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The results of collaborative antibiotic stewardship ward round in the trauma and orthopaedic directorate of a district general hospital

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Abstract
Antimicrobial resistance (AMR) has become a global problem for health care services, with fewer antimicrobials entering the market and some pathogenic organisms becoming resistant to commonly used antimicrobials. Antimicrobial stewardship (AS), including evidence-based standard setting, education and communication, and audits of practice, has become a key method of preventing the rise in AMR. Data on antibiotic consumption are often obtained through prospective and retrospective point prevalence audits of antibiotic usage, but such studies are very resource intensive and only provide a snapshot of consumption. The objective of the study reported here was to examine orthopaedic antibacterial usage at a District General Hospital trust level over a two-year period after a collaborative AS programme was implemented.

Keywords: Antibiotic stewardship, Ward Round, Musculoskeletal infections

Introduction
AMR is an important patient safety and public health issue. AS is one of the key strategies in tackling this problem [1]. Over the past 10 years, the UK has seen a number of national initiatives to promote AS and adsssdress the rise in AMR. Examples include 'Clostridium difficile (CD) Infection: How to deal with the Problem'; 'Clean, Safe Care: Reducing Infections and Saving Lives'; 'The Health and Social Care Act 2008, Code of Practice'; and 'The UK Five-Year Antimicrobial Resistance Strategy'. Although the importance of measuring antimicrobial consumption has repeatedly been highlighted, particularly in secondary care, the ability to undertake such analysis has been hampered by the lack of readily available data and, until recently, analysis of antibiotic acquisition costs has been the only way to estimate usage [2]. Electronic prescription and administration of medicines have the potential to provide better data, with patient-linked information on antimicrobial selection linked to diagnosis, microbiological results and outcomes. However, almost 90% of NHS hospitals do not have electronic prescribing in place [3].
The main goal of AS is to improve infection cure rates. It can also minimize unintended consequences of antimicrobials, such as, CD colonization. Restricting the use of certain antimicrobials can also reduce the evolution of antibiotic-resistant bacteria. Cost-effectiveness of running AS can be achieved by reducing antibiotic costs without adversely impacting quality of care [2, 4]. Data regarding antibiotic usage in orthopaedic patients is prospectively collected since AS programme was implemented in October 2011 and we present our data over a two year period till December 2013.

Methods
A multidisciplinary, consultant led antibiotic ward round was implemented in October 2011. The ward round is an office-based exercise with case notes, prescription kardex, laboratory results including microbiology data and clinical information of patients available at the time. The indications for, choice of antibiotics, duration and further treatment plan were made based on clinical information and a note for the case notes was dictated immediately. Changes to prescriptions were also made at the time. The information was conveyed to the appropriate wards. This involved the consultant orthopaedic surgeon (starting the trauma on-call week), consultant microbiologist, pharmacist and antibiotic prescription nurse. Data from the meetings was collected prospectively over 118 weeks using a standard data form. Figure 1 shows the Antibiotic Sheet used during the Ward Round. The plan for each patient is recorded at the end of the round. Outcome codes are explained in Table 1.

Table 1: Outcome codes

Outcome	Code
De-escalation	D
Escalation	E
Continue	C
Review documented	R
Switched to IV	IV
Switched to oral	O
Oral antibiotic added	OA
Oral antibiotic stopped	OS
IV added	IVA
IV stopped	IVS
Dose change	DC
Ward round cancelled	X
Consultant not available	Z
Patient discharged	H
Duration Documented	DD

Antibiotic Ward Round – Orthopaedics

Date:

Patient Name/ CHI/Ward/ Admission/ Consultant	Antibiotic(s)	Relevant Clinical Details	Intervention made to treatment		Outcome code
	Flucloxacillin 2g iv four times daily 2.3.15	Painful R knee Cellulitis/Septic arthritis? *NKDA*	eGFR >60 3.3 CRP 98 3.3 Continue iv 1 more day review, then oral for 7 days	Hb 123 3.3 WCC 8.4 3.3	C R DD
	Rifampicin oral 300mg twice daily 11.2.15 Flucloxacillin 2g iv four times daily 30.1.15	Septic arthritis L knee T2DM IVAB for 6 weeks (week 5) Washout L knee 31.1,4.2 + 9.2 *20.2. MRI infection of spine facet joint* *NKDA*	eGFR >60 4.3 CRP 92 4.3 For line insertion today- continue	Hb 88 4.3 WCC 5.6 4.3	C R DD
	Trimethoprim oral 200mg twice daily 3.3.15 **3 days then review UTI** Clarithromycin oral 500mg twice daily 26.2 .15 **pre op chest infection**	Fall #L NOF L DHS 1.3 ?chest infection, UTI? *Allergies- penicillin*	eGFR 47 4.3 CRP 98 4.3 26.2.15 MSU – E coli, sensitive to trimethoprim Stop abx's on the 7th March	Hb 103 4.3 WCC 10.2 4.3	C R DD
	Flucloxacillin 2g iv four times daily 23.2.15 Rifampicin oral 300mg twice daily 26.2.15	Lower back pain radiating to L leg, poor mobility, MR1 23.2 ?Discitis, for picc line L5/S1 microdiscectomy Dec 2014 *NKDA*	eGFR >60 1.3 CRP 7 1.3 For line insertion today – 6 weeks abx's ? OPAT	Hb 100 1.3 WCC 4.6 1.3	C R DD

Fig 1: Antibiotic Sheet used during the Ward Round

Results

Over the first 2 years 269 patients were reviewed. We noticed a 22% decrease in the volume of IV antibiotic prescriptions. 35% of antibiotic prescriptions were de-escalated (reducing the dose or narrowing the spectrum), however 9% required escalation. 2% of prescriptions were stopped for being clinically not required any more. There was 48% decrease in costs of IV antibiotics and 30% decrease in total cost of oral and IV antimicrobials.

The Defined Daily Dose (a statistical measure of drug consumption) of Benzylpenicillin is represented in Figure 2 as an example of antibiotic usage in orthopaedic wards. It shows a noticeable sustained decrease in antibiotic usage with implementation of AS.

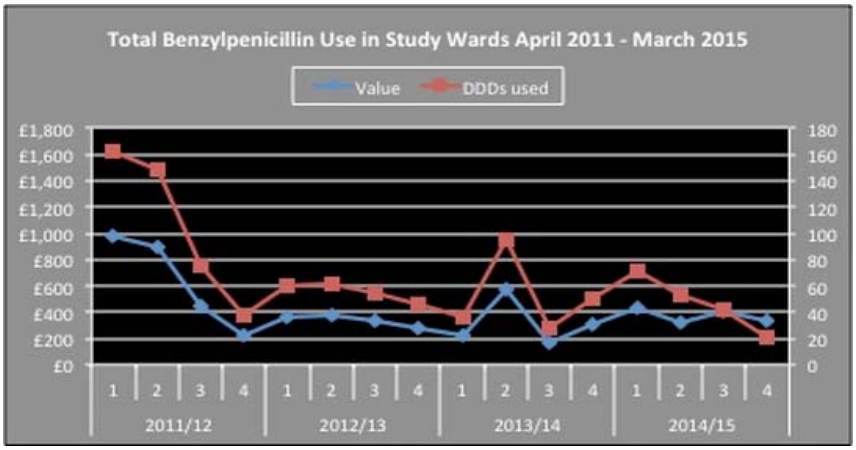

Fig 2: Defined Daily Dose of Benzylpenicillin

Discussion

We find that AS leads to a clear, documented, more cohesive approach to patients' treatment. It makes the orthopaedic consultant and on-call team aware of all patients on antibiotics and the plan for the following week (on-call week system). It has shown reduced usage and costs of antibiotics. It also has a number of soft, non-quantifiable benefits to the working of the departments. The cohesive approach improves patient confidence, satisfaction and possibly reduces hospital stay. It reduces the need for junior doctors phoning microbiology department for advice about various patients.

Hospitals that have a similar mix of medical and surgical specialties would be expected to have similar proportions of antibacterial usage, unless there were differences in the levels of antimicrobial stewardship between hospitals [5]. Comparison with other countries shows that antibiotic usage in UK is greater than in France and Australia. A confounder is that the English data include outpatient antibiotic treatment (OPAT), which is not included in hospital data by other groups [6, 7].

Clearly, more work is required to validate these findings, but they illustrate an opportunity for hospitals to benchmark themselves against other similar units. Analysis of antimicrobial consumption offers a useful instrument for observing trends for individual hospitals, groups of hospitals or whole countries. Although our study shows evidence in reducing use of antibiotics and costs, we aim to improve the parameters of our data collection to be able to present more robust data. We continue to prospectively collect data on the performance of this AS programme. Given the rising problem of antibiotic resistance, this key pillar strategy against it should be implemented in all hospitals.

Competing Interests

None declared.

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