



Short communication

Antimicrobial stewardship programmes in Emilia-Romagna, Italy

Angelo Pan^{1,*}, Carlo Gagliotti¹, Davide Resi¹, Maria Luisa Moro¹

Area Rischio infettivo, Agenzia sanitaria e sociale regionale dell'Emilia-Romagna, Viale Aldo Moro 21, I-40127, Bologna, Italy

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ABSTRACT

The purpose of this study was to evaluate the state-of-the-art of antimicrobial stewardship programmes (ASPs) in Emilia-Romagna, Italy. A self-compiled, 23-question, multiple-choice questionnaire, divided into eight sections, focusing on Public Health Trust (PHT) characteristics, multidisciplinary team, formulary restrictions, education, guidelines and protocols, auditing, antimicrobial therapy management and consumption, and resistance surveillance, was sent to all 17 PHTs of Emilia-Romagna. The 'composite index of good antibiotic use' (ICATB) score, a French ASP process index based upon 12 different parameters, was calculated. All PHTs completed the survey. All PHTs had an antimicrobial control programme, although an antimicrobial stewardship team was present in 11/17 (65%) of trusts. The main results were (a) active antimicrobial committee, 47% of PHTs; (b) restricted formularies, 100%; (c) courses on surgical antimicrobial prophylaxis (SAP) and antimicrobial therapy, 56% of surgical specialties and 47% of PHTs, respectively; courses for new prescribers, nil; (d) guidelines on SAP and on antimicrobial therapy, 100% and 71% of PHTs, respectively; (e) antimicrobial prescribing audits, 71%; and (f) antibiotic consumption and antimicrobial resistance data periodically fed back to wards, 100% and 88% of PHTs, respectively. Low overall quality scores were observed for antibiotic committee, education and auditing activities. The mean ICATB score was 11.94 points, varying significantly among trusts (5.25–16.25 points). In conclusion, all PHTs have implemented an ASP, although significant differences exist between trusts. Antimicrobial committee organisation, education and auditing activities represent the most critical points and need to be addressed by regional programmes in order to harmonise the healthcare system.

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1. Introduction

Antimicrobials are a necessary tool of modern medicine. However, they are fragile agents, since the emergence of resistance to antibiotics among microbes is a common, natural, billions of years old phenomenon that strongly limits the long-term power of these molecules. With antibiotic use in medicine being the most important driver of the emergence and widespread diffusion of antibiotic resistance worldwide, antimicrobial stewardship programmes (ASPs) are nowadays indispensable public health tools, being recommended by different authorities, including the European Community [1,2].

Although antibiotics were introduced into clinical practice only 90 years ago, antimicrobial resistance is quite common,

particularly in the hospital setting, where antibiotic pressure is found at its highest levels. Whilst a vast proportion of hospitalised patients (20–60%) are treated with antimicrobials, a high proportion of antibiotic use is inappropriate or incorrect [3]. To face this problem, scientific societies and the World Health Organization (WHO) have prepared guidelines to favour ASP implementation, mainly based upon a multimodal strategy, generally including formulary restriction, antimicrobial consumption and resistance analysis and feedback, and education [1,4,5].

Italy is a country both with high antibiotic consumption and high antimicrobial resistance levels in many micro-organisms [6]. The situation is now complicated by the rapid diffusion in Italy of multiresistant bacteria, including extended-spectrum β -lactamase-producing and carbapenem-resistant Enterobacteriaceae [6]. Whilst most hospitals have implemented some kind of ASP, no data are available in Italy regarding the effective organisation of such programmes.

The aim of this study was to describe the ASPs that have been implemented in the public hospitals in Emilia-Romagna, Italy. Here we present the results of a survey performed in this region.

* Corresponding author. Tel.: +39 051 527 7135; fax: +39 051 527 7043.

E-mail addresses: apan@regione.emilia-romagna.it, a.pan@ospedale.cremona.it (A. Pan), cgagliotti@regione.emilia-romagna.it (C. Gagliotti), dresi@regione.emilia-romagna.it (D. Resi), mlmoro@regione.emilia-romagna.it (M.L. Moro).

¹ For the Antimicrobial Stewardship Study Group of Regione Emilia-Romagna. See [Appendix A](#) for the list of members.

2. Methods

2.1. Setting

This study was conducted in Emilia-Romagna, a region in northern Italy with 4.4 million inhabitants. The regional public health system is organised into 17 Public Health Trusts (PHTs), which are represented by four university hospitals, one tertiary care hospital, all teaching hospitals (TeachH), one orthopaedic teaching centre and ten hospital trusts (HTrust), each including three to nine district hospitals, for a total of 61 facilities with 18 766 beds (range 24–1509 beds), performing 584 441 ordinary admissions in 2010. Of the 17 trusts, 12 (71%) have an infectious diseases ward.

2.2. Questionnaire

A multiple-choice, closed questionnaire was prepared based upon the Infectious Diseases Society of America (IDSA) 2007 antimicrobial stewardship guideline and the '*indice composite du bon usage des antibiotiques*' (ICATB) ('composite index of good antibiotic use') score [1,7]. The questionnaire consisted of 23 questions divided into eight sections: trusts characteristics; multidisciplinary team; formulary restrictions; education on surgical prophylaxis and antimicrobial therapy; guidelines and protocols; antimicrobial prophylaxis auditing; management of antimicrobial therapy and antimicrobial consumption; and resistance surveillance.

2.3. Antimicrobial stewardship programme score analysis

An ASP quantitative and qualitative score, implemented in France (the ICATB score), was used to evaluate the organisation level of each hospital [7]. The ICATB score is based upon 12 different parameters, which were all part of the questionnaire. The ICATB score is based on: presence of an antimicrobial committee; presence of an antimicrobial therapy specialist; web connection between wards and pharmacy; web-based drug request; education of new prescribers on antimicrobial therapy; written guidelines and protocols on antimicrobial use; antimicrobial formulary; limited amount of antimicrobials dispensed by the pharmacy; presence of restricted used antimicrobials; surveillance of antimicrobial consumption; auditing on antimicrobial prescription, antimicrobial use and resistance monitoring. To each parameter a score of 0–4 is assigned based upon the level of organisation in each trust. The score is divided into three sections: organisation, ICATB-O (maximum 4 points); means, ICATB-M (8 points); and action, ICATB-A (8 points). The total score may vary between a minimum of 0 and a maximum of 20.

2.4. Regional data

Data regarding antimicrobial consumption were retrieved from the regional hospital drug consumption databases (Assistenza farmaceutica ospedaliera) [8]. Data on mean diagnosis-related group (DRG) scores were retrieved from the regional databases [9]. This parameter was chosen because it gives an overall idea of the complexity of the patients.

2.5. Statistical analysis

Owing to the limited number of questionnaires, only a descriptive statistical analysis was performed. The proportion of different answers was evaluated. A Pearson correlation coefficient was separately calculated between ICATB score, including its subscores, and antimicrobial consumption and between ICATB

score and DRG. These analyses were performed using Microsoft Excel[®] (Microsoft Corp., Redmond, WA).

3. Results

All 17 PHTs answered the questionnaire and all PHTs reported that one or more antimicrobial stewardship strategies have been implemented, with the first PHT starting a formal ASP in 2000. A multidisciplinary antimicrobial stewardship team (AST) has been organised in 11/17 PHTs (65%), namely in all five TeachH and in six of the ten HTrust. ASTs are constituted by a median of five members: in all cases an infectious diseases physician and a pharmacist are present, and in 10/11 cases a hygiene expert and a microbiologist are part of the team. An internist is part of the AST in 6/11 cases, an epidemiologist in 5/11 and a surgeon in 4/11, whilst in no case is an information technology (IT) expert present.

A restricted formulary strategy is present in all PHTs, with a median of 13 restricted antibiotics per trust, with 6 agents being controlled in all trusts, namely daptomycin, linezolid, ertapenem, tigecycline, caspofungin and posaconazole. Other antimicrobials with restricted use are represented by the antifungals liposomal amphotericin B and voriconazole, whose use is restricted in 94% and 88% of PHTs, respectively, and by the antibiotics teicoplanin, restricted in 82% of PHTs, imipenem and meropenem (76%), piperacillin/tazobactam (53%), colistin (35%), cefepime (12%), intravenous (i.v.) levofloxacin (12%), vancomycin (6%), quinupristin/dalfopristin (6%) and i.v. rifampicin (6%). The most common control strategy is the single-patient request, applied for 61% (range 25–88%) of the restricted antimicrobials. Prescription from the infectious diseases specialist is required for 15% (range 0–60%) of the antibiotics, whilst prescription limited to some specialists only is present in 3% (range 0–13%) of PHTs, depending on the antimicrobial agent.

Education programmes on surgical antimicrobial prophylaxis have been implemented in 16/17 trusts, although with differences between the surgical specialties: from 57% of ear-nose and throat surgery to 94% among general surgery wards. In 16% (range 0–38%) of the wards, depending on the specialty, a course on prophylaxis was held over the last 12 months. Courses on antimicrobial therapy have been organised in all PHTs: hospital-wide courses have been implemented in 8/17 trusts (47%), whilst courses have been implemented in single wards in 36% (range 0–90%) of wards. No educational programme has been implemented in any facility for new prescribers.

Trust-wide antimicrobial treatment guidelines are available in 24% of cases, whilst in 47% of PHT guidelines are available only in some wards. In 29% of PHTs no guideline has been implemented at all. Guidelines on streamlining/de-escalation, combination therapy and parenteral–oral switch of antimicrobials are available in 18%, 18% and 33% of trusts, respectively. Guidelines on perioperative antimicrobial prophylaxis are present in all PHTs, in 71% being trust guidelines whilst in the remaining 29% of cases they are available only in some wards. Audits on antimicrobial prophylaxis have been performed in 53% of PHTs.

Antimicrobial therapeutic drug monitoring (TDM) is available in 15/17 PHTs (88%): vancomycin TDM is performed in all centres and teicoplanin in 7 trusts, whilst aminoglycosides are dosed in 24–53% of PHTs, depending on the antimicrobial agent.

Monitoring and feedback of data on antimicrobial use and resistance is performed in 88% and 100% of trusts, respectively. Data on antibiotic use are reported as defined daily dose in 11/17 PHTs, whilst in no case is the prescribed daily dose used. Antibiotic resistance reports are published on a regular basis, with intervals of 3, 6 or 12 months in 84% of cases.

Application of the ICATB score showed significant differences among PHTs, with scores ranging between 5.25 and 16.25

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