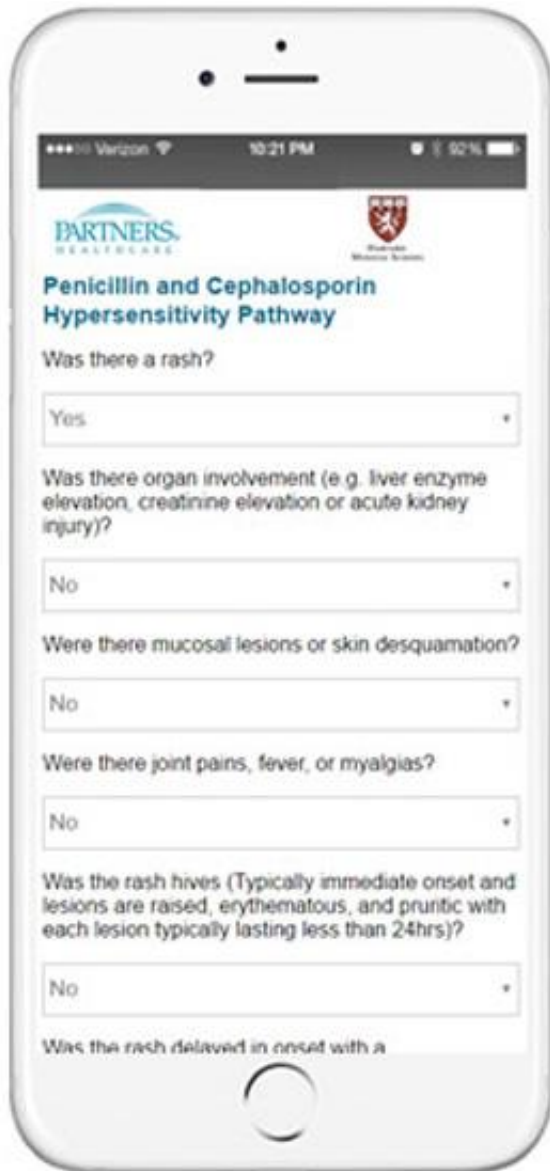


# Skin testing, computerized support tool can improve antibiotic use in hospital inpatients

6 March 2017



The treatment guideline/decision support tool used to determine whether patients with penicillin allergy in their medical record could safely receive penicillin-related antibiotics was accessible via this secure smartphone app or hospital desktop computers. Credit: Brett Macaulay, Division of Infectious Diseases, Massachusetts General Hospital

Massachusetts General Hospital (MGH) and Brigham and Women's Hospital (BWH) investigators have developed two approaches to increasing the use of penicillins and cephalosporins - highly effective antibiotics that are not as problematic as many alternatives - in hospitalized patients previously believed to be allergic to penicillin. Their report, which has been published online in the *Journal of Allergy and Clinical Immunology*, describes how both tested protocols—use of penicillin allergy skin tests or a computerized guideline/decision support tool—safely increased the use of penicillin and penicillin-related antibiotics in inpatients.

"From 10 to 15 percent of hospitalized patients have [penicillin allergy](#) in their medical record, but studies have shown that more than 95 percent are not really allergic," explains Kimberly Blumenthal, MD, MSc, of the Division of Rheumatology, Allergy and Immunology, the Medical Practice Evaluation Center, and the Lawrence Center for Quality and Safety at MGH, co-lead and corresponding author of the *JACI* paper. "We know that over-reporting of penicillin allergies has a negative impact on patient care, as the alternative drugs often used are less effective, more toxic and can both leave patients vulnerable to dangerous *C. difficile* infection and increase antibiotic resistance in the community. The need to address over-reported penicillin allergy has been widely acknowledged, but how to do that has remained unclear."

"This study offered a unique opportunity to examine what strategy best serves inpatients who have this listed allergy," explains co-lead author Paige Wickner, MD, MPH, of the BWH Division of Rheumatology, Immunology and Allergy and the Department of Quality and Safety.

Over a two-year period—June 2014 to June 2016—the investigators compared three approaches to treating BWH inpatients who needed antibiotic treatment and had a recorded penicillin allergy.

During the first five months, patients on the medical service received standard of care treatment, with testing via either skin test or test dosing conducted only after referral by the primary care team and consultation with an allergy specialist.

During the next seven months, inpatients with a recorded penicillin allergy who needed [antibiotic treatment](#) were screened for skin-test eligibility. Those with a history of more serious allergic reactions or those taking drugs that could interfere with skin testing were ineligible, and testing also required consent of the patient and the care team. Patients whose skin test was negative and safely tolerated an oral dose of amoxicillin - a form of penicillin in the same beta-lactam antibiotic class as cephalosporins - were determined not to be allergic.

During the third seven-month period, physicians had access to a computerized treatment guideline and decision support system, which - based on details of the reported allergic reaction, such as whether the patient experienced a rash, fever or joint pain - categorized the reaction as follows:

- very low risk - full dose of penicillin or cephalosporin
- low risk - reduced test dose of penicillin or cephalosporin
- medium/high risk - consult with an allergy specialist
- serious reaction - avoid penicillin or cephalosporin.

Due to logistical issues, including schedule coordination and the inability to conduct tests on more than one patient at a time, only 43 of the 179 patients (24 percent) who would have been eligible for skin testing actually had the test. But while that did not result in a significant increase between the standard-of-care and skin-test periods in the overall percentage of those receiving penicillin or cephalosporin, among patients who had the test, the likelihood of receiving the more favorable prescription increased almost six times. In fact, none of the skin-tested patients proved to have a penicillin allergy, and they also had more than double the chance of being discharged with a penicillin or cephalosporin prescription.

During the treatment guideline/decision support period, the likelihood that patients would receive a more favorable antibiotic prescription almost doubled over the standard of care period. Among the providers caring for the 199 medical patients during this period, 112 completed the decision support protocol and there were almost 300 unique webpage views of the guideline, which was accessible both at all hospital desktop computers and through mobile devices connecting to the secure hospital intranet. No adverse reactions occurred during either the standard-of-care or skin-test periods, and only one patient had a mild reaction—an itchy skin rash—to an amoxicillin dose after a negative penicillin skin test during the treatment guideline/decision support period.

Blumenthal notes that the guideline/decision support tool was not integrated into the electronic health record during the study period and that, as the tool becomes more available, it may have an even greater effect on antibiotic prescriptions. The tool has now been adopted at MGH, BWH, Newton-Wellesley Hospital, Brigham and Women's Faulkner Hospital and North Shore Medical Center—all members of Partners HealthCare System. Such a tool also could be useful for hospitals with limited ability to adopt a skin testing protocol or lack of access to staff allergy specialists.

"We found that addressing penicillin allergy by either method could lead to an overall improvement in antibiotic choice for these patients," Blumenthal says. "We don't want to discourage any method of evaluation because even thinking about whether a patient's penicillin allergy is true could lead a provider to make a different management decision. Even here at MGH, we estimated that skin testing all patients with recorded penicillin allergy would be impractical without a significant staff increase or technological guidance."

Wickner adds, "In our Partners system alone, we have more than 200,000 patients who carry this listed diagnosis in the electronic medical record. It is exciting to have safe and effective systems in place to improve the care of these patients when they are hospitalized."

**More information:** Kimberly G. Blumenthal et al, Tackling Inpatient Penicillin Allergies: Tools for Antimicrobial Stewardship, *Journal of Allergy and Clinical Immunology* (2017). [DOI: 10.1016/j.jaci.2017.02.005](https://doi.org/10.1016/j.jaci.2017.02.005)

Provided by Massachusetts General Hospital

APA citation: Skin testing, computerized support tool can improve antibiotic use in hospital inpatients (2017, March 6) retrieved 15 June 2022 from <https://medicalxpress.com/news/2017-03-skin-computerized-tool-antibiotic-hospital.html>

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