ANAPHYLAXIS SIMULATION CURRICULUM

Case 1

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I. **Title:** Anaphylaxis 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**

- Understanding anaphylaxis criteria and when epinephrine is appropriate/not appropriate
- Understanding individual roles for MD, nurses etc during treatment of anaphylaxis
- Appropriate technique for giving Epinephrine
- Appropriate documentation of symptoms for anaphylaxis
- Ongoing/Subsequent care for ongoing anaphylaxis

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:

- Male standardized patient

C. Props:

- Pretend medications

V. Actors

- Facilitator
- Standardized patient (paid actor)
- Participants/healthcare team members

IV. **Instructor Notes**

A. Tips to keep scenario flowing

1. If need for further evaluation not recognized, facilitator can make a suggestion for further evaluation, and/or administering a medication.

2. Facilitator will suggest calling 911 or code for ongoing care if this is not recognized as the next step.
3. If anaphylaxis is not recognized, facilitator will comment on urticaria, angioedema, history of HTN/afib, and that the patient just received test dose challenge

B. Scenario programming

1. Optimal management path
    - History and physical examination
    - Diagnose anaphylaxis with urticaria/angioedema and wheezing in the setting of allergen exposure
    - Management is initiated with epinephrine
    - Positioning of patient (Trendelenburg)
    - Assess for adjunctive medications

2. Potential complications/errors path(s)
    - Failure to recognize anaphylaxis
    - Failure to administer epinephrine for treatment of anaphylaxis
    - Attempting treatment with adjunctive medications only.

V. Debriefing

Method of debriefing: Group will discuss how scenario went, commenting on positive aspects and aspects that could be improved.

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?

VI. Case Narrative

CC: angioedema/urticaria

HPI

Mr. Smith is a 65-year-old gentleman with PMH significant for asthma, atrial fibrillation, CAD, HTN, DM, osteoarthritis, allergic rhinitis with a history of penicillin allergy presenting for penicillin allergy evaluation. The patient has a history of a reaction to amoxicillin, which occurred about 8 years ago. At that time, he had received amoxicillin for a non-purulent cellulitis of his right arm. After 2 doses, he developed hives, itching and lip swelling. The patient was treated with antihistamines and the amoxicillin was discontinued. He was given a Medrol dose pak but did not take it. He has an upcoming surgery for a left knee replacement for severe osteoarthritis and was referred to see you given his history of penicillin allergy and need for intra-operative antibiotics. The patient has a history of dermatographism and the reaction was not high risk, and so skin testing was not performed.

Mr. Smith received 50mg of amoxicillin. He reported a feeling of "dry throat" after taking the first dose, but thinks it may be due to the "bubble gum" flavor of the amoxicillin oral suspension. 15 minutes after taking the 500mg dose of amoxicillin, he reports feeling itching in his throat, as well as on his palms. He also feels that his lips feel swollen and there is a rash on his abdomen.

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

- *The patient reports a feeling of itching and tightness of his throat. His lips and tongue are feeling swollen.*
- *He first had a feeling of itching on his abdomen, that has progressed to red, raised bumps. These seem to be expanding.*
- *He feels slight chest tightness and mild shortness of breath.*
- *He is feeling some stomach upset as well, but wonders if this is because he didn't eat breakfast this morning.*
- *No rhinorrhea, congestion, cough, sneezing, vomiting or diarrhea, lightheadedness, dizziness.*

His vital signs are: T37.6, HR 95, BP 130/80, RR 22, O_2 sat 94% on RA. Weight is 70kg.

PMH:

Asthma
HTN
DM, type II
Osteoarthritis
Allergic rhinitis

HOME MEDICATIONS
Metformin 500mg BID
Lisinopril 20mg BID
Zyrtec 10mg daily
Flonase 2 sprays intranasal daily
Aspirin 81mg daily
Albuterol 2 puffs q6hrs prn

Flovent 110mcg inh BID

ALLERGIES
Penicillin – urticaria/angioedema/pruritus 8 yr ago

PSH:
None

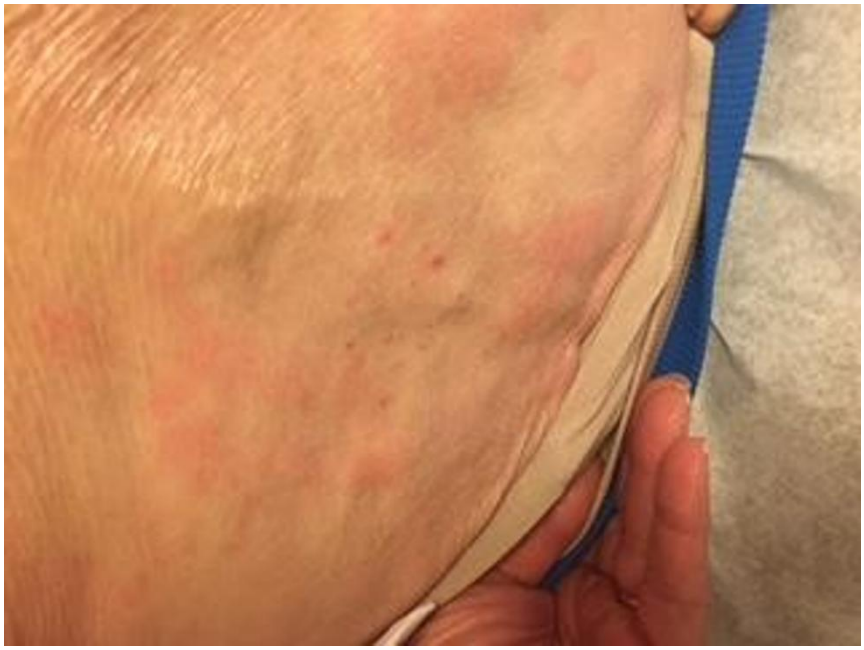
SOCIAL History:
EtOH: Social drinking
Tobacco: Prior history, quit 20 years ago. 10 pack year history
Illicits: Denies
Occupation: Mechanic

FAMILY History:
Mother: Healthy
Father: Healthy

ROS:
(+) itching, tightness of throat, lip/tongue swelling, hives on abdomen, nausea, chest tightness and mild shortness of breath.

(-) No rhinorrhea, congestion, sneezing, vomiting or diarrhea. No medication changes (forgot to hold his metoprolol), pleurisy, orthopnea, paroxysmal nocturnal dyspnea, lower extremity edema, lower extremity asymmetry, calf tenderness, abdominal pain, recent travel, palpitations.

PHYSICAL EXAM: *learner must ask for specific findings if cannot be portrayed by standardize patient*
GENERAL: Flushed gentleman, appears anxious.
HEENT: PERRL, MMM. Angioedema of lips and tongue. Facial flushing
NECK: Supple. No stridor
PULM: Tachypneic, with scattered wheezing, no rales.
CV: Slight tachycardia, regular rhythm, no murmurs/gallops/rubs
ABD: Normoactive BS, soft, NT/ND. Scattered urticaria on abdomen.
EXT: No LE edema, WWP
NEURO: No focal deficits
SKIN: Flushing of the face, several urticarial lesions on abdomen (See photo).



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

Temperature (ºC)	HR (bpm)	BP (mmHg)	RR (per min)	O_2 Sat
37	105	115/82	24	89% on RA

FACILITATOR SHOULD ASK ABOUT THE DIFFERENTIAL DIAGNOSIS AT THIS POINT FOR URTICARIA/ANGIOEDEMA AND WHEEZING.

CLINICAL PROGRESSION:
The patient will continue to complain of itching, hives, swelling, and then develop shortness of breath and wheezing.

The patient is having anaphylaxis to antibiotic challenge. Correct management includes identifying wheezing, urticarial lesions, pruritus as consistent with anaphylaxis, administration of IM epinephrine, consideration of access and IVF and airway monitoring. Steroids, nebulizers, and/or antihistamine alone will cause the patient to decompensate. The patient will improve slightly after the initial dose of epinephrine, but will a repeat dose of epinephrine.

CLINICAL PROGRESSION:
History and physical performed, IV access and monitoring considered. The patient will continue to complain of itching, hives, swelling, and then develop shortness of breath and wheezing.

The patient is having anaphylaxis to antibiotic challenge. Correct management includes identifying wheezing, urticarial lesions, pruritus as consistent with anaphylaxis, administration of IM epinephrine, consideration of IVF and airway monitoring. Steroids, nebulizers, and/or antihistamine alone will cause the patient to decompensate. The patient will improve slightly after the initial dose of epinephrine, but will require glucagon, repeat doses of epinephrine and initiation of an epinephrine drip with transfer to the ED.

*****IF ALBUTEROL OR OTHER NEBULIZERS, STEROIDS, OR ANTIHISTAMINES ARE ADMINISTERED**

- Symptoms will improve temporarily with persistent wheezing, but slightly decreased work of breathing, RR will decrease, O2 sat will transiently increase, but then decline.

Temperature (ºC)	HR (bpm)	BP (mmHg)	RR (per min)	O_2 Sat
37	105	100/70	20	92%% on RA

- *After 2-3 minutes: Increased work of breathing, increased wheezing, RR increases, O2 decline.*

Temperature (ºC)	HR (bpm)	BP (mmHg)	RR (per min)	O_2 Sat
37	110	90/60	245	86% on RA

*****IF A SECOND ROUND OF ALBUTEROL OR OTHER NEBULIZERS ARE ADMINISTERED WITHOUT EPINEPHRINE**

- Symptoms will again only improve transiently, RR will decrease, O2 sat will transiently increase, but then decline.

Temperature (ºC)	HR (bpm)	BP (mmHg)	RR (per min)	O_2 Sat
37	105	90/70	20	88% on RA

- *After 2-3 minutes:*

Temperature (ºC)	HR (bpm)	BP (mmHg)	RR (per min)	O_2 Sat
37	110	88/60	25	84% on RA

*****IF OXYGEN ADMINISTERED BY FACE MASK WITHOUT EPINEPHRINE**

- Symptoms will remain unchanged with wheezing, chest tightness, O2 sat will improve slightly.

Temperature (ºC)	HR (bpm)	BP (mmHg)	RR (per min)	O_2 Sat
37	115	90/50	24	88% on 2-4L 92% on NRB

*****IF ONLY ANTIHISTAMINES ARE ADMINISTERED**

- There will be no effect.

*****IF EPINEPHRINE IM 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 thighat epinephrine IM 0.3MG at 1:1000 concentration

- RR/O2 sat improve. Patient appears slightly improves, however, still with some symptoms of pruritus, shortness of breath/wheezing.

Temperature (ºC)	HR (bpm)	BP (mmHg)	RR (per min)	O_2 Sat
37	99	110/65	20	95% on 2L

- And then after 5 minutes, the vitals worsen again with increased distress.

Temperature (ºC)	HR (bpm)	BP (mmHg)	RR (per min)	O_2 Sat
37	120	82/45	20	87% on 2L

*****IF EPINEPHRINE IM 0.3-0.5MG 1:1000 CONCENTRATION IS ADMINISTERED A SECOND TIME**

- Improvement in symptoms.

Temperature (ºC)	HR (bpm)	BP (mmHg)	RR (per min)	O_2 Sat
37	100	105/70	20	95% on 2L

- Team should discuss transfer to ED or calling EMS.

*****IF EPINEPHRINE IV BOLUS 1:10000 CONCENTRATION FROM THE CODE CART IS ADMINISTERED**

- The patient will become tachycardic and hypertensive and report chest pain

• Temperature (ºC)	HR (bpm)	BP (mmHg)	RR (per min)	O_2 Sat
37	145	180/100	20	98% on RA

*****IF EPINEPHRINE IS NOT ADMINISTERED**

- Patient becomes more distressed with increasing shortness of breath, wheezing, develops full body hives, rhinorrhea, eye watering, hypotension and tachycardia.

Temperature (ºC)	HR (bpm)	BP (mmHg)	RR (per min)	O_2 Sat
37	180	50/30	35	72% on RA