond to in-flight medical emergencies from liability.
      - Applies to claims arising from domestic flights and most claims arising from international flights involving US carriers or residents.
        - Does allow for liability if the provider is "grossly negligent" or intentionally causes harm (for example, if the provider is intoxicated).
  - The provider will need to provide handoff (if necessary) and document on the airline's specific system.
  - HIPPA still applies.

- **How to Respond:**
  - First determine if you are able to respond. If you have had alcohol, are you ok to respond?
  - Introduce yourself to the airline personnel and provide your role and qualifications.
  - Introduce yourself to the patient and ask if you have permission to care for the patient.
  - If patient is unable to provide history, attempt to obtain collateral information. This can be obtained from family, near-by passengers, medication lists in wallets or emergency applications/health applications on smartphones. On an iPhone,

this is accessible from an unlocked phone via the Apple "Health" application. In a locked phone, it can be accessed on the passcode screen by tapping the "Emergency" option, and then tap the "Medical ID" option.

- Request emergency medical kit**.** You can discuss with airline personnel and request ground-based medical consultation if necessary. Typically, this will be required if you are requesting diversion for a critically ill patient. Remember the pilot has the final say in any diversions.
- Complete the airline documentation and keep a copy for your records.

- **Specific Medical Conditions**
  - **Cardiac Arrest** accounts for 0.3% of in-flight emergencies, 86% of these in-flight events result in death. Treat with CPR and AED but consider pronouncing death if patient has been without pulse for 20 to 30 minutes without return of spontaneous circulation.
  - **Chest Pain/Acute Coronary Syndrome account for** approximately 8% of in-flight emergencies; ill-appearing patients should prompt request for diversion as soon as possible.
  - **Stroke** accounts for 2% of in-flight emergencies and should prompt request to divert/land as soon as possible. Provider should always check blood sugar as this can mimic a stroke; however, most kits won't have a glucometer so it is recommended to ask other passengers or to presumptively give dextrose.
  - **Altered mental status (AMS)** accounts for 5.8% of in-flight emergencies, with approximately 1.6% of all in-flight emergency's being AMS secondary to hypoglycemia secondary to diabetic complications.
    - Insulin pumps:
      - During ascent the gas in the pump will expand, causing an insulin bolus and patients may have resultant hypoglycemia 1-2 hours later.
      - During descent gas will contract or dissolve causing decreased insulin, possibly leading to hyperglycemia.
  - **Pre-syncope or syncope** accounts for approximately 37% of in-flight emergencies; providers should obtain history, consider the wide differential of syncope, and treat appropriately.
  - **Trauma** emergencies in-flight are relatively common but usually minor.
  - **Dyspnea** accounts for approximately 12% of in-flight emergencies, usually secondary to chronic respiratory conditions that are exacerbated by decreased oxygen levels.

        - It is important to know that patients with pulmonary hypertension can have severe hypoxemia as the plane ascends.
    - **Infections** can often present during flight. Patients should be isolated if contagious infection is likely.
    - **Psychosis** or other psychiatric events account for approximately 3.5% of in-flight emergencies; responders should attempt to calm the patient since typically there are no sedatives in the in-flight kit. If necessary, physically restrain the patient.

Hypoglycemia

- Patients with AMS, acute neurological deficits or abnormalities or seizures should always be evaluated for hypoglycemia with a bedside serum glucose test.
- Causes of hypoglycemia:
    - Most Common:
        - Exogenous insulin.
        - Sulfonylurea use.
    - Less common:
        - Alcohol, starvation, gastric surgery, gastroenteritis, vomiting, sepsis, insulin secreting tumors, liver disease, kidney disease, cancers.
- If blood glucose is less than 60 mg/dL and patient is symptomatic (anxiety, palpitations, trembling, confused, feeling weak, lightheaded, nausea, neurologic symptoms, etc.) you should treat immediately.
    - Tolerating foods and liquids (PO):
        - Juice, candy, complex carbohydrates
    - Not tolerating PO:
        - Dextrose IV
            - D50 in Adults, 1 amp (approximately 25gm of glucose)
                - Will increase blood sugar (BS) from 40 to 350 mg/dL, average increase in BS is 160 mg/dL
            - D25 at 2-4 cc/kg in pediatrics (approximately 0.5 to 1gm of glucose per kg of body weight)
            - D10 at 5-10 cc/kg in infants or neonates (approximately 0.5 to 1gm of glucose per kg of body weight)
            - Repeat doses as needed to keep BS in normal range (85 to 125 mg/dL), or as needed for symptom control
        - Glucagon
            - Glucagon IM/IV/subcutaneous 0.5 to 1mg for adults

DEBRIEFING AND EVALUATION PEARLS

    - Glucagon IM/IV/subcutaneous 0.03mg/kg for pediatric patients
- If left untreated, hypoglycemia can rapidly progress to even lower blood glucose levels which can lead to:
    - Lethargy/AMS
    - Seizures
    - Coma

Other debriefing points:

- Did participants use closed loop communication?
- Did they utilize all available resources such as other passengers, patient belongings, and flight attendants?
- Did participants update patient when he was back to baseline?
- What did the participants find difficult about responding to the in-flight emergency? Did they feel the emergency medical kit was complete or limiting?
- If using the optional "free alcohol" at the beginning of the case, discuss when a physician can respond to an in-flight emergency. Should they respond if they have had an alcoholic beverage?

References/Wrap Up: *We recommend learners read the below papers.*

1. Nable J, Tupe C, Gehle B, Brady W. In-Flight Medical Emergencies during Commercial Travel. *N Engl J Med* 2015; 373:939-945.
2. Graf J, Stüben U, Pump S. In Flight Medical Emergencies. Continuing Medical Education. *Deutsches Ärzteblatt International.* 2012;109(37):591–602.
3. King B, Goss P, Paterson M, Crock P, Anderson D. Changes in altitude cause unintended insulin delivery from insulin pumps: mechanisms and implications. *Diabetes Care*. 2011;34(9):1932–1933.
4. Chandra A, Conry S. Be Prepared for In-Flight Medical Emergencies. *ACEPNow.* 2010;29(8). Available at: https://www.acepnow.com/article/prepared-flight-medical-emergencies/. Accessed 7/7/2018.

SIMULATION ASSESSMENT

In-Flight Emergency: Altered Mental Status Secondary to Hypoglycemia

Learner: _____

Assessment Timeline

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

Critical Actions	0:00
1. Assess airway, breathing, circulation 2. Request in-flight medical kit 3. Examine the patient 4. Obtain collateral information from patient's wallet, phone, or backpack 5. Give oral or IV dextrose 6. Disconnect insulin pump 7. Encourage more complex foods or liquids (PO) to avoid recurrence	

SIMULATION ASSESSMENT

In-Flight Emergency: Altered Mental Status Secondary to Hypoglycemia

Learner: _____

Critical Actions:

- ☐ Assess airway, breathing, circulation
- ☐ Request in-flight medical kit
- ☐ Examine the patient
- ☐ Obtain collateral information from patient's wallet, phone, or backpack.
- ☐ Give Oral or IV dextrose
- ☐ Disconnect insulin pump
- ☐ Encourage more complex foods or liquids (PO) to avoid recurrence.

Summative and formative comments:

Milestones assessment:

	Milestone	Did not achieve level 1	Level 1	Level 2	Level 3
1	**Emergency Stabilization (PC1)**	☐ Did not achieve Level 1	☐ Recognizes abnormal vital signs	☐ Recognizes an unstable patient, requiring intervention Performs primary assessment Discerns data to formulate a diagnostic impression/plan	☐ Manages and prioritizes critical actions in a critically ill patient Reassesses after implementing a stabilizing intervention
2	**Performance of focused history and physical (PC2)**	☐ Did not achieve Level 1	☐ Performs a reliable, comprehensive history and physical exam	☐ Performs and communicates a focused history and physical exam based on chief complaint and urgent issues	☐ Prioritizes essential components of history and physical exam given dynamic circumstances

Standardized assessment form for simulation cases. JETem © Developed by: Megan Osborn, MD, MHPE; Shannon Toohey, MD; Alisa Wray, MD
Niknafs N, et al. In-Flight Emergency: Altered Mental Status Secondary to Hypoglycemia. JETem 2018. 3(3):S25-47. https://doi.org/10.5072/FK22N56Q28

SIMULATION ASSESSMENT

In-Flight Emergency: Altered Mental Status Secondary to Hypoglycemia

Learner: _____

	Milestone	Did not achieve level 1	Level 1	Level 2	Level 3
3	**Diagnostic studies (PC3)**	☐ Did not achieve Level 1	☐ Determines the necessity of diagnostic studies	☐ Orders appropriate diagnostic studies. Performs appropriate bedside diagnostic studies/procedures	☐ Prioritizes essential testing Interprets results of diagnostic studies Reviews risks, benefits, contraindications, and alternatives to a diagnostic study or procedure
4	**Diagnosis (PC4)**	☐ Did not achieve Level 1	☐ Considers a list of potential diagnoses	☐ Considers an appropriate list of potential diagnosis May or may not make correct diagnosis	☐ Makes the appropriate diagnosis Considers other potential diagnoses, avoiding premature closure
5	**Pharmacotherapy (PC5)**	☐ Did not achieve Level 1	☐ Asks patient for drug allergies	☐ Selects an medication for therapeutic intervention, consider potential adverse effects	☐ Selects the most appropriate medication and understands mechanism of action, effect, and potential side effects Considers and recognizes drug-drug interactions
6	**Observation and reassessment (PC6)**	☐ Did not achieve Level 1	☐ Reevaluates patient at least one time during case	☐ Reevaluates patient after most therapeutic interventions	☐ Consistently evaluates the effectiveness of therapies at appropriate intervals

Standardized assessment form for simulation cases. JETem © Developed by: Megan Osborn, MD, MHPE; Shannon Toohey, MD; Alisa Wray, MD
Niknafs N, et al. In-Flight Emergency: Altered Mental Status Secondary to Hypoglycemia. JETem 2018. 3(3):S25-47. https://doi.org/10.5072/FK22N56Q28

SIMULATION ASSESSMENT

In-Flight Emergency: Altered Mental Status Secondary to Hypoglycemia

Learner: _____

	Milestone	Did not achieve level 1	Level 1	Level 2	Level 3
7	**Disposition (PC7)**	☐ Did not achieve Level 1	☐ Appropriately selects whether to admit or discharge the patient	☐ Appropriately selects whether to admit or discharge Involves the expertise of some of the appropriate specialists	☐ Educates the patient appropriately about their disposition Assigns patient to an appropriate level of care (ICU/Tele/Floor) Involves expertise of all appropriate specialists
9	**General Approach to Procedures (PC9)**	☐ Did not achieve Level 1	☐ Identifies pertinent anatomy and physiology for a procedure Uses appropriate Universal Precautions	☐ Obtains informed consent Knows indications, contraindications, anatomic landmarks, equipment, anesthetic and procedural technique, and potential complications for common ED procedures	☐ Determines a back-up strategy if initial attempts are unsuccessful Correctly interprets results of diagnostic procedure
20	**Professional Values (PROF1)**	☐ Did not achieve Level 1	☐ Demonstrates caring, honest behavior	☐ Exhibits compassion, respect, sensitivity and responsiveness	☐ Develops alternative care plans when patients' personal beliefs and decisions preclude standard care
22	**Patient centered communication (ICS1)**	☐ Did not achieve level 1	☐ Establishes rapport and demonstrates empathy to patient (and family) Listens effectively	☐ Elicits patient's reason for seeking health care	☐ Manages patient expectations in a manner that minimizes potential for stress, conflict, and misunderstanding. Effectively communicates with vulnerable populations, (at risk patients and families)
23	**Team management (ICS2)**	☐ Did not achieve level 1	☐ Recognizes other members of the patient care team during case (nurse, techs)	☐ Communicates pertinent information to other healthcare colleagues	☐ Communicates a clear, succinct, and appropriate handoff with specialists and other colleagues Communicates effectively with ancillary staff

Standardized assessment form for simulation cases. JETem © Developed by: Megan Osborn, MD, MHPE; Shannon Toohey, MD; Alisa Wray, MD
Niknafs N, et al. In-Flight Emergency: Altered Mental Status Secondary to Hypoglycemia. JETem 2018. 3(3):S25-47. https://doi.org/10.5072/FK22N56Q28