Antimicrobial Stewardship
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Implementing an antimicrobial stewardship programme

Chapter: Implementing an antimicrobial stewardship programme
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Introduction to antimicrobial stewardship programmes

Antimicrobial stewardship programmes (ASPs) should be at the heart of all antimicrobial initiatives in an institution, be it audit, educational, or ‘interdepartmental and interdisciplinary communication and collaboration’ pertaining to antimicrobials [1]. Setting up an ASP or expanding it from a small base can be a daunting task. The reasons for this, and the basic principles of antimicrobial stewardship, have been discussed in Chapters 1 and 2 and the necessary interventions on the shop floor will be discussed in Chapter 5. This chapter sets out how to implement an ASP in an individual healthcare setting. Implementing an ASP follows the principles of change management: plan, do, study, act (PDSA) [2].
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Know your environment and organization

Before embarking on the development of an ASP, the programme team needs to understand and define their environment and organization.

Information that should be collected includes:

- **Patient mix:** what patient population does the organization care for, are they primarily surgical or medical, are they long-term care patients, are there large numbers of immune-compromised or elderly patients? These factors will affect where you focus the ASP.
- **Antimicrobial consumption:** this should be standardized using agreed consumption metrics such as daily defined dose (DDD) (see Chapter 6). Where are the areas of high antimicrobial consumption? Who are the high prescribers? Where are broad-spectrum antimicrobials used?
- **Familiarity with local epidemiological patterns and knowledge of infections such as Clostridium difficile and antimicrobial resistance rates** informs antimicrobial choice and reduces the risk. It is only then that effective targeting, de-escalation, and discontinuation of therapy can be advised, all elements of what Paterson, citing Parrino, describes as the ‘back-end approach’ to antimicrobial stewardship [3].
- **Resources:** what resources, both human and funding, are available within the organization to deliver an ASP.
- **A gap analysis can be undertaken of existing programmes against potential performance.** There are a number of tools available to do this [4,5].

Box 4.1 lists the the most important references to consult when initiating an ASP.

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Box 4.1 Practical points

The following resources, all available on the internet, are very useful in implementing an ASP:

- ‘Antimicrobial stewardship in Australian hospitals’ (Australia) [6]
- ‘Core elements of hospital antibiotic stewardship programs’ (CDC, USA) [7]
- ‘Starting and growing your antimicrobial stewardship program’ (Canada) [8]
- ‘Start smart—then focus’ (UK) [5]
- ‘A hospital pharmacist’s guide to antimicrobial stewardship programs’ (USA) [9]


Developing a case for an ASP and gaining support

You must be clear why you are developing an ASP and be able to effectively sell your idea to the institutional stakeholders. Developing a case requires a different emphasis on the core message for different audiences within the organization. The clinical teams are more likely to be responsive to issues of patient safety and antimicrobial resistance. Management are more likely to respond to the financial implications, and this is an important area to consider if you are putting forward a business case to support an ASP.

Patient safety

While patient safety may appear a more ethereal outcome, and therefore difficult to quantify, it is one that every ASP programme needs to have as its focus. The WHO report from the Strategic and Technical Advisory Group on Antimicrobial Resistance (STAG-AMR) makes this abundantly clear [10]. Australian national guidance also states this very unequivocally ‘Antibiotic stewardship resides within the healthcare facility’s quality improvement and patient safety governance structure’ [6]. Owens [11] points out how ‘shepherding precious resources’ benefits safety and costs, as do George et al. [12] in an intensive therapy unit (ITU) setting.
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National campaigns in both Scotland and Wales (the Saving 1000 Lives Campaign) have placed stewardship front and centre as the nucleus of patient safety programmes [13]. Tamma et al. [14] argue that the centrality of patient safety to antimicrobial stewardship is under- emphasised.

In order to work, ASPs must be based on consensus. Commitment is required from management, clinical leadership, and individual healthcare practitioners. Prescribers must feel that they have ownership of programmes and policies [15,16]. Dutch experience has shown that timely and appropriate participation of physicians promotes success, at least with antimicrobial guidance [17].

**Financial savings**

In times of austerity, interventions to reduce costs will always garner support from healthcare managers saddled with the need to balance budgets. Goff [18] talks about addressing the concerns of those who might oppose an ASP and arbitrating with them by emphasizing the positive outcomes such as improved quality of care, a reduction in drug resistance, and cost savings.

In a university hospital study, Lee et al. [19] showed that implementing the Centers for Disease Control (CDC) antibiotic ‘time out’ initiative saved money and gave focus to antibiotic targeting [19]. In a study conducted in a Hong Kong hospital in 2008, Ng et al. [20] showed that the human resource costs required to run an ASP could be offset by savings from antibiotic expenditure. Beardsley et al. [21] calculated savings of between USD 900 000 and more than USD 2 000 000 per year with an ASP programme, while Standiford et al. [22] showed that in 7 years of operation an ASP introduced at the University of Maryland Medical Center showed a reduction in antimicrobial expenditure of around USD 3 000 000 in the first 3 years. Despite this, the ASP was terminated, only to be reinstated when cost-effectiveness data became available. Non-cash-releasing benefits flowed from all of these studies but they are harder to quantify.

**Requirements for Success**

Duguid and Cruickshank [6] in their guide to antimicrobial stewardship in Australian hospitals cite Boaden et al.’s [23] ‘factors’ for successful improvements of clinical processes and outcomes in healthcare. These are:

1. The need for the participation of a nexus of physicians.
2. The need for individual practitioner feedback.
3. The need for a responsive and supportive organizational culture.
4. The need for appropriate funding and allocation of resources combined with phased, targeted interventions and progress monitoring allowing rapid directional change if needed.
5. The need for an organization’s policies to support the efforts and activities of the patient-facing implementers.

Composition of an antimicrobial management team

At its core, antimicrobial stewardship is a multifaceted, multidisciplinary systematic approach to antimicrobial optimization. In Chapter 2 the overall structure of an antimicrobial management team (AMT) was discussed, but a more detailed look is warranted here.

The Infectious Diseases Society of America (IDSA) and Society for Healthcare Epidemiology of America (SHEA) guidelines 2007 [24], reflecting a US setting, emphasized the importance of an infectious diseases (ID) physician and a clinical pharmacist with ID training as essential components of an ASP. Other stakeholders, although important and desirable, were not initially indispensable.

Nathwani [25] emphasized the need for a lead acute hospital doctor and specialist pharmacist together with a medical infection specialist (medical microbiologist and/or ID doctor) as a component of the AMT. He realized that there were few ID physicians in the UK environment and that in this setting medical microbiologists tend to take a leading role.

Clinical pharmacists outnumber microbiology and ID staff and are ideally placed to act as the ‘boots on the ground’ as they conduct their ward visits interacting with prescribers in what Patterson called the ‘trenches’ [26,27] and influencing those who actually administer the medicines, i.e. nurses. They are in a unique position to be able to interdict prescribing, often prospectively, by policing the agreed formulary and proposing therapeutic alternatives (the so-called front-end approach) [26].

Charani and Holmes [28] go further, believing that proper engagement in ASPs requires wider involvement, in particular from general pharmacists and nurses. Charani et al. [29], Edwards et al. [30], and Manning [31] all see the forgotten nursing resource as a force multiplier in helping ASPs to develop and succeed, especially in areas where other resources may be threadbare.

Rohde et al. [32] agree with Nathwani that, in the absence of optimal leaders such as ID physicians and ID pharmacists, general ‘hospitalists’ (internal medicine doctors) and other health professionals can and do make appropriate leaders for ASPs. Rohde et al. argue that enhanced collaboration between hospitalists and ID physicians could fill an unmet need that would allow more institutions to engage in active stewardship programmes. The recommendations from the seminal paper of Dellit et al. [24] that an ASP should be led by an ID physician/ID
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pharmacist has ironically been seen as a barrier by some establishments to initiating an ASP, especially if they lack those specialist staff.

The terms antimicrobial management team and antimicrobial stewardship team (AST) are often used interchangeably, and the exact definition varies from source to source, but a distinction should be drawn between the operational team providing the stewardship on the shop floor and the overall institutional ASP team. However, in many institutions they may comprise the same people (Figure 4.1).

![Figure 4.1](image)

Elements and obstacles in implementing an ASP (IP&C, infection prevention and control).

Creating a framework

Allerberger et al. [33] set out a common framework on the structure and organizational requirements to ensure antimicrobial optimization.

Key principles were formulated which remain essential parts of all ASPs:

1. The creation of an organizational framework to lead, endorse, remain accountable for, and specify the scope of action, the direction, the competencies, and activities. The support of hospital management was considered highly desirable.

2. Ensuring there is sufficient capacity in terms of human, material, and technical resources available to proceed.
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AMTs should sit at the hub of the governance wheel, as discussed in Chapter 2. Ideally the operational team should have oversight from a group such as an antimicrobial stewardship committee (ASC) which has hospital management and senior clinical representation as well as the members of the AMT (see Figure 4.1).

**Communication**

Morris et al. [34] state that the AMT should create a vision of their ASP to effectively define its purposes, beliefs, and values, and this can be encapsulated in a vision statement that ‘sets the themes and direction for team members’ [35]. An example of a vision statement is that from the Mount Sinai Hospital and University Health Network in Toronto, Canada: ‘Helping patients receive the right antibiotics when they need them’ [35]. It is important that this vision is communicated to all the relevant stakeholders in the institution including senior and middle management, medical, pharmacy, and nursing staff. Methods of communication include newsletters, educational sessions, the internet, and social media (see Chapter 8). The message must be repeated and varied to maintain interest.

**Getting started**

In ‘Antimicrobial stewardship in Australian hospitals’, van Gessel and Duguid, citing Boaden et al. [6,23], again describe how one should ‘start low and go slow’, looking out for the following:

- aim for achievability
- ensure improvement or failure is communicated to participants
- realistic target reconnaissance to drive change
- PDSA cycles to test changes
- know when to enshrine the change.

Changes should be small and introduced sequentially. Each change should be tested *in situ*, using a PDSA cycle to see how it has performed and to allow unforeseen problems to surface [2]. These problems can then be dealt with before proceeding to the next change. It may take several PDSA cycles before full successful implementation is achieved.
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Measuring progress

Measurement and feedback of stewardship interventions is essential to the successful implementation of an ASP. These should be both process measures, such as the number of interventions, the number of antimicrobial stewardship rounds completed, and the number of patients reviewed, and outcome measures, such as antimicrobial consumption, resistance rates, and quality of patient care. These are discussed in Chapter 7.

Implementation barriers and how to overcome them

ASPs require patience and determination from the usually limited teams involved in them. One must never discount inspiration and previous experience as drivers for success.

Potential barriers to implementing ASPs include lack of resources in terms of time, funding, or staffing, apathy, ignorance, or a belief that such programmes are too difficult to implement or have little effect on patient flow [36]. Those most willing to engage in antimicrobial stewardship may not have the influence or kudos within the establishment to bring about necessary change management or summon the support to engender the best possibility of success.

Resistance to change is minimized if social aspects are understood, for example perceived attack on prescriber autonomy, and communication is maximized and education strengthened [2,6] (see Chapter 3).

There must be some form of contingency planning should the project run into apathy or opposition or both. In those cases, in order to stay on track, even with a leaner proposal, ‘adaptive leadership’ [37] will be required. This is where influencing strategies and networking with acquaintances (particularly if strategically placed) can help. The author’s own experiences of helping to set up an ASP in the face of some internal friction necessitated the ‘stick to one’s guns’ approach to slowly win over the non-believers. In order to gain executive and senior management support quickly, some achievable gains are required, the so-called ‘low hanging fruit’ [38]. Initiatives such as switching from intravenous to oral dosing, formulary restriction policies, antibiotic redundancy, and awareness of bioavailability are relatively easy to implement—and more importantly are associated with cash-releasing efficiency savings. Achievements such as this appeal to all ‘lean’-thinking healthcare organizations.

Entrenching the programme

Once the initial objectives of the ASP have been met, the strategy must be developed to take the programme forward. Examples include expanding the programme into more challenging areas such as haematology/oncology and antifungal stewardship. Many of these areas...
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are discussed in later chapters. It is vital that the lessons learnt and successes are disseminated to as broad an audience as possible [34].

References


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