

Supplementary Material

Figure S1: Penicillin Allergy History Toolkit (Adapted from Shenoy et al. JAMA 321.2 (2019): 188-199)

Agent/Route: _____ Date of Reaction _____

Reaction history (check all that apply):

Risk Level	Reaction
Intolerance	<input type="checkbox"/> Isolated GI upset (diarrhea, nausea, vomiting, abdominal pain) <input type="checkbox"/> Chills <input type="checkbox"/> Headache <input type="checkbox"/> Fatigue
Low risk	<input type="checkbox"/> Family history <input type="checkbox"/> Itching WITHOUT rash (pruritus) <input type="checkbox"/> Unknown, remote (>10 years ago) reaction <input type="checkbox"/> Patient denies allergy but is on record
High risk (potential IgE reactions)	<input type="checkbox"/> Anaphylaxis <input type="checkbox"/> Angioedema <input type="checkbox"/> Bronchospasm (chest tightness) <input type="checkbox"/> Cough <input type="checkbox"/> Nasal symptoms <input type="checkbox"/> Arrhythmia <input type="checkbox"/> Throat tightness <input type="checkbox"/> Hypotension <input type="checkbox"/> Flushing/redness <input type="checkbox"/> Shortness of breath <input type="checkbox"/> Rash, type of rash (if known): _____ <input type="checkbox"/> Syncope/pass out <input type="checkbox"/> Wheezing <input type="checkbox"/> Dizzy/lightheadedness
Severe risk (potential severe none-immediate reactions)	<input type="checkbox"/> Steven-Johnson syndrome (rash with mucosal lesions) <input type="checkbox"/> Serum sickness (rash with joint pain, fever, myalgia) <input type="checkbox"/> Thrombocytopenia <input type="checkbox"/> Fever (not from infection) <input type="checkbox"/> Organ injury (liver, kidney) <input type="checkbox"/> Erythema multiforme (rash with target lesions) <input type="checkbox"/> Dystonia <input type="checkbox"/> Anemia <input type="checkbox"/> Acute generalized exanthematous (rash with pustules) <input type="checkbox"/> Drug reaction eosinophilia and systemic symptoms (rash with eosinophilia and organ injury)
Other	<input type="checkbox"/> Other symptoms not listed above: _____
Beta-lactam use	<input type="checkbox"/> Penicillin or beta-lactam use after documented reactions/allergy (patient reported vs chart review): Patient reported: Chart review:

History Taken by: _____ Date: _____

Figure S2: Template to document in allergy section

Smartphrase: “.PCNALLERGYUNKNOWN”

Infectious Diseases pharmacist completed allergy assessment. Unable to determine risk. Patient has tolerated [LIST PREVIOUS TOLERATED AGENTS] in the past. Penicillin Allergy Factsheet handout by CDC was given. See progress note from pharmacist on [DATE].

Smartphrase: “.PCNALLERGYINTOLERANCE”

Infectious Diseases pharmacist completed allergy assessment. Allergy determined to be intolerance. It is safe to use [AGENT] for this patient. Patient has tolerated [LIST PREVIOUS TOLERATED AGENTS] in the past. Will likely tolerate [CEPHALOSPORINS], as these do not share side chains and risk for cross-reactivity is low. Penicillin Allergy Factsheet handout by CDC was given. See progress note from pharmacist on [DATE].

Smartphrase: “.PCNALLERGYLOWRISK”

Infectious Diseases pharmacist completed allergy assessment. Allergy determined to be low-risk. Patient has tolerated [LIST PREVIOUS TOLERATED AGENTS] in the past. Will likely tolerate [CEPHALOSPORINS], as these do not share side chains and risk for cross-reactivity is low. Penicillin Allergy Factsheet handout by CDC was given. This patient may be a good candidate for direct oral challenge. See progress note from pharmacist on [DATE].

Smartphrase: “.PCNALLERGYHIGHRISK”

Infectious Diseases pharmacist completed allergy assessment. Allergy determined to be high-risk. Patient has tolerated [LIST PREVIOUS TOLERATED AGENTS] in the past. Will likely tolerate [CEPHALOSPORINS], as these do not share side chains and risk for cross-reactivity is low. Penicillin Allergy Factsheet handout by CDC was given. See progress note from pharmacist on [DATE].

Smartphrase: “.PCNALLERGYSEVERERISK”

Infectious Diseases pharmacist completed allergy assessment. Allergy determined to be high-risk. Do not recommend skin testing or challenge. Patient has tolerated [LIST PREVIOUS TOLERATED AGENTS] in the past. Will likely tolerate [CEPHALOSPORINS], as these do not share side chains and risk for cross-reactivity is low. Penicillin Allergy Factsheet handout by CDC was given. See progress note from pharmacist on [DATE].

Figure S3: Template progress note

Smartphrase: ".PCNALLERGYASSESSMENT"

Penicillin Allergy History Assessment

Assessment performed on [DATE] by [NAME, CREDENTIALS]

Patient name: ***

DOB: ***

Patient reported following reactions to [NAME OF PENICILLIN AGENT].

Intolerance: ***

Low risk: ***

Moderate-high risk: ***

High risk: ***

Other symptoms: ***

Penicillin Allergy Factsheet handout given: Y/N

Onset of symptoms after starting antibiotics was *** and patient received treatment with *** following the reaction. This reaction occurred *** (time frame) ago. PRIOR to this reaction, patient has tolerated ***. AFTER the reaction, patient has tolerated *** without complications.

Based on the history provided by the patient, this allergy has been deemed (low/intermediate/high) risk. Allergy list was updated to reflect this information.

Penicillin and cephalosporin allergies only show cross-reactivity if two agents have structural resemblance in side chains. Shown below are beta-lactam antibiotics with common side chains. Agents that do not share structural similarities in side chains do not have cross-reactivity. Refer to the table below and previously tolerated antibiotics in guiding antibiotic choice. This table was adopted from article by Zagursky et al. "Cross-reactivity in β -lactam allergy." Published in *The Journal of Allergy and Clinical Immunology: In Practice* 6.1 (2018): 72-81. to reflect products available in the US.

Date/time:

Name:

Phone: ***

Pager: ***

Penicillin and Cephalosporin Side Chains³

	Nafcillin	Oxacillin	Dicloxacillin	Penicillin G/V	Piperacillin	Ampicillin	Amoxicillin	Cefadroxil	Cephalexin	Cefazolin	Cefoxitin	Cefuroxime	Cefotetan	Cefprozil	Cefaclor	Ceftibuten	Cefdinir	Cefixime	Ceftriaxone	Cefditoren	Cefotaxime	Cefpodoxime	Ceftazidime	Cefepime	Ceftaroline	Ceftolozane
Nafcillin																										
Oxacillin			X																							
Dicloxacillin		X																								
Penicillin G/V				X	X	X	X	X	X					X	X											
Piperacillin				X	X	X	X	X	X					X	X											
Ampicillin				X	X	X	X	X	X					X	X											
Amoxicillin				X	X	X	X	X	X					X	X											
Cefadroxil				X	X	X	X	X	X					X	X											
Cephalexin				X	X	X	X	X	X					X	X											
Cefazolin																										
Cefoxitin												X									X					
Cefuroxime											X	X							X	X	X	X		X	X	
Cefotetan																			X	X	X					
Cefprozil				X	X	X	X	X	X						X											
Cefaclor				X	X	X	X	X	X					X												
Ceftibuten																	X	X	X	X	X	X	X	X	X	
Cefdinir																	X	X	X	X	X	X	X	X	X	
Cefixime												X					X	X	X	X	X	X	X	X	X	
Ceftriaxone												X					X	X	X	X	X	X	X	X	X	
Cefditoren												X					X	X	X	X	X	X	X	X	X	
Cefotaxime											X	X					X	X	X	X	X	X	X	X	X	
Cefpodoxime												X					X	X	X	X	X	X	X	X	X	
Ceftazidime																	X	X	X	X	X	X	X	X	X	
Cefepime												X					X	X	X	X	X	X	X	X	X	
Ceftaroline																	X	X	X	X	X	X	X	X	X	
Ceftolozane																	X	X	X	X	X	X	X	X	X	

X	= highest risk of cross-reactivity, fully identical side chains	X	= moderate risk of cross-reactivity, partially identical side chains	X	= low risk of cross-reactivity, similarities in side chains		= no similarities in side chains, very low to no risk of cross-reactivity
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