

ANAPHYLAXIS SIMULATION CURRICULUM

Case 2



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I. Title: Hypotension after drug challenge

II. Target Audience: Healthcare team members involved with penicillin allergy testing (RN, MA, PharmD, MD, DO, NP, PA)

III. Learning and Assessment Objectives

- Recognizing that hypotension alone, in the setting of a known allergen exposure, meets criteria for anaphylaxis even without classic skin or respiratory findings
- Understanding that a negative skin test does not eliminate the risk of a reaction to a full challenge dose, and appropriately monitoring an observed oral challenge
- Recognizing the effect of home medication list on the presentation and treatment response of anaphylaxis (blunted response to epinephrine)
- Escalating therapy appropriately when epinephrine alone is insufficient
- Understanding the role of serum tryptase in the workup of anaphylaxis presenting with hypotension
- Appropriate documentation of the reaction and disposition planning (transfer of care/escalation)

Critical Actions Checklist:

- Vital sign monitoring
- Rapid patient history, including home medications (beta blocker)
- Rapid physical examination
- Develop a differential diagnosis for hypotension after a drug challenge (vasovagal reaction vs. anaphylaxis vs. medication effect)
- Identification of anaphylaxis based on isolated hypotension after a likely allergen exposure
- Patient positioning
- Prompt administration of epinephrine
- Airway evaluation and supplemental oxygen
- Recognition of a blunted response to epinephrine and escalation to glucagon
- Appropriate disposition planning / transfer of care

IV. Environment

A. Simulation room set up: Outpatient clinic

B. Mannequin/standardized patient set up:

- Female standardized patient

C. Props:

- Pretend medication vials (epinephrine, glucagon, antihistamines)

V. Actors

- Facilitator
- Standardized patient (paid actor)
- Participants

VI. Instructor Notes

A. Tips to keep scenario flowing

- If the need for further evaluation is not recognized, the facilitator can assist by making a suggestion for further evaluation and/or administering a medication.
- Facilitator will suggest transfer to the ED for ongoing care if this is not recognized as the next step.
- If anaphylaxis is not recognized because there are no hives or angioedema, facilitator can prompt: "Remember, she just received a full challenge dose of a drug she has a history of reacting to, and her blood pressure has dropped significantly — what could explain that?"
- If the blunted response to epinephrine is not recognized, facilitator can prompt learners to review the patient's **home medication list**.

B. Scenario programming

1. Optimal management path

- History and physical examination, including review of home medications
- Recognize isolated hypotension after a likely allergen (amoxicillin) exposure as anaphylaxis
- Prompt IM epinephrine administration
- Oxygen/monitoring
- Recognize blunted response to epinephrine due to home beta blocker and escalate to glucagon
- Consider epinephrine repeat dosing, IV access, epinephrine infusion

2. Potential complications/errors path(s)

- Failure to recognize isolated hypotension (without hives/angioedema) as anaphylaxis
- Attributing hypotension solely to a vasovagal reaction and delaying epinephrine
- Repeating IM epinephrine multiple times without recognizing the need for glucagon in a beta-blocker-treated patient
- Failure to consider the home beta blocker as a cause of poor response to epinephrine

VII. Debriefing

1. How do you think the scenario went?
2. What went well?
3. What could have been done better?
4. Did everyone feel as though they had a role in the scenario?
5. Was there effective communication?
6. Why can a negative skin test still be followed by a reaction to a full challenge dose?
7. Why might anaphylaxis present with hypotension alone, without skin or respiratory findings?
8. How did the patient's home beta blocker change your treatment approach?
9. What is the role of serum tryptase in this scenario?
10. How might this scenario change in a child? In a pregnant patient?

VIII. Authors and their affiliations

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IX. Case Narrative

CC: hypotension during an observed oral amoxicillin drug challenge

HPI

Mrs. Coleman is a 40-year-old woman with a past medical history of migraine headaches, mild anxiety, and seasonal allergic rhinitis, presenting for a reported penicillin allergy.

Two years ago, she was hospitalized for pyelonephritis and received intravenous ampicillin-sulbactam. Shortly after the infusion began, she became acutely hypotensive and tachycardic. The antibiotic was stopped and she was treated with IV fluids and observation. She was labeled with a penicillin allergy and has avoided all beta-lactam antibiotics since.

Given the history of an observed reaction with hemodynamic instability, she was considered a higher-risk candidate for evaluation, but skin testing was still pursued given the need for perioperative antibiotics.

Full skin testing was performed today with PPL (Pre-Pen), penicillin G, and ampicillin; both skin prick test and intradermal testing were negative. Given the negative results, the decision was made to proceed with an observed oral amoxicillin 500mg challenge dose in clinic.

Approximately 15 minutes after taking the amoxicillin, she reports feeling “dizzy” and “not right.” She denies itching, throat tightness, or difficulty breathing.

The rest of the symptoms are given only if specifically asked for by the learners.

- *She feels lightheaded and mildly nauseated.*
- *She notes mild flushing of her face and chest, but no hives.*
- *No throat tightness, tongue swelling, or difficulty swallowing.*
- *No wheezing or shortness of breath.*
- *No abdominal pain, vomiting, or diarrhea.*
- *She forgot to hold her propranolol this morning and took her usual dose.*

Her vital signs are: T 37.0, HR 118, BP 78/48, RR 20, O₂ sat 96% on RA. Weight is 65kg.

PMH:

Migraine headaches

Mild anxiety

Seasonal allergic rhinitis

HOME MEDICATIONS
Propranolol 40mg BID
Sumatriptan 50mg PO PRN migraine
Loratadine 10mg daily PRN
Combined oral contraceptive pill, daily

ALLERGIES
Penicillin (ampicillin-sulbactam) hypotension and tachycardia, observed reaction during hospitalization 2 years ago

PSH: None

SOCIAL History:

EtOH: Social drinking

Tobacco: Never smoker

Illicits: Denies

Occupation: Teacher

FAMILY History:

Mother: Migraines

Father: Healthy

ROS:

(+) dizziness, lightheadedness, nausea, mild facial/chest flushing

(-) itching, throat tightness, tongue swelling, wheezing, shortness of breath, hives, chest pain, abdominal pain, vomiting, diarrhea

PHYSICAL EXAM: *learner must ask for specific findings if cannot be portrayed by the standardized patient*

GENERAL: Anxious-appearing woman, mildly diaphoretic

HEENT: PERRL, MMM. No angioedema of lips/tongue

NECK: Supple. No stridor

PULM: Clear to auscultation bilaterally, no wheezing

CV: Tachycardic, regular rhythm, no murmurs/gallops/rubs

ABD: Normoactive BS, soft, NT/ND

EXT: No edema, warm and well perfused

NEURO: Alert and oriented x3, no focal deficits

SKIN: Mild flushing of face, chest, and upper trunk. No urticaria.

INITIAL VITAL SIGNS (*Do not display until learners request*):

Temperature (°C)	HR (bpm)	BP (mmHg)	RR (per min)	O2 Sat
37	98	78/48	20	96% on RA

*****FACILITATOR SHOULD ASK ABOUT THE DIFFERENTIAL DIAGNOSIS FOR HYPOTENSION IN THIS SETTING (VASOVAGAL REACTION vs. ANAPHYLAXIS vs. MEDICATION EFFECT) AT THIS POINT*****

CLINICAL PROGRESSION:

History and physical performance, patient positioning, IV access and monitoring considered. The patient's blood pressure remains low and she remains tachycardic, without development of hives, angioedema, or respiratory symptoms.

The patient is having anaphylaxis to the amoxicillin challenge, meeting diagnostic criteria via isolated hypotension in the setting of exposure to a likely allergen, despite the absence of prominent skin or respiratory findings. Correct management includes recognizing hypotension alone as sufficient for a diagnosis of anaphylaxis in this context, and prompt administration of IM epinephrine. Because she takes a beta blocker for migraine

prophylaxis, her response to epinephrine will be blunted, and she will require glucagon and potentially two doses of epinephrine to achieve hemodynamic stability.

*****IF IM EPINEPHRINE 0.3–0.5MG 1:1000 CONCENTRATION IS ADMINISTERED.**

FACILITATOR SHOULD ASK WHERE THE INJECTION SHOULD BE ADMINISTERED AND AT WHAT DOSE --> SHOULD BE INJECTED INTRAMUSCULARLY INTO THE MID-OUTER ASPECT OF THE THIGH AT 0.3MG, 1:1000 CONCENTRATION**

HR and BP improve but the patient remains hypotensive and tachycardic despite an appropriately-dosed and administered injection.

Temperature (°C)	HR (bpm)	BP (mmHg)	RR (per min)	O2 Sat
37	108	82/50	20	96% on RA

*****IF IM EPINEPHRINE IS REPEATED A SECOND TIME WITHOUT GLUCAGON*****

Only minimal improvement — blood pressure remains low.

Temperature (°C)	HR (bpm)	BP (mmHg)	RR (per min)	O2 Sat
37	110	84/52	20	97% on RA

*****IF THE TEAM DOES NOT RECOGNIZE THE BLUNTED EPINEPHRINE RESPONSE, FACILITATOR CAN PROMPT THEM TO REVIEW THE PATIENT'S HOME MEDICATION LIST (PROPRANOLOL)*****

*****IF GLUCAGON 1mg IM IS ADMINISTERED. (This dose has not been approved for anaphylaxis, so ideally would use glucagon IV 1-5mg over 5 min).**

Significant improvement in blood pressure and heart rate. The patient reports feeling “much better” and “less dizzy,” her color improves, and she is able to sit up and speak in full sentences without difficulty.

Temperature (°C)	HR (bpm)	BP (mmHg)	RR (per min)	O2 Sat
37	120	104/68	18	98% on RA

She should remain on continuous monitoring facilitator can note that improvement after glucagon does not eliminate the risk of recurrence, and the team should not discontinue monitoring or discharge the patient at this point.

*****IF EPINEPHRINE IS NOT ADMINISTERED AT ALL*****

The patient becomes progressively more hypotensive and tachycardic, develops worsening dizziness, and reports feeling faint. If unrecognized and untreated, she will progress toward loss of consciousness.

Temperature (°C)	HR (bpm)	BP (mmHg)	RR (per min)	O2 Sat
37	135	62/38	24	93% on RA