

Addressing Inpatient Beta-Lactam Allergies: A Multihospital Implementation



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Addressing inaccurate penicillin allergies is encouraged as part of antibiotic stewardship in the inpatient setting. However, implementing interventions targeted at the 10% to 15% of inpatients reporting a previous penicillin allergy can pose substantial logistic challenges. We implemented a computerized guideline for patients with reported beta-lactam allergy at 5 hospitals within a single health care system in the Boston area. In this article, we describe our implementation roadmap, including both successes achieved and challenges faced. We explain key implementation steps, including assembling a team, stakeholder engagement, developing or selecting an approach, spreading the change, establishing measures, and measuring impact. The objective was to detail the lessons learned while empowering others to be part of this important, multidisciplinary work to improve the care of patients with reported beta-lactam allergies. © 2017 American Academy of Allergy, Asthma & Immunology (J Allergy Clin Immunol Pract 2017;5:616-25)

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Approximately half of all hospitalized patients receive antibiotics, and the 10% to 15% of inpatients with previous reported penicillin allergy receive broader-spectrum, often less effective or more toxic antibiotics.¹⁻³ Patients who have a reported beta-lactam allergy, and who are treated with a non-beta-lactam, have an increased risk of treatment failure⁴ and adverse events.⁵ Often, non-beta-lactam alternative antibiotics are used, even among patients who have infections for which first-line treatment is a beta-lactam antibiotic.^{3,6} The overuse of broad-spectrum antibiotics contributes to growing antimicrobial resistance for the hospital and community, and has been associated with increased odds of resistant organisms and *Clostridium difficile* infections for patients reporting penicillin allergy.⁷

Previous data from both outpatient^{8,9} and inpatient¹⁰⁻¹² settings support that the vast majority of patients who report an allergy to beta-lactam antibiotics are not truly allergic. Indeed, more than 95% of patients who report penicillin allergy, and are tested, are found to tolerate penicillins and related beta-lactams.⁸⁻¹³ Because of this large discrepancy, penicillin allergy evaluation in some form is encouraged by the Centers for Disease Control and Prevention,¹⁴ the National Quality Forum,¹⁵ the American Board of Internal Medicine,¹⁶

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Abbreviations used

ASCs- Antibiotic Stewardship Committees
BPA- Best practice advisory
BWF- Brigham and Women's Faulkner Hospital
BWH- Brigham and Women's Hospital
EHR- Electronic health record
MGH- Massachusetts General Hospital
NSMC- North Shore Medical Center

the Infectious Diseases Society of America,¹⁷ the Society for Healthcare Epidemiology in America,¹⁷ and the American Academy of Allergy, Asthma, and Immunology.¹⁸ As guidelines and position statements accrue, allergists have a unique opportunity to collaborate with colleagues from infectious diseases, pharmacy, and quality improvement to design and implement system-based solutions to help improve antibiotic choices among patients with reported penicillin allergy.

Various methods to address inpatient penicillin allergies have been previously proposed. Programs with routine penicillin skin testing, performed by internists, allergists, and pharmacists, were previously implemented with varying success.^{10,12,19-23} Other groups used routine allergy consultation, with or without patient screening performed by pharmacists.^{11,24} Alternative approaches have targeted penicillin allergy evaluation only for inpatients with particular infections,²¹ or those prescribed particular beta-lactam alternative drugs (eg, aztreonam).^{11,25}

Generally, 4 pathways toward achieving health care improvements have been defined: (1) standardization, (2) coordination, (3) improving treatment decisions, and (4) prevention.²⁶ In this article, we present our experience designing and performing a multisite implementation project that targeted all these pathways. We used a *standardized approach* to patients reporting beta-lactam allergies that included *coordination between clinical providers, pharmacy, and nursing to improve treatment decisions and prevent unnecessary downstream adverse events*. The intervention was a computerized guideline that engaged nonallergy providers to clinically assess the patients' penicillin or cephalosporin allergy history to safely prescribe beta-lactam antibiotics.

In this article, we present key principles in designing the guideline and tools that we used, and explain effective implementation steps: assembling a team, gaining stakeholder engagement, developing or selecting an approach, spreading the change, establishing measures, and evaluating impact. The objective was to detail the lessons we learned in this process, as well as empower allergists to join multidisciplinary teams across the United States tasked to improve the care of patients with reported beta-lactam allergies.

FORMING THE TEAM AND STAKEHOLDER ENGAGEMENT

Generally, improvement teams should include specific individual roles, such as management sponsor, team leader, subject matter expert, team member, and improvement advisor/project manager.²⁷ Although the optimal team structure for improvement is often a dedicated team, most teams, including ours, must recruit part-time team members who add this project into any available time.²⁶ Programs that affect the choice of antimicrobials have implications for a broad group of providers. Each stakeholder must have both a role in the program and a vested interest

in the success of the program. An effective implementation team should include, at a minimum, the following:

- Executive Sponsor (eg, hospital leadership, quality/safety leadership, and antibiotic stewardship leadership). The executive sponsor can use their authority to allocate resources, remove barriers, and provide liaisons.²⁷ A sponsor is also important to help deliver the message and inspire change. The sponsor is not a day-to-day participant, but periodically reviews the implementation team's progress. The right executive sponsor may be motivated to support this initiative because all hospitals report health care-associated infections to the Centers for Disease Control and Prevention's National Healthcare Safety Network.²⁸ Public reporting of health care-associated infections has not only reputational impact but is also linked to reimbursement from the Centers for Medicare & Medicaid Services.^{29,30} In addition, as of January, 2017, the Joint Commission required hospitals to implement antimicrobial stewardship programs to improve antibiotic use and mitigate the emergence of antibiotic resistance. This project could be used by hospitals to demonstrate compliance with that standard.³¹
- Allergy/Immunology Clinical Lead. To devise a safe and effective program, the team requires allergist expertise, because general inpatient providers have limited drug allergy knowledge.^{3,32-34} The education about penicillin allergy and allergy procedures, and development of hospital protocols and policies, should come from those with specialty level knowledge and experience. Programs without access to allergy expertise should collaborate with hospitals that have allergists, or consider adoption of an intervention that has been previously vetted and evaluated. Evaluating patients with drug allergies is within the scope of allergy practice and for a community allergist, the hospital relationship would likely result in increased outpatient referrals. In addition, collaborative quality improvement activities can be used for Maintenance of Certification credits for boards, such as the American Board of Internal Medicine and the American Board of Allergy and Immunology.
- Infectious Diseases Clinical Lead. The role of the infectious diseases clinical lead is to serve as the subject matter expert for antibiotic usage, including identifying stewardship priorities such as targeted patient groups, infections, and/or drugs. Antibiotic Stewardship Committees (ASCs),^{17,35,36} often composed of leaders in medicine, infectious diseases, and pharmacy, perform interventions designed to improve and measure the appropriate use of antibiotic agents by promoting the selection of the optimal antibiotic. ASCs also may address patient-reported penicillin allergy.^{17,35} Because ASCs are regularly tracking antibiotic usage, and are soon to be a Joint Commission standard,³¹ they are a natural place to identify engaged team members and leverage existing hospital resources.
- Pharmacy Lead. Pharmacists are integral for day-to-day medication safety. They review medication orders, and check drugs against previously reported allergies to avert potentially iatrogenic allergic reactions. Given their involvement in allergy checking and drug verification and processing, pharmacists can play a key role in identifying patients who require allergy clarification, and those at high risk of complications because of unnecessary alternative antibiotic use. Pharmacy cooperation is

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