

Pharmacy Education: Graded Challenges & Antibiotic Allergy Documentation Consult

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On behalf of the Antimicrobial Stewardship Program

University of Nebraska
Medical Center



Nebraska
Medicine

Graded Challenges

- Used to assess tolerance in patients with self-reported allergies to beta-lactam antibiotics, like penicillin
 - Risk of reaction with appropriately administered graded challenge < 1%
 - If tolerated, patient is not allergic to that antibiotic
 - Can receive full doses in future without being challenged again
 - Different than desensitization process
- Can be **administered in all healthcare settings** (floor/wards, ICU, observation, ED, clinic, etc.)
- **UNMC/NM Guidance on antimicrobial website:**
 - https://www.unmc.edu/intmed/_documents/id/asp/2023_penicillinallergy_guidance.pdf
 - https://www.unmc.edu/intmed/_documents/id/asp_2023_non-pcn_bl_allergy_guidance.pdf



Comparison of Graded Challenge and Desensitization

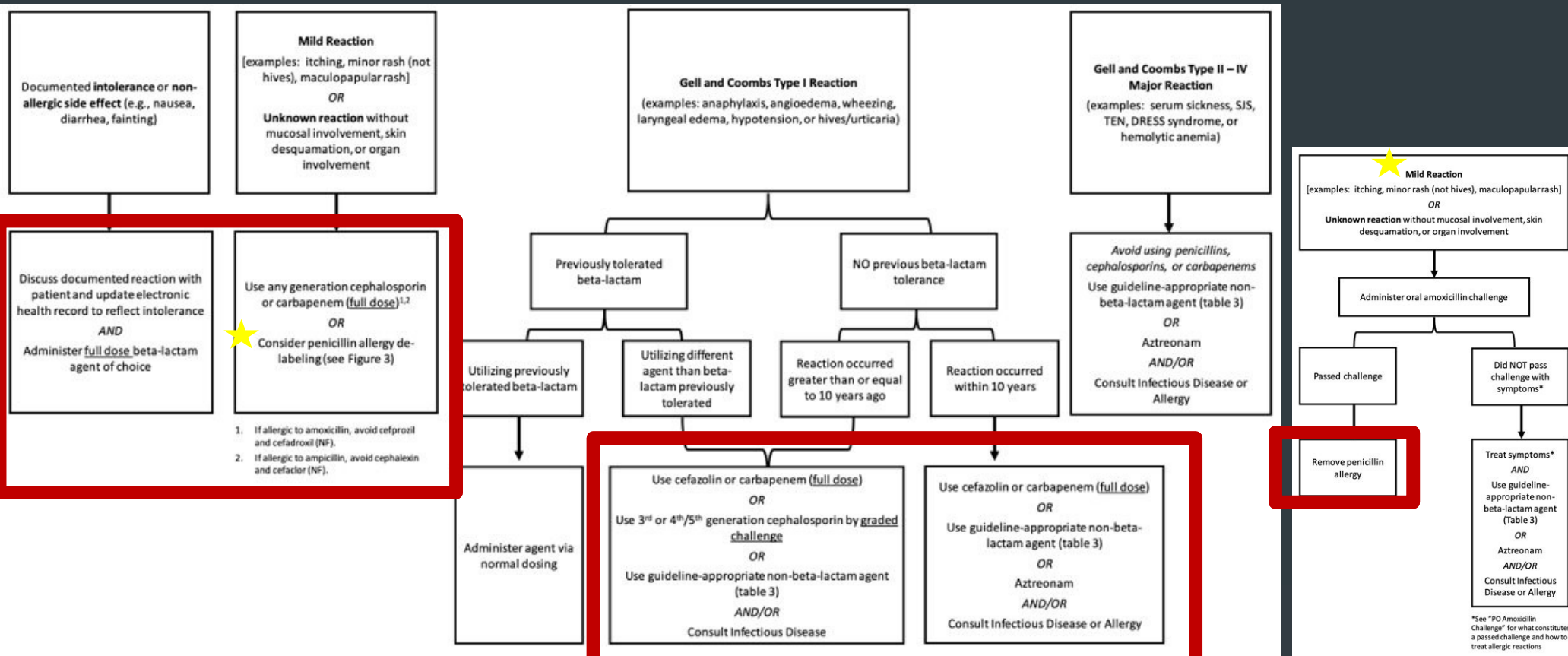
Graded Challenge	Desensitization
<ul style="list-style-type: none">• 2-3 step process starting with 1-10% of full dose• Assess tolerance to same antibiotic or related one (see UNMC guidance for eligibility criteria)• Proves patients are no longer allergic• Do NOT need to repeat for subsequent administration• Can be administered in any healthcare setting	<ul style="list-style-type: none">• 8-18 step process starting with <0.001% of full dose• Provides ability to safely administer antibiotic despite severe allergy to same agent• MUST repeat process for patients if there is any interruption in antibiotic therapy• Only administered in ICU due to more frequent monitoring requirements

Updated Penicillin Allergy Guidance

- Can administer full dose cefazolin or carbapenem regardless of penicillin allergy
- De-label penicillin allergy after successful oral amoxicillin challenge
- Consult to Pharmacy for Allergy Documentation



Updated Penicillin Allergy Guidance



New! Guidance on Treating Patients with Non-Penicillin Beta-Lactam Allergies

- If Mild Reactions (Type IV): Itching, maculopapular rash (not hives)
 - Can give full dose of beta-lactams with no or low structural similarity
 - Can consider graded challenge for beta-lactams with high structural similarity
 - May still result in delayed hypersensitivity



New! Guidance on Treating Patients with Non-Penicillin Beta-Lactam Allergies

- If IgE-mediated (Type I) Reactions: anaphylaxis, angioedema, wheezing, laryngeal edema, hypotension, or hives/urticaria
 - Reaction \geq 10 years ago
 - Can give full dose of BL with no structural similarity
 - Give graded challenge if some structural similarity
 - Reaction < 10 years ago
 - Can give graded challenge for beta-lactams with no or low structural similarity
 - Can consider graded challenge for beta-lactams with high structural similarity



Beta-Lactam Cross Reactivity

Beta-Lactam Cross Reactivity		PCNs					1st Gen CPNs			2nd Gen CPNs				3rd Gen CPNs				4th Gen CPN	Advanced CPNs			CARB	MONO		
		Penicillin G/V	Oxacillin	Amoxicillin	Ampicillin	Piperacillin	Cefadroxil	Cephalexin	Cefazolin	Cefaclor	Cefoxitin	Cefprozil	Cefuroxime	Cefdinir	Cefotaxime	Cefpodoxime	Ceftazidime	Ceftriaxone	Cefepime	Ceftaroline	Ceftolazone	Cefiderocol	Ertapenem	Meropenem	Aztreonam
PCNs	Penicillin G/V																								
	Oxacillin																								
	Amoxicillin																								
	Ampicillin																								
	Piperacillin																								
1st Gen CPNs	Cefadroxil																								
	Cephalexin																								
	Cefazolin																								
2nd Gen CPNs	Cefaclor																								
	Cefoxitin																								
	Cefprozil																								
	Cefuroxime																								
3rd Gen CPNs	Cefdinir																								
	Cefotaxime																								
	Cefpodoxime																								
	Ceftazidime																								
	Ceftriaxone																								
4th Gen CPN	Cefepime																								
Advanced CPNs	Ceftaroline																								
	Ceftolazone																								
	Cefiderocol																								
CARB	Ertapenem																								
	Meropenem																								
MONO	Aztreonam																								

NO STRUCTURAL SIMILARITY

Cross reaction unlikely, no R1 or R2 side chain similarity

LOW STRUCTURAL SIMILARITY

Cross reaction less likely, similar R1 or R2 side chain

HIGH STRUCTURAL SIMILARITY

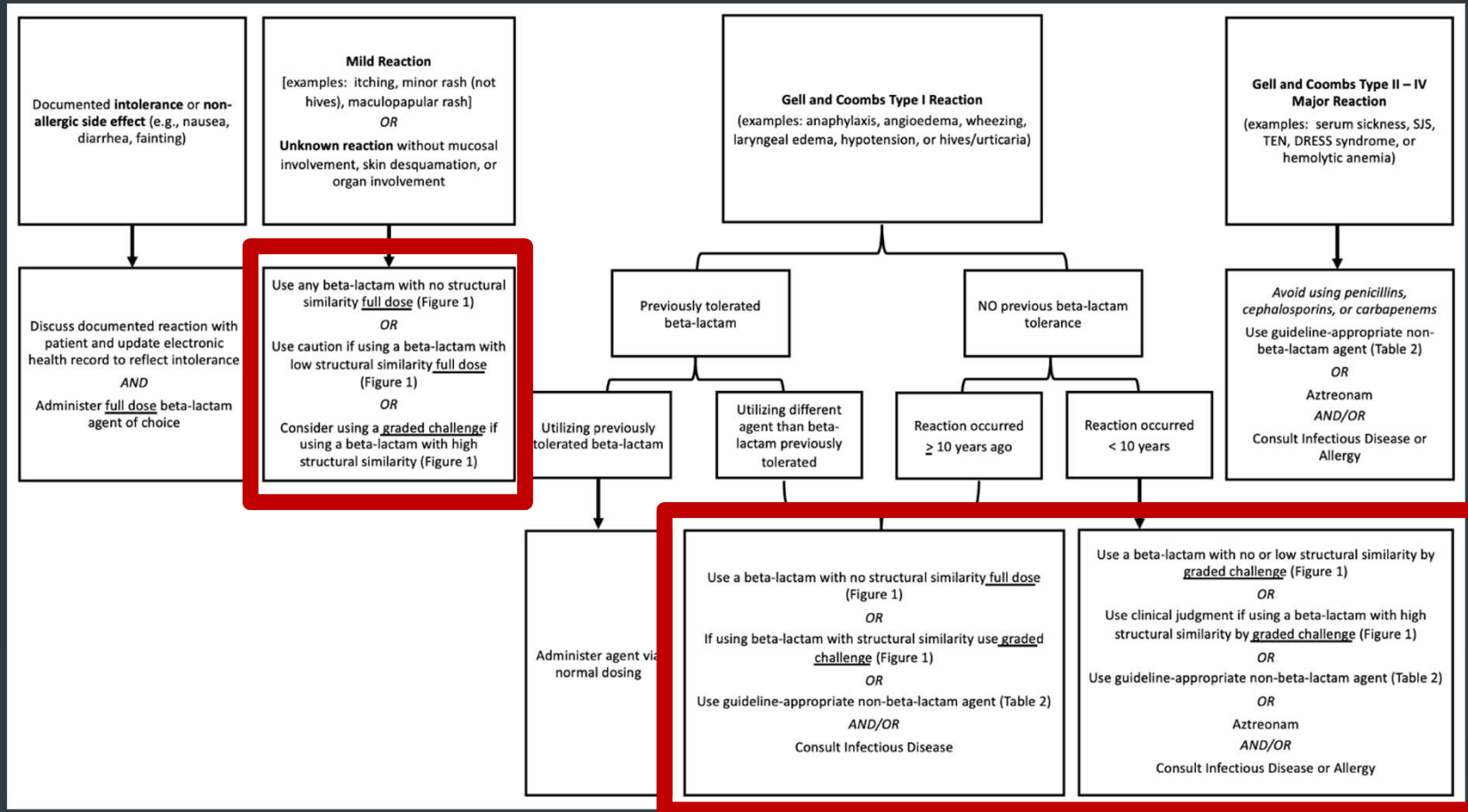
Cross reaction likely, identical R1 or R2 side chain

PCNs = penicillins
CPNs = cephalosporins

CARB = carbapenems
MONO = monobactams



New! Non-Penicillin Beta-Lactam Allergy Guidance

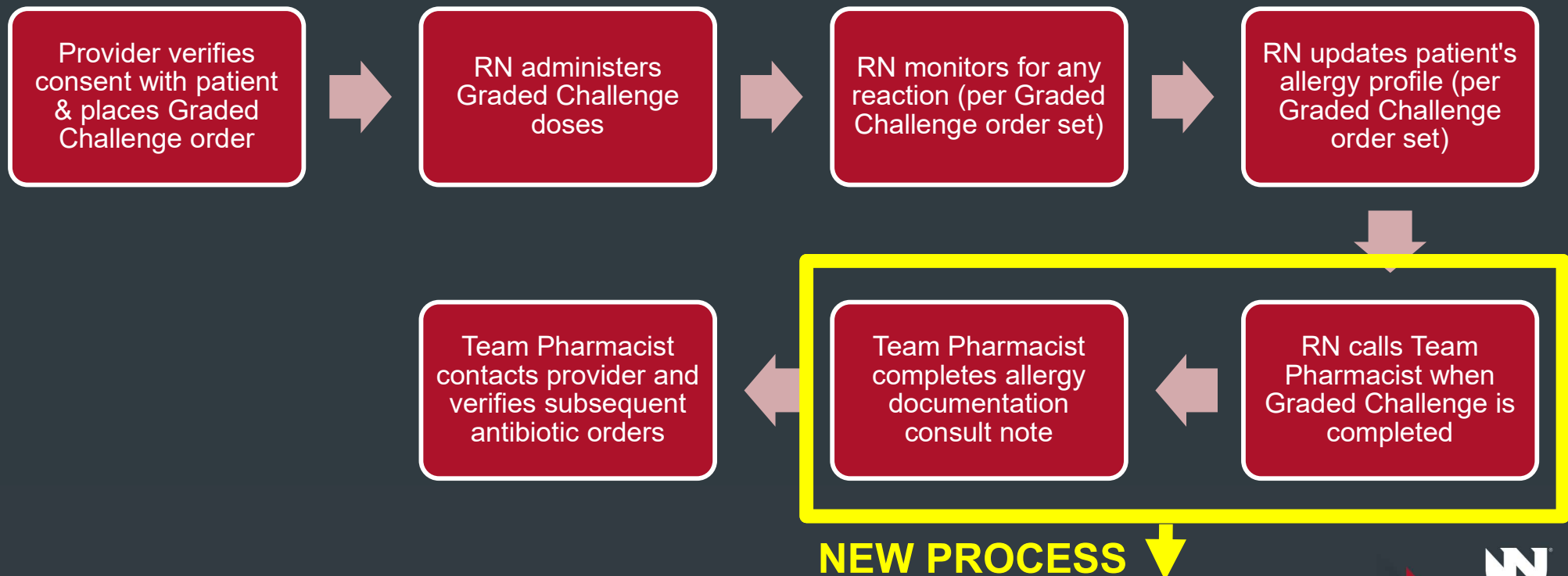


NEW PROCESS/WORKFLOW

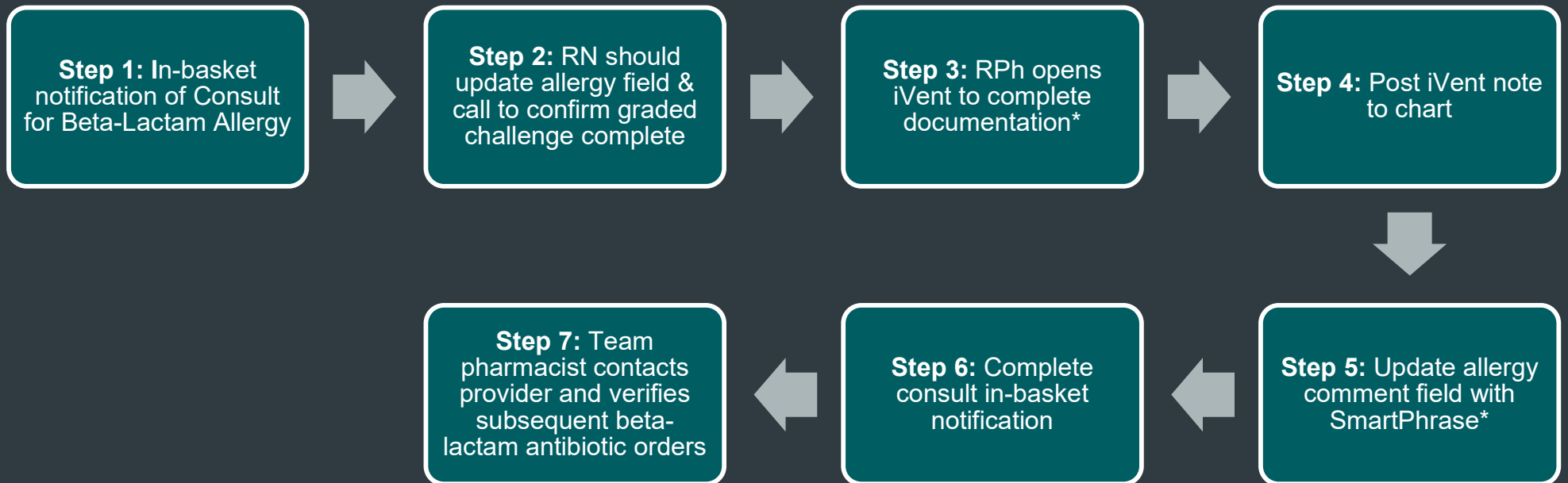
Pharmacy Consult: Beta-Lactam Allergy Documentation



Process for Beta-Lactam Graded Challenge and Updated Allergy Documentation



Overview of Process for Completing Allergy Documentation Consult



***See following slides for more detailed information on specific steps**



Step 3: Beta-Lactam Allergy iVent

New i-Vent

Type	Subtype	Status	Significance	Value	Time spent	Response	Outcomes
Consult	Beta-Lactam Allergy Documentation	Open	Medium	50.00	20min	Accepted	Optimized Therapy

Associated Orders

Order Name or ID **+ Add**

Associated Users

User Role

Documentation

Beta-Lactam Allergy Update Consult

Adult Willow (MRN:05000040) was assessed by *** for review of beta-lactam allergy. Based on review, {Select appropriate option:37746}

- **Associated Orders:** link the consult
- **Associated Users:** link the provider that placed the consult
- **How to fill out the iVent**
 - “Assessed by” field should be the provider that placed the consult order
 - “Based on review” options include:
 - Allergy removed
 - Direct IV beta-lactam graded challenge
 - Direct PO challenge
 - Direct cephalosporin use



Step 3: “Allergy Removed” Option

- Select this option if it was assessed that patient’s self-reported beta-lactam allergy is a documented intolerance, non-allergic side effect, etc.
 - Note: allergy should then be removed/deleted from patient profile, when appropriate (a record is kept in case it is re-added)

Beta-Lactam Allergy Update Consult

Adult Willow (MRN:05000040) was assessed by *** for review of beta-lactam allergy. Based on review, Beta-lactam allergy removed.

Based on history of {Select most appropriate:37741}, it was deemed the patient was not allergic to the beta-lactam {Select one:37742} and allergy was removed from the patient's chart per Nebraska Medicine [Penicillin Allergy Guidance](#) or Non-Penicillin Beta-Lactam Allergy Guidance.

- ☐ a documented intolerance of ***
- ☐ a non-allergic side effect of ***
- ☐ an allergy entered in error
- ☐ ***

Beta-Lactam Allergy Update Consult

Adult Willow (MRN:05000040) was assessed by *** for review of beta-lactam allergy. Based on review, Beta-lactam allergy removed.

Based on history of {Select most appropriate:37741}, it was deemed the patient was not allergic to the beta-lactam {Select one:37742} and allergy was removed from the patient's chart per Nebraska Medicine [Penicillin Allergy Guidance](#) or Non-Penicillin Beta-Lactam Allergy Guidance.

- ☐ penicillin
- ☐ cephalosporin
- ☐ carbapenem



Step 3: “Direct IV Beta-Lactam Graded Challenge” Option

- Select this option if provider placed an order for IV beta-lactam graded challenge
 - Note: assess that patient qualifies for IV graded challenge per ASP allergy guidance documents

Beta-Lactam Allergy Update Consult

Adult Willow (MRN:05000040) was assessed by *** for review of beta-lactam allergy. Based on review, patient received IV beta-lactam graded challenge.

Patient required treatment with {Select agent:37744} for ***. Based on the [Penicillin Allergy Guidance](#) or Non-Penicillin Beta-Lactam Allergy Guidance, the benefit of using the antibiotic to treat infection was higher than the risk of reaction to the antibiotic. Consent was obtained. The patient received the antibiotic per IV graded challenge protocol at 1/100th, 1/10th, and full dose with 30 minutes in-between each dose. The patient was monitored for the entire challenge and 30 minutes after the last dose. Patient had {Select result:37745}. Penicillin allergy was updated in the chart. If further evaluation is needed, please consult Allergy as an outpatient by calling 402-555-1234.

- ☐ cefTRIAxone
- ☐ ceFEPIme
- ☐ ceftAZidime/avibactam
- ☐ ceftolozane/tazobactam
- ☐ ertapenem
- ☐ meropenem

Beta-Lactam Allergy Update Consult

Adult Willow (MRN:05000040) was assessed by *** for review of beta-lactam allergy. Based on review, patient received IV beta-lactam graded challenge.

Patient required treatment with {Select agent:37744} for ***. Based on the [Penicillin Allergy Guidance](#) or Non-Penicillin Beta-Lactam Allergy Guidance, the benefit of using this beta-lactam to treat infection was higher than the risk of reaction to the antibiotic. Consent was obtained. The patient received the antibiotic per IV graded challenge protocol at 1/100th, 1/10th, and full dose with 30 minutes in-between each dose. The patient was monitored for the entire challenge and 30 minutes after the last dose. Patient had {Select result:37745}. Penicillin allergy was updated in the chart. If further evaluation is needed, please consult Allergy as an outpatient by calling 402-555-1234.

- ☐ no reaction to the challenge and can receive this antimicrobial in normal fashion for future administration
- ☐ had *** symptoms and the challenge was discontinued
- ☐ ***

Step 3: “Direct PO Challenge” Option

- Select this option if provider placed an order for the oral amoxicillin challenge
 - Note: penicillin allergy should be removed/deleted from patient profile if patient tolerates PO amoxicillin challenge

Beta-Lactam Allergy Update Consult

Adult Willow (MRN:05000040) was assessed by *** for review of beta-lactam allergy. Based on review, patient received direct PO amoxicillin graded challenge.

Patient determined to be low risk and a candidate for direct oral amoxicillin challenge based on the [Penicillin Allergy Guidance](#). Consent was obtained. The patient received amoxicillin 25 mg and then 250 mg approximately 30 min later. Patient was monitored for a total of 60 minutes. Patient {Select result:37743}. Penicillin allergy was updated in the chart.

- ☒ had no reaction
- ☐ had *** symptoms and was treated with ***
- ☐ ***



Step 3: “Direct Cephalosporin Use” Option

- Select this option if provider placed an order for direct “full dose” beta-lactam in patient with self-reported beta-lactam allergy
 - Note: assess that patient qualifies for direct “full dose” per ASP allergy guidance documents

Beta-Lactam Allergy Update Consult

Adult Willow (MRN:05000040) was assessed by *** for review of beta-lactam allergy. Based on review, patient received direct cephalosporin use.

Patient determined to be low risk and a candidate for cephalosporin use at full dose without further assessment based on the [Penicillin Allergy Guidance](#) document or Non-Penicillin Beta-Lactam Allergy Guidance. Beta-lactam allergy was updated in chart. If further evaluation is needed, please consult Allergy as an outpatient by calling 402-559-4015 to schedule.



Step 5: Allergy Comment Field

- Allergy “Storyboard”

- Update the comment section of the beta-lactam allergy using the **“.RxBetaLactamAllergyUpdate”** smart phrase
- Even if the beta-lactam allergy is removed/deleted, still update the comment section as this will be saved in record

Allergies:

Amoxicillin-pot Clavulanate

ADMITTED: 1/18/2023 (5 D)

Patient Class: Inpatient

Expected Discharge: Today

Osteomyelitis of skull (HCC)

Wt	Ht	Dos	Wt
98.1 kg	180.3 cm	—	

BMI	BSA
30.15 kg/m ² !	2.22 m ²

Allergies/Contraindications

CrCl:

Add a new agent ☐ Full Search

[View Drug-Allergy Interactions](#)

Reaction	Severity	Reaction Type	Noted
Amoxicillin-pot Clavulanate pt developed a rash after taking augmentin, his Dr office was not sure if this was an allergy or not Tolerated oxacillin graded challenge on 1/21/23	Rash High	Allergy	11/14/2022
Seasonale (91) (Levonorgestrel-ethinyl-Estrad) Deletion Reason: Erroneous Entry	Nasal congestion Not Specified	Contraindication	11/14/2022

Fully Reviewed



☒ Mark as Reviewed



Last Reviewed by Maria D Barrios, RN on 1/18/2023 at 11:46 AM: Fully Reviewed [Past Reviews](#)

Questions about Graded Challenge Process?

- Page On-Call Antimicrobial Stewardship Pharmacist
 - 888-0349
- And/or contact any of the Infectious Diseases Pharmacists
 - Voalte: Antimicrobial Stewardship Pharmacist



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