Reassessment of Documented Penicillin Allergies: Implications on Antibiotic Selection and Clinical Outcomes in Hospitalized Adults

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BACKGROUND

- Up to 90% of individuals in the U.S. who report a penicillin allergy are not truly allergic[1,2].
- Avoidance of penicillins increases treatment cost by adding between $1,145 to $4,254 per inpatient case[3].
- Using alternative antibiotics contributes to antibiotic resistance[4-8].

OBJECTIVES

- Assess the prevalence of true allergic reactions among patients with a reported history of penicillin allergies.
- Determine the impact of documented penicillin allergies on alternative antibiotic prescribing.

METHODS

- This retrospective study investigated allergic reactions in hospitalized adult patients with reported allergies to a penicillin.
- Data was collected from 13 HSHS inpatient facilities between January 2022 and May 2024.
- Patient information was obtained through Epic's SlicerDicer and Epic Clarity, with additional chart reviews for accuracy.
- The study assessed allergic reaction incidence as the primary outcome, and penicillin avoidance with an alternative antibiotic as the secondary outcome.

RESULTS

Table 1: Baseline Demographics

	Total Patients *n* = 4456	Alternative Antibiotic *n* = 3678	Administered Penicillin *n* = 778
Age (years) [SD]			
Mean	60.7 [20.9]	60.8 [21]	60.5 [20.7]
Legal Sex (*n*) [%]			
Male	1514 [34]	1241 [33.7]	273 [35.1]
Female	2942 [66]	2437 [66.3]	505 [64.9]
Race (*n*) [%]			
Black or African American	355 [8]	268 [7.3]	87 [11.2]
Other	25 [0.5]	16 [0.4]	9 [1.1]
Patient Declined	22 [0.5]	15 [0.4]	7 [0.9]
White or Caucasian	4054 [91]	3379 [91.9]	675 [86.8]

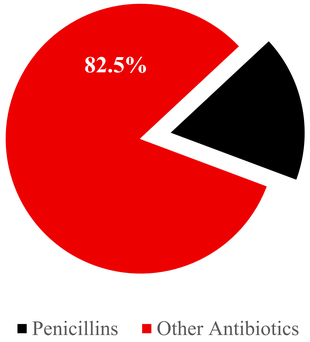
Table 2: Initial Documented Reaction to Penicillin

Documented Reaction (*n*) [%]	Total Patients *n* = 4456	Alternative Antibiotic *n* = 3678	Administered Penicillin *n* = 778
Anaphylaxis	145 [3.3]	122 [3.3]	23 [3]
Angioedema	191 [4.3]	166 [4.5]	25 [3.2]
Diarrhea	319 [7.2]	259 [7]	60 [7.7]
GI Upset	209 [4.7]	179 [4.9]	30 [3.9]
Hives	902 [20.2]	785 [21.3]	117 [15]
Itching	143 [3.2]	111 [3]	32 [4.1]
Nausea	103 [2.3]	75 [2]	28 [3.6]
Other	64 [1.4]	32 [0.9]	32 [4.1]
Rash	956 [21.5]	780 [21.2]	176 [22.6]
Shortness of Breath	35 [0.8]	31 [0.8]	4 [0.5]
Unknown	922 [20.7]	751 [20.4]	171 [22]
Vomiting	467 [10.5]	387 [10.5]	80 [10.3]

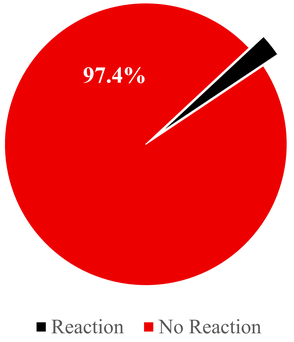
Table 3: Antibiotic Class of Alternative Antibiotic

Antibiotic Class (*n*)	Alternative Antibiotic *n* = 3678
Not Cephalosporin	1646
Cephalosporin	2032

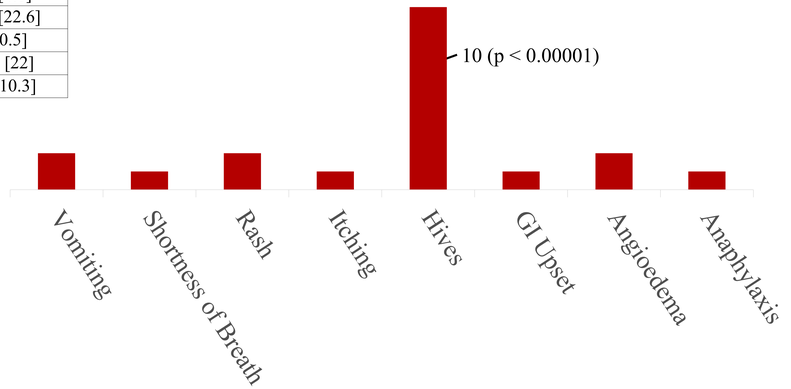
Antibiotic Choice for Patients with Reported Penicillin Allergy



Reactions to Penicillin Upon Re-Exposure



Documented Re-Reaction



CONCLUSION

- Of the 17.5% of patients with a documented allergy that received penicillin, only 2.6% re-reacted to exposure. A majority of patients tolerated a penicillin without adverse effects, indicating that many documented allergies may be inaccurate.
- With 50% of re-reactions being hives, differing procedures may be appropriate based on the original reported reaction to penicillin. Future research can focus on implementing systematic penicillin allergy testing and re-evaluation protocols, especially with reactions such as hives. By identifying true penicillin tolerance, we can minimize the risks associated with alternative antibiotic use, such as increased resistance and increased healthcare costs.
- Of patients who received an alternative antibiotic, 2,032 (55.2%) patients were administered cephalosporins. Further studies are needed to evaluate the incidence of allergic reactions in patients with reported penicillin allergies who are administered cephalosporins to better understand cross-reactivity and guide safe prescribing practices.
- This study revealed disparities in care: 24.5% of Black or African American patients received a penicillin despite a documented allergy, compared to 16.6% of White or Caucasian patients ($p = 0.000353$). Further research should be conducted to determine if a correlation between allergy response and race exists.

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