Removal of Incorrect Penicillin Allergy Labels in a UK Hospital

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Abstract

Introduction

Penicillin allergy (penA) records are common, often incorrect and are associated with broad spectrum antibiotic use. We piloted a pharmacist-led multidisciplinary penicillin allergy de-labelling (PADL) daily ward round to determine the opportunity for PADL in a UK hospital.

Methods

A daily ward round, delivered by either an antibiotic pharmacist or a junior doctor, identified adult medical and surgical patients between 7th November 2022 and 31st January 2023 with a penA record that was preventing first-line penicillin use. An allergy history was taken before risk stratifying likelihood of future harm from penicillin re-exposure and an allergy testing method was determined (direct de-label on history alone (DDL) or after direct drug provocation testing (DDPT)). Following successful de-label, the antibiotic was switched to a penicillin antibiotic.

Results

Of 7214 inpatients during the study period, 1133 (15.7%) had a penA record. Of 285 allergy histories taken, 105 (36.8%) met high risk criteria, 45 (15.8%) met low risk criteria eligible for DDL and 73 (25.6%) met low risk criteria eligible for DDPT. We were unable to obtain a history for 61 (21.4%) patients.

Of 45 low risk patients eligible for DDL, 40 (88.9%) were de-labelled of which 24 (53.3%) were switched to a penicillin antibiotic. Of 73 patients with a low-risk allergy history eligible for DDPT, 16 (21.9%) received DDPT, of which nine were switched to a penicillin antibiotic. Two DDL patients experienced harm (thrush within 5 days and delayed skin reaction after day 5), none of the DDPTs had a reaction by day 5. The switches resulted in 175 DDDs of penicillin use and reduced alternative antibiotic use by 173 DDDs.

Conclusion

PADL patient pathway delivered by pharmacists and junior doctors was safe and effective and well accepted by patients and the wider clinical teams.

Introduction

Over 15% of hospitalised patients have a record of penicillin allergy (penA).[1] Patients with penA records are usually treated with alternative antibiotics; often more costly, potentially less effective, more toxic, and often broader spectrum.[2] These risks are largely avoidable because more than 95% can tolerate penicillins.[3] PenA de-labelling (PADL) is an antimicrobial stewardship priority because of the negative consequences of penA records on patients and healthcare systems.[4] The paucity of allergists in the US, UK and elsewhere[5] has prompted the development of national guidelines and toolkits, enabling non-allergists to deliver PADL,[6,7] but the UK data are limited .[1,8] We piloted a pharmacist-led multidisciplinary PADL ward round to understand the opportunity for PADL in a UK hospital.

Methods

Setting

750 bed hospital, serving a population of 430,000 people, and without allergy services.

The PADL intervention and toolkit

A penA record was any record of allergy or intolerance to a penicillin, referred to as penA record from this point. A live report identified adult inpatients with a penA record along with key patient characteristics (see S1). A local PADL toolkit and work instructions were developed using national guidelines (see S2).[6]

The Removal of Inappropriate Penicillin Allergy Label (RIPAL) team was antibiotic pharmacist lead (NP) and included another antibiotic pharmacist (DH) and junior doctors (BG, JM, CW). The RIPAL team completed the accreditation process before inclusion in the RIPAL rota (see S3). NL (antibiotic pharmacy technician) supported allergy focused history taking ad hoc. Daily RIPAL ward rounds started 7th November 2022 and ended on 31st January 2023 (Monday to Friday except national holidays) on adult medical and surgical wards (excluded intensive care unit, maternity wards, paediatric wards, and the haematology/oncology ward) undertaken by the duty PADL team member for that day.

Patients with a penA preventing penicillin use were included. For PADL process see S2. In brief, an allergy focused history was completed, patients checked for exclusion criteria prior to decision to test.

To determine the extent of penicillin prescribing in patients with a penA record by clinical teams we extracted additional data from the electronic prescribing and medicine administration (EPMA) system for the study period (see S4).

The PADL intervention was authorised by the hospital's Medicines Practice Committee and received Health Regulatory Authority ethics committee approval (IRAS project ID 299708).

Results

7214 inpatients spent some, or all, of their inpatient stay on a visited ward during the study period: median age 71 years (IQR 55-81 years), 3483 (48.3%) male. 1133/7214 (15.7%) had a penA record on admission to hospital of which 587 (51.8%) were prescribed an antibiotic. Of 587 patients, 171 (29.1%) received a penicillin (see Figure 1).

The RIPAL intervention

285 (48.6%) of 587 patients with a penA prescribed an antibiotic had an allergy history taken. 105 (36.8%) had a high-risk allergy history, 45 (15.8%) met low risk criteria and eligible for de-label on history alone, 73 (25.6%) met low risk criteria and eligible for DDPT. We were unable to obtain a history from 61 (21.4%) patients and one patient (0.4%) was undergoing allergy testing at another hospital (See S5).

Of the 45 low risk patients eligible for DDL, 40 were de-labelled (88.9%); median age 76 years (IQR 68-84.5 years), median Charlson comorbidity index (CCI) 5 (IQR 4-7), median NEWS score 1 (IQR 0-4) and 18 (45%) male. 4 denied consent for de-label. 24/40 (60%) were switched to a penicillin and followed up by the RIPAL team, of which one patient reported oral thrush by day 5 and one patient reported a maculopapular rash at day 6. The mean time between antibiotic initiation and DDL with an antibiotic change to penicillin, was 2.2 days (range 0-7).

Of 73 patients eligible for DDPT, 16 (21.9%) were given a DDPT by the study team; median age 75 years (IQR 64.5-82.5 years), median CCI 4 (IQR 2.5-6.5), median NEWS score 0 (IQR 0-2) and 12 (75%) were male. Nine (12.3%) were switched to a penicillin antibiotic to complete their antibiotic course. Fourteen patients reported no reactions day 5 post-DDPT and two were uncontactable. Fifty-seven patients were not given a DDPT, the most common was denying consent (see S5). The mean days between antibiotic initiation and DDPT with an antibiotic change to penicillin was 2.9 days (range 1-6).

Impact of DDL and DDPT on antibiotic use

Of 24 DDL patients, the majority were switched from levofloxacin (12 patients) to amoxicillin (17 patients), resulting in 139 days of penicillin and reduced alternative antibiotic days of therapy by 143 (see Table 1).

Of DDPT patients the most common switch was away from levofloxacin or meropenem to amoxicillin. Switching resulted in 31 days of penicillin and saved 31 days of alternative antibiotics (see Table 1).

Of 19 de-labelled patients who received antibiotics post discharge, 9 (47.4%) received a penicillin (suppl. 6)

De-labelling / exposure of penA patients to penicillin outside of the RIPAL study (by other hospital clinical teams)

During the study period, 171 penA patients were prescribed a penicillin. Of these, 40 were due to the RIPAL intervention and 131 were prescribed a penicillin by the clinical teams without RIPAL team involvement; 61 (46.6%) had their penA record removed from the EPMA system.

Discussion

This study demonstrates the feasibility of a pharmacist-led multidisciplinary PADL ward round in an English hospital. Sixteen patients were de-labelled by DDPT, of which none reported a reaction to the penicillin. Forty patients were de-labelled on history alone, with 24 subsequently prescribed a penicillin as an inpatient, resulting in two adverse drug events.

Outside of the study, 131 penA patients were prescribed a penicillin antibiotic by the responsible clinical team. Combined, almost a third of inpatients with a penA requiring an antibiotic during their inpatient stay, received a penicillin. PADL has been discussed locally in several clinical forums as an antibiotic stewardship opportunity; this increased awareness may explain the high penicillin exposure to patients with penA records.

Almost 20 percent of patients reviewed by the RIPAL team were de-labelled. A systematic review of non-allergist delivered PADL showed 14% of assessed patients were de-labelled by DDL and 27% by DDPT; our 14.0% DDL figure is comparable but our 5.6% DDPT figure is low.[1] The majority of our patients eligible for DDPT were not challenged due to exclusion criteria. Given the risk of genuine penA in this cohort is comparable to the general population, these exclusion criteria are unnecessarily restrictive, and their removal would further optimise PADL. The low rates of patient consent may be explained by poor patient understanding of the benefits of PADL.[10,11] The harm associated with the PADL patient pathway was low and comparable to the rates reported in the literature.[1]

A large proportion of patients met what we'd categorised as high-risk phenotypes, but which others have categorised as low-risk and therefore reconsidering our risk categories would optimise PADL.[9-12]

Strengths and weaknesses

The study is limited by its single centre design and small patient numbers. There has been considerable previous work on PADL in the study hospital which may affect transferability.

Conclusion

A PADL patient pathway delivered by pharmacists and junior doctors was safe, effective, and well accepted by clinical teams and patients. Further work is required to optimise patient information and the PADL protocol.

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Tables and figures

Name of Penicillin prescribed post-RIPAL	DOTs prescribed post-DDL	DOTs prescribed post-DDPT
Amoxicillin PO	91	14
Amoxicillin IV	18	2
Flucloxacillin PO	12	
Flucloxacillin IV		4
Co-amoxiclav PO	11	7
Tazocin IV	7	4
Total	139	31
Name of alternative Antibiotic switched away from due to RIPAL	DOTs saved due to swich to a penicillin post-DDL	DOTs saved due to swich to a penicillin post-DDPT
Levofloxacin PO	74	5
Clarithromycin PO	5	7
Co-trimoxazole PO	12	
Meropenem IV	8	11
Vancomycin IV	2	1
Clindamycin PO	7	
Ciprofloxacin PO	15	
Levofloxacin IV	3	
Doxycycline PO	6	
Metronidazole PO	11	
Linezolid PO		4
Teicoplanin IV		3
Total	143	31

Table 1 – DDL and DDPT antibiotic days of therapy (DOTs) Direct de-label (DDL); Direct Drug Provocation Test (DDPT)

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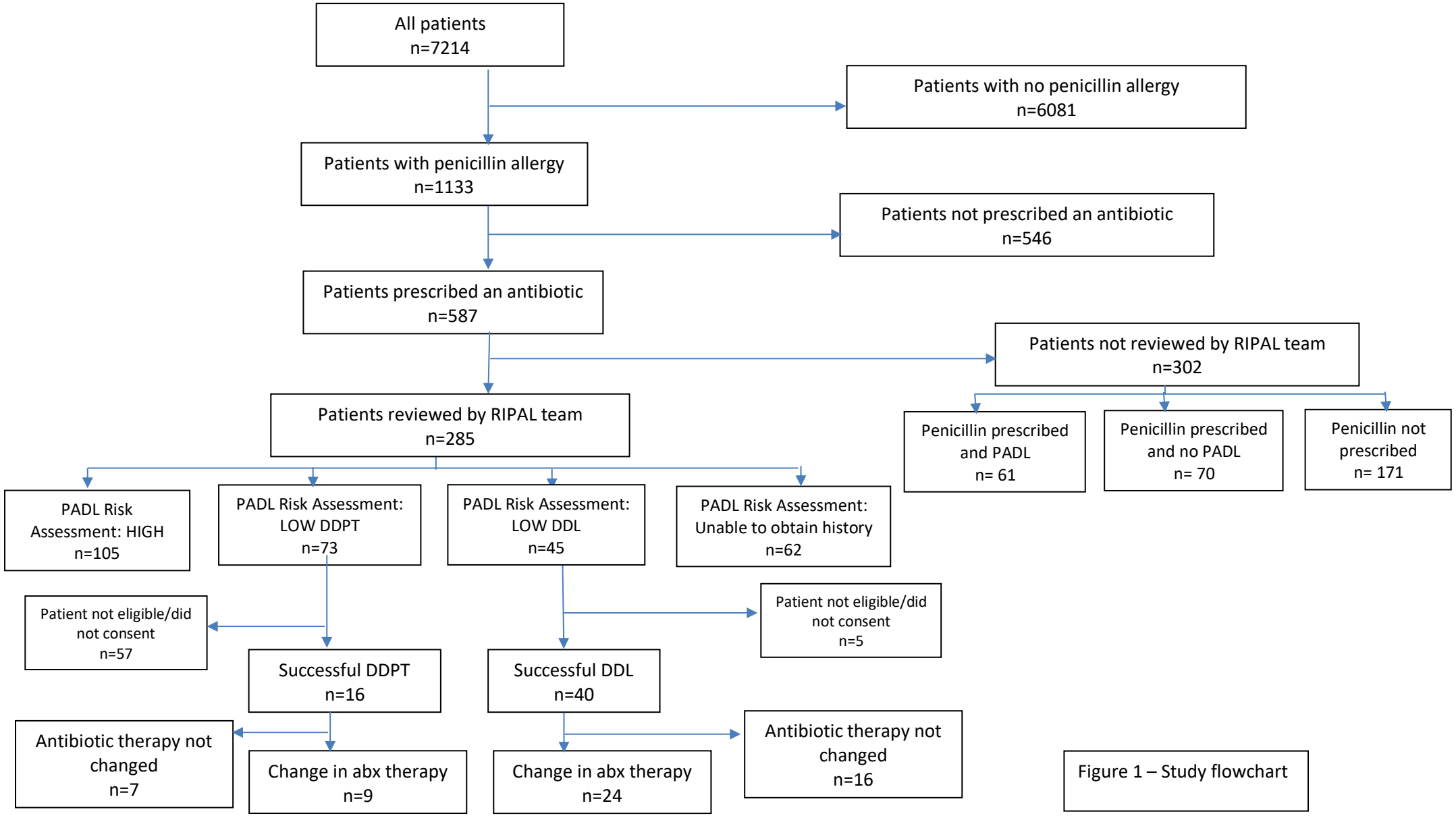

Figure 1 – Study flowchart