

# Ruling out penicillin allergy at a university hospital: proof of concept

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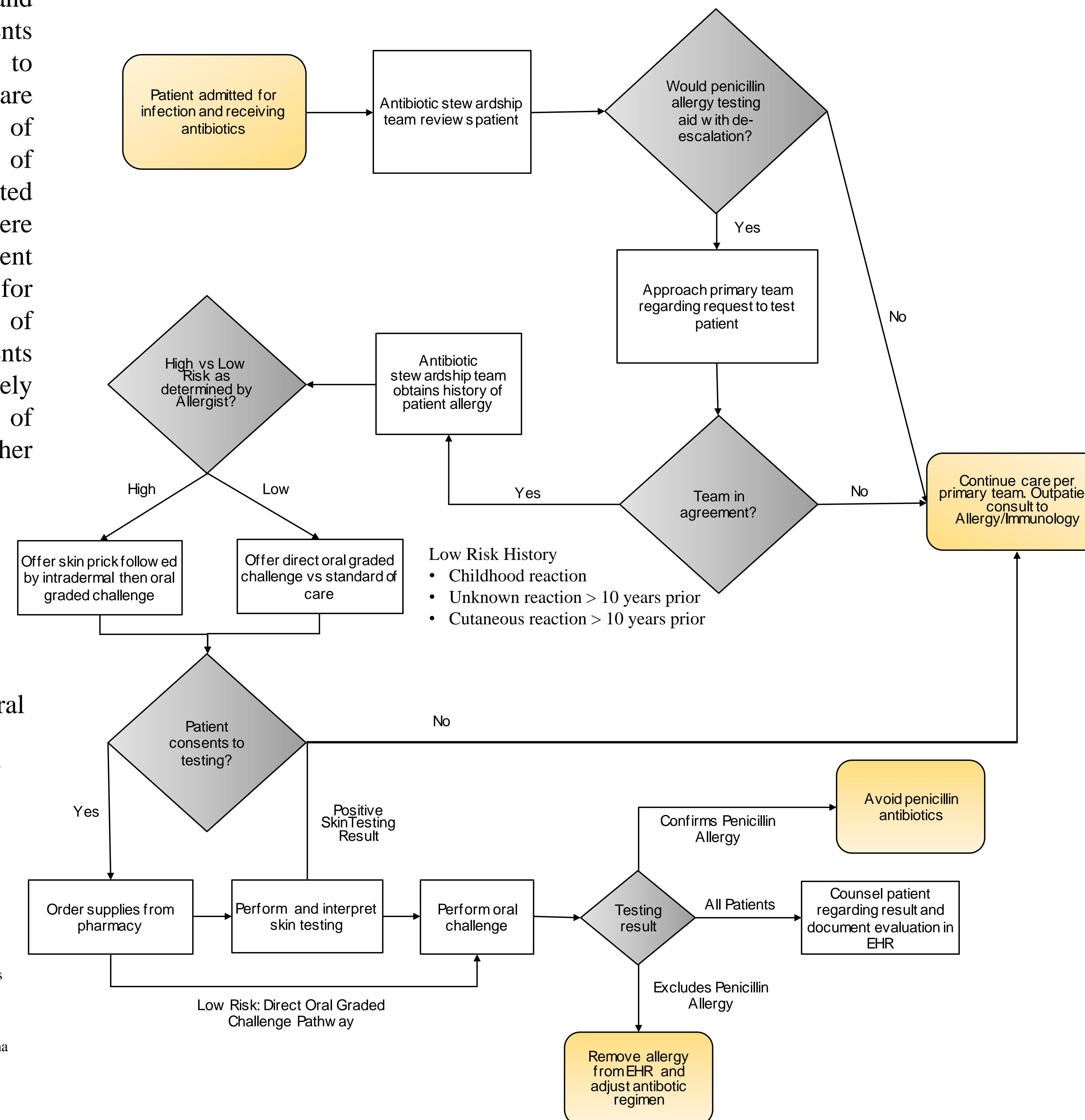
## Abstract

Reported penicillin allergy results in excessive antibiotic use, complications, and cost. We hypothesized that a protocol evaluating penicillin allergy in inpatients with skin prick testing, intradermal testing and graded oral challenge to amoxicillin would reduce excessive antibiotics, complications, and healthcare costs. Patients with penicillin allergy who were admitted to the University of Colorado Hospital, were on antibiotics and would benefit from de-escalation of therapy were selected for the study. Patients with negative testing were educated regarding their results, the electronic health record was updated, and patients were given documentation describing their test result. 30 patients ultimately underwent evaluation. We found that a large majority of patients tested negative for penicillin allergy, passed their oral challenges, and underwent de-escalation of antibiotic therapy. Antibiotic complications were not observed in patients undergoing testing. Evaluating inpatients for penicillin allergy effectively changed prescribing patterns on an initial intervention. This initial proof of concept could serve as a model for resource devotion and expansion to other affiliate hospitals.

## Background

- Approximately 10% of patient allergy lists include penicillin.<sup>1,2,3</sup>
- Utilization of skin testing to evaluate penicillin allergy has been validated to have a greater than 90% negative predictive value (NPV). Use of a graded oral challenge after negative skin testing was demonstrated to further increase NPV to 99% after further data evaluating skin testing alone revealed a lower NPV than initially realized.<sup>4,5,6</sup>
- Recent data suggests that a direct to oral challenges is safe in patients with remote, low risk, history.<sup>7</sup>

## Methods/Process



## Results

	Number of patients	Percent of patients	
Penicillin Allergy Excluded	26	86.7%	
Penicillin Allergy Confirmed	2	6.6%	
Non-specific Rash to Oral Challenge*	2	6.6%	
Antibiotic Complications <sup>^</sup>	3	10%	
Mean Antibiotic Days with Penicillin Allergy Confirmed	53.3 days		
Mean Antibiotic Days with Penicillin Allergy Excluded	37.6 days		
	Pre	Post	Percent Change
Beta Lactam Prescribing	13	23	180%
Penicillin Prescribing	2	16	800%
Antibiotic Cost Savings Per Patient <sup>#</sup>	\$567		

\*No severe reactions documented, 2 patients with erythematous maculopapular rash not consistent with urticaria after oral challenge

<sup>^</sup>All 3 individuals carried MDRO diagnosis prior to penicillin allergy evaluation

<sup>#</sup>Analysis includes average cost of penicillin evaluation.

## Conclusion

- Our algorithm is safe, and effective at ruling out penicillin allergy in patients that would benefit from more tailored antibiotic therapy.
- We demonstrated cost savings in antibiotic costs when including the cost of penicillin allergy testing.
- Penicillin and beta lactam prescribing patterns were changed as a result of evaluation.
- Implementation of direct to oral challenge will streamline enrollment and reduce costs.
- Resource devotion to test patients earlier in admission will increase cost savings.
- Direct to oral challenge can be an option in practice settings where allergy/immunology expertise for skin testing is not routinely available.

- References:
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