

The Impact of Reported Penicillin Allergy on Patients Presenting with Infection

Stephanie Harris¹, David Hobden², Marisa Lanzman³, Indran Balakrishnan¹,
Susan Hopkins¹

1. Department of Medical Microbiology, The Royal Free London NHS Foundation Trust, London UK
2. Department of Respiratory Medicine, Barts Health NHS Trust, London UK
3. Department of Pharmacy, The Royal Free London NHS Foundation Trust, London UK

Introduction: sepsis

- Sepsis is associated with 5.1% of deaths in England¹
- The UK Sepsis Trust estimate that 150,000 hospital admissions per year in UK are due to sepsis²
- 4.3% of emergency department attendances fulfil the criteria for sepsis

1. McPherson D, BMJ Open, 2013.

2. UK Sepsis Trust 2016, derived from data provided by the Health and Social Care Information Centre, 2016

3. Cowan SL, European journal of emergency medicine, 2015

Introduction: penicillin allergy

- In-hospital “penicillin allergy” prevalence is between 8% and 15%^{1,2}
- Rate of anaphylaxis per dose of antibiotics is 0.1 per 10,000 doses for penicillin³

[HOME](#) » [NEWS](#) » [UK NEWS](#)

GP killed patient by prescribing penicillin, court told

A doctor killed an elderly patient by ignoring instructions that he was allergic to penicillin and prescribing the drug, a court heard.

By Richard Savill
5:51PM GMT 17 Nov 2008

[UK News](#)
[News »](#)

1. Macy E, Current Allergy and Asthma Reports, 2014.
2. Lee CE, Archives of Internal Medicine, 2000.
3. Johannes CB, Drug Safety, 2007.

world class expertise  **local care**

Royal Free London 
NHS Foundation Trust

Introduction: why is this important

In some serious infections beta-lactams are superior to others

- MSSA infections: beta-lactams versus vancomycin¹.
- Gram negative blood stream infections: decreased mortality, treatment failure and length of stay with beta-lactams V others²

90% of these patients could be “de-labelled³” safely

Strategies include:

- Skin patch testing or penicillin challenges

1. Wong D, BMC Infectious Diseases, 2016.

2. Jeffers MN International Journal of Pharma Research and Health Sciences, 2015.

3. Chen JR, Journal of Allergy and Clinical Immunology, 2017

Introduction: consequences of Penicillin allergy label

In an infection episode

- Treatment failure with serious infections¹
- Longer lengths of stay
- Increased prevalence of resistant organisms
- Delays to administration of first antibiotic

1. Jeffres MN, Journal of Allergy and Clinical Immunology, 2016.

2. Macy E, Journal of Allergy and Clinical Immunology, 2014.

In their lifetime

- Increased healthcare use²
- More frequent antibiotic usage⁴
- Increased use of reserve antibiotics and multiple antibiotics⁴
- Higher costs⁵

3. Conway EL, Clinical Therapeutics, 2017.

4. Van Dijk SM, Clinical Immunology in Practise, 2014.

5. Li M, Journal of Clinical Pathology 2014.

Aim

To evaluate patient outcomes with documented penicillin allergy in patients presenting with sepsis to a London teaching hospital

Method

- Prospective database of patients presenting to who triggered the sepsis pathway April-June 2017
- Additional patient level data collected
 - Episode level: demographics, co-morbidities, allergies, observations on presentation, application of the sepsis 6 bundle, initial and final diagnosis, microbiological and radiological finding and antibiotics given.
 - Outcome measures: LOS, ITU admission, in hospital mortality, readmission at 7 and 30 days.
- Data were analysed using Chi-squared, means, t-test etc

Results: Recorded allergy to penicillin

Penicillin Allergy	
Documented as penicillin allergic	15.5%
Rash reaction	40%
Unknown reaction	25%
Gastrointestinal side effects	15%
No reaction recorded	15%
Shortness of breath	5%
Temperature	5%

Results: Penicillin allergy demographic and initial presentation

	Penicillin allergic N=20	Not penicillin allergic N=109	P value
Female gender	75%	51%	0.04
Age	68.9 (median 75.1, SD 22.6)	68.1 (median 70.7, SD 17.7)	0.86
Mean Charlson co-morbidity score	4.9 (SD 2.4)	5.3 (SD 2.9)	0.56
Presented out of hours	40%	33%	0.77
Antibiotics within the 1 st hour	60%	78%	0.09
Sepsis 6 bundle in the 1 st hour	45%	69%	0.04

Results: Criteria to trigger the sepsis pathway

Trigger in ED	Penicillin allergic	Not penicillin allergic	P value
Respiratory rate	70%	68%	0.85
Heart rate	30%	42%	0.31
Blood pressure	25%	19%	0.56
Mental state	40%	14%	0.004
Risk of neutropenia	10%	19%	0.32
Temperature	70%	63%	0.57
Lactate > 4	35%	17%	0.05

Results: Diagnosis at presentation

Penicillin allergic	Not penicillin allergic	P value
Respiratory (50%)	Respiratory (41%)	0.52
Urological (15%)	Urological (13%)	0.07
Sepsis not specified (10%)	Sepsis not specified (17%)	0.34

Results: Initial treatment

Penicillin allergic	Not penicillin allergic
Levofloxacin (35%)	Co-amoxiclav (54%)
Clarithromycin (15%)	Piperacillin/tazobactam (31%)
Metronidazole (15%)	Amoxicillin (6%)
Teicoplanin (15%)	Gentamicin (4%)
Gentamicin (10%)	Teicoplanin (2%)

Results: Microbiological and radiological findings

Radiology or Microbiology	Penicillin allergic		Not penicillin allergic		P value
	% Taken	% Positive	% Taken	% Positive	
Blood Cultures	90%	15%	94%	18%	0.71
Urine Cultures	45%	20%	39%	4%	0.02
Chest Radiograph	100%	50%	96%	26%	0.04

Results: Outcomes

Outcome	Penicillin allergic	Not penicillin allergic	P value
In hospital mortality	15%	6%	0.19
30 day mortality	6%	17%	0.79
Average length of admission (days)	14.3 (median 6, SD 22.2)	10.4 (median 6, SD 12.4)	0.26
ITU admission	25%	9%	0.04
7 day readmission	6%	13%	0.66
30 day readmission	6%	23%	0.11

Discussion

On arrival in the ED PenA Patients:

- More likely to have a raised lactate >4
- More likely to have radiological or microbiological evidence of infection
- Despite similarities in age and co-morbidity scoring on presentation

In the hospital PenA patients were:

- Less likely to receive the full sepsis 6 bundle in the 1st hour
- Less likely to receive antibiotics in the first hour.
- More likely to need ITU admission

Discussion

- PenA patients are over represented in hospital populations and in our sample of sepsis pathway patients.
- This is a small, preliminary study, we aim to complete 6 months of data collection to assess this correlation further and develop a multivariate model.

Conclusion

- PenA is has been associated with poorer outcomes and increased healthcare costs.
- It may mean differences in pre-hospital care.
- Large number of people with PenA in the population – a potentially modifiable risk factor?
- Many can be de-labelled on the basis of a thorough allergy history alone

Any questions?

world class expertise  local care