

Original Article

The High Impact of Penicillin Allergy Registration in Hospitalized Patients

Savannah M. van Dijk, MD^a, Helga Gardarsdottir, PharmD, PhD^b, Marjan W.M. Wassenberg, MD, PhD^c, Jan Jelrik Oosterheert, MD, PhD^d, Mark C.H. de Groot, PhD^e, and Heike Rockmann, MD, PhD^a *Utrecht, The Netherlands*

What is already known about this topic? Suspected penicillin allergy is often not verified or excluded by diagnostic testing.

What does this article add to our knowledge? Prevalence of penicillin allergy registration in a general population of patients hospitalized in a Dutch University Medical Center is 5.6%, has high impact on antibiotic prescribing, and is associated with a higher risk of readmission within 12 weeks.

How does this study impact current management guidelines? Verification of the penicillin allergy in hospitalized patients might restrict the use of reserve antibiotics and improve patient outcome.

BACKGROUND: Suspected penicillin allergy (Pen-A) is often not verified or excluded by diagnostic testing.

OBJECTIVE: To assess the prevalence and impact of Pen-A registration in a Dutch University Medical Center.

METHODS: In a prospective matched cohort study, all admitted patients (July 2013-July 2014) who underwent a pharmacotherapeutic interview were selected. Patients with a registered Pen-A were matched on age, sex, and department of admission with up to 3 patients without a registered Pen-A. Relative risks (RRs) of receiving a reserve antibiotic, death during hospitalization, and rehospitalization were compared in the 2 cohorts. The number and type of antibiotics prescribed during admission and duration of hospitalization were compared.

RESULTS: Of 17,959 patients, 1010 (5.6%) patients (66.7% women; median age, 55 years) had a Pen-A registration. These

patients had a higher risk of receiving reserve antibiotics (RR, 1.38; 95% CI, 1.22-1.56) and of being rehospitalized within 12 weeks (RR, 1.28; 95% CI, 1.10-1.49). A significantly larger proportion of Pen-A registered patients received reserve antibiotics such as tetracyclines (1.8% vs 0.8%), macrolides/lincosamides/streptogramins (12.5% vs 4.9%), and quinolones (7.9% vs 4.3%) or received 2 or more types of antibiotics during hospitalization (21.7% vs 16.9%).

CONCLUSIONS: Prevalence of Pen-A registration in hospitalized patients is high, has high impact on antibiotic prescribing, and is associated with a higher risk of readmission. Verification of the Pen-A in hospitalized patients might restrict the use of reserve antibiotics and improve patient outcome. © 2016 The Authors. Published by Elsevier Inc. on behalf of the American Academy of Allergy, Asthma & Immunology. This is an open access article under the CC BY-NC-ND license (<http://creativecommons.org/licenses/by-nc-nd/4.0/>). (J Allergy Clin Immunol Pract 2016;■:■-■)

Key words: Allergy registration; Antimicrobial stewardship; Beta-lactam antibiotic; Drug hypersensitivity; Penicillin

Antibiotics are one of the most frequently prescribed type of drugs, of which beta-lactam antibiotics account for the most.¹⁻³ Beta-lactam antibiotics are characterized by their high safety profile, narrow spectrum of activity, and low costs. One of the main factors limiting their use is the suspicion of penicillin allergy (Pen-A).⁴ Pen-A is the most commonly registered drug allergy,⁵⁻⁷ but the true prevalence in the general population is unknown, and remains difficult to determine because of varying study populations and designs. A Danish study reported a prevalence of 5% in hospitalized patients, whereas studies from the United States report higher prevalences of up to 16%.^{5,8-12} A recent study performed in a Dutch general practice population in which Pen-A registration in medical files was assessed reported a prevalence of 2%.¹³

Diagnostic workup for evaluation of Pen-A may include detailed patient history, skin testing, *in vitro* testing, and drug

^aDepartment of Dermatology and Allergology, University Medical Centre Utrecht, Utrecht, The Netherlands

^bDivision of Laboratory and Pharmacy, Department of Clinical Pharmacy, University Medical Centre Utrecht, Utrecht, The Netherlands

^cDepartment of Medical Microbiology, University Medical Centre Utrecht, Utrecht, The Netherlands

^dDepartment of Internal Medicine and Infectious Diseases, University Medical Centre Utrecht, Utrecht, The Netherlands

^eDivision of Laboratory and Pharmacy, Department of Clinical Chemistry and Haematology, University Medical Centre Utrecht, Utrecht, The Netherlands

Conflicts of interest: M. C. H. de Groot is employed by IMI-PROTECT and Bio-banking and Biomolecular Research Infrastructure (BBMRI-NL). The rest of the authors declare that they have no relevant conflicts of interest.

Received for publication February 18, 2016; revised March 7, 2016; accepted for publication March 23, 2016.

Available online ■■

Corresponding author: Heike Rockmann, MD, PhD, Department of Dermatology, University Medical Center Utrecht, Heidelberglaan 100, 3584 CX Utrecht, The Netherlands. E-mail: h.rockmann@umcutrecht.nl.

2213-2198

© 2016 The Authors. Published by Elsevier Inc. on behalf of the American Academy of Allergy, Asthma & Immunology. This is an open access article under the CC BY-NC-ND license (<http://creativecommons.org/licenses/by-nc-nd/4.0/>).

<http://dx.doi.org/10.1016/j.jaip.2016.03.009>

Abbreviations used

ATC- Anatomical Therapeutic Chemical

Pen-A- penicillin allergy

RR- relative risk

UMCU- University Medical Center Utrecht

challenge. Studies on outpatient adult patients showed that an alleged Pen-A can be confirmed in only a minority (16.5%-29.0%) of patients.^{6,9,10,14-20} This percentage of confirmed Pen-A seems lower in children than in adults (7.9%-15.9%) and also lower in hospitalized patients when compared with outpatients. In patients with a history of possible Pen-A who are admitted to hospitals, the prevalence of confirmed allergy varies from 1% to 14%.²¹⁻²⁵ Altogether, most patients with a suspected Pen-A are not currently allergic and should tolerate penicillin antibiotics.

In clinical practice, hospitalized patients with a documentation of penicillin antibiotic allergy are more often treated with reserve antibiotics such as fluoroquinolones, macrolides, glycopeptides, vancomycin, and aminoglycosides.^{5,11,12} Use of these reserve antibiotics has been associated with a higher risk of treatment failure, adverse drug reactions, complications such as *Clostridium difficile* infection, methicillin-resistant *Staphylococcus aureus* infection, and vancomycin-resistant Enterococcus infections, and higher costs and reinforce the development of antibiotic resistance.^{4,5,7-10,26-29}

Recent studies showed that patients with a Pen-A registration have a longer duration of hospitalization than do patients without this registration.^{5,12} However, evidence on these various consequences of registered Pen-A was based mostly on very small patient numbers and poorly designed studies.^{4,5,7,10,11}

This study aimed to assess the prevalence of registered Pen-A in a large Dutch tertiary university medical hospital center and its impact on health care—related factors such as the number and type of antibiotics prescribed, mortality during hospitalization, duration of hospital stay, and risk of readmission.

METHODS**Setting and study population**

This prospective, matched cohort study included patients from the Utrecht Patient Orientated Database, which includes all patients treated at the University Medical Centre in Utrecht (UMCU), a university hospital in the Netherlands with 1042 beds. All patient data are electronically registered and anonymized.³⁰ This study was approved by the local medical research ethical committee (METC 14-626/C).

The source population included all patients admitted to the UMCU (N = 24,165) from July 1, 2013, until July 1, 2014. A systematic standardized pharmacotherapeutic interview was introduced in 2010 for all patients admitted to the UMCU and is performed by a trained nurse or pharmacist assistant before admissions or at patient bedside within 24 hours of admission of all patients unselectively. The study population included all patients (children and adults) who underwent a standardized pharmacotherapeutic interview for evaluation and registration of drug usage and drug hypersensitivity. If patients report a drug allergy, the following criteria for registration of drug hypersensitivity are used by the trained nurse or pharmacist assistant: (1) evaluation by a specialist or general practitioner and/or (2) symptoms of cutaneous reactions, dyspnea, collapse, or fever after drug exposure up to a few days. Drug

hypersensitivity is registered in the patients' electronic medical file. This registration can be updated by physicians at any time. There is no standardized recommendation on how to deal with a drug allergy registration.

The study population excluded patients admitted to intensive care wards, patients admitted for day treatments, patients admitted and discharged during the same weekend, and healthy women admitted because of labor and neonates, because the standardized pharmacotherapeutic interview was not implemented reliably for these patients in the study period.

Patient cohort

Patients with a registered Pen-A (Pen-A patients) in their medical journal during their first admission during the study period (index date) were matched with up to 3 patients who had no Pen-A registered in their medical file (non-Pen-A patients) on the index date. *Penicillin* is defined as all class Anatomical Therapeutic Chemical (ATC)-J01C penicillin beta-lactam antibiotics including among others ampicillin and amoxicillin.³¹ Registered Pen-A patients were matched to non-Pen-A patients on sex, age up to ± 3 years, and department of admission.

Study outcomes

The primary outcome measure of this study was prevalence of Pen-A registration. The secondary aim was to compare the risk of the first antibiotic prescribed during admission being a reserve antibiotic, the risk of death during hospitalization, and assessing the number, type, and route (intravenous) of antibiotics prescribed during admission and duration of hospitalization (in days) in patients with and without a Pen-A. In addition, the risk of readmission within 4 and 12 weeks from discharge was assessed.

Duration of hospitalization was defined as 1 day plus the date of discharge minus the date of admission. Prescribed antibiotics were grouped into the following 10 ATC classes: tetracyclines (J01A); amphenicols (J01B); beta-lactam antibacterials, penicillins (J01C); other beta-lactam antibacterials (J01D); sulfonamides and trimethoprim (J01E); macrolides, lincosamides, and streptogramins (J01F); aminoglycoside antibacterials (J01G); quinolone antibacterials (J01M); combinations of antibacterials (J01R); and other antibacterials (J01X).³¹ *Reserve antibiotics* were defined as all ATC groups excluding penicillins (J01C).

STATISTICAL ANALYSIS

Prevalence was measured by defining the number of patients with a registered Pen-A in the study population. Descriptive statistics for the matched cohort were reported using proportions, medians, and interquartile ranges. The associations between having a Pen-A registration and receiving a reserve antibiotic as a first prescription during hospitalization, mortality during hospitalization, and rehospitalization within 4 weeks and 12 weeks after discharge were estimated as relative risk (RR) with 95% CI using stratified Cox proportional hazards analysis. Differences in proportion were assessed for the type of antibiotics prescribed during hospitalization, receiving 2 or more antibiotics, and receiving antibiotics through intravenous administration using Mantel-Haenszel chi-square test. Medians were compared using Mann-Whitney tests. Differences were considered statistically significant when the *P* value was less than .05. All statistical analyses were conducted with SAS9.4.

Download English Version:

<https://daneshyari.com/en/article/5647448>

Download Persian Version:

<https://daneshyari.com/article/5647448>

[Daneshyari.com](https://daneshyari.com)