Development of a Pathway for Removal of Inappropriate Penicillin Allergy Labels in Hospitalized Patients

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Background

- >90% of reported penicillin allergies are found inaccurate when formally assessed[1,2].
- Inappropriate allergy labels lead to decreased utilization of first-line beta-lactam antibiotics, and adverse clinical outcomes[1,3].
- The objective of this study was to develop a multi-disciplinary approach to decrease inaccurate labeling among hospitalized patients with documented penicillin allergy.

Methods

- A team of clinicians, pharmacists, and nurses utilized the DMAIC (Define, Measure, Analyze, Intervene, Control) quality strategy to improve accuracy of penicillin allergy labeling.
- Allergic reactions were stratified to develop a penicillin allergy de-labeling algorithm (**Figure 1**).
- Admission to the intensive care unit (ICU) for anaphylaxis was defined as a balancing measure.
- Baseline data from patients with a documented penicillin allergy admitted to a single inpatient floor at Mayo Clinic, Rochester between June and October 2019 were reviewed.
- A cause and effect diagram was used to conduct a root cause analysis.
- The predefined algorithm was then implemented among patients who reported penicillin allergy admitted to the same floor from November 2019 to January 2020.
- Study data were collected and basic descriptive statistics generated.

Figure 1: Penicillin Allergy Delabeling Algorithm

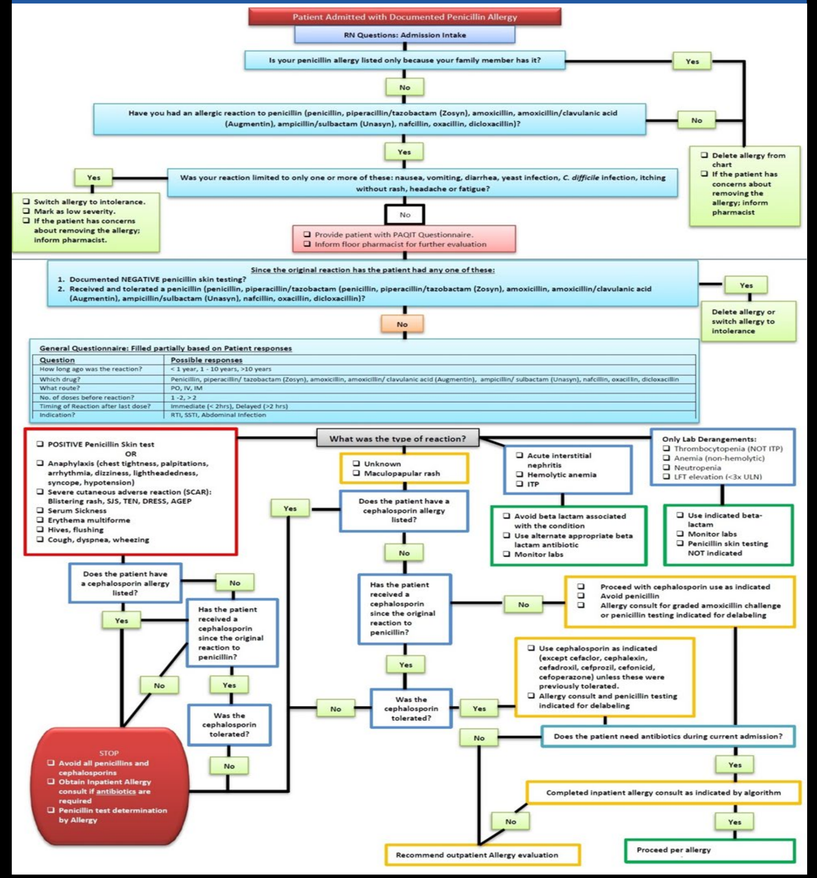

Figure 2: Graphic Representation of Proportion of Type of Documented Allergic Reactions to Penicillin

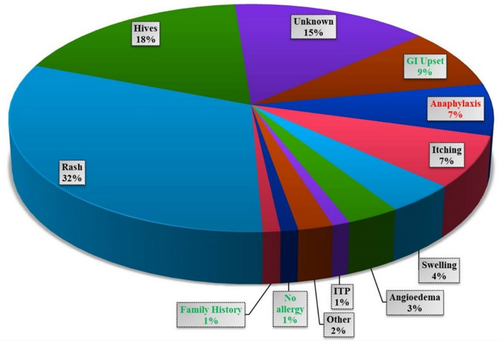

Table 1: Metrics and Outcomes at Baseline and During Successive PDSA Cycles

	Baseline, n (%) (Jun 11, 2019 – Oct 31, 2019)	PDSA Cycle 1, n (%) (Nov 11, 2019 – Dec 11, 2019)	PDSA Cycle 2, n (%) (Dec 12, 2019 – Jan 11, 2020)
Documented penicillin allergy	96	16	24
Nursing intervention (%)	0 (0)	4 (25)	19 (80)
Eligibility for intervention by pharmacists (%)	--	3/4 (75)	11/19 (58)
Intervention by pharmacists (%)	--	1/3 (33)	9/11 (82)
Eligibility for review by allergists after pharmacists' review (%)	--	1/1 (100)	7/9 (77)
Intervention by allergists	--	0	0
Penicillin allergy de-labeled per protocol (%)	2 (2%)	0 (0)	9/19 (47.4)
Eligible for cephalosporin use (%)	--	1/4 (25)	7/19 (37)

Results

- 96 patients were included in the control group with mean age of 71 years (range 65-84) and 55% females.
- Breakdown of documented allergic reactions are represented in **Figure 2**.
- 58 (60%) received an antibiotic for a median duration of 1.5 days (IQR: 0 – 6). Of these, 7(12%) received penicillin-class antibiotics, and 41 (70.6%) received non-beta-lactam antibiotics.
- 2 (2%) of these patients were de-labeled without any penicillin skin tests.
- Detailed metrics of each PDSA cycle are shown in **Table 1**. During PDSA cycle 2, inaccurate penicillin documentation was removed in 9/19 (47.4%) of hospitalized patients.
- There were no ICU admissions for anaphylaxis.

Conclusions

- Multiple factors contribute to penicillin allergy mislabeling.
- Our comprehensive algorithm addresses nuances of penicillin allergic reactions and increased accurate penicillin allergy labeling in 47.4% of the cases.
- Beta-lactam use also increased to 37% through our pilot project while maintaining patient safety.
- A multidisciplinary and patient-centered approach aligned with institutional workflows is necessary to improve patient outcomes.

References

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