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Research Articles

Delivering outpatient antibiotic therapy (OPAT) in an Acute Medical Unit

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Key Points
- Administering intravenous antibiotic therapy in an outpatient setting (OPAT) is a feasible option in treating a wide spectrum of infections requiring parenteral antibiotics.
- Careful patient selection, appropriate choice of antibiotic and its delivery, access to clinical and laboratory monitoring, and rigorous evaluation of outcome measures, are crucial factors in ensuring a safe and successful treatment outcome.
- OPAT can produce considerable savings in the number of hospital bed days reduce the patients' risk of developing nosocomial infections.

Abstract

Outpatient antibiotic therapy (OPAT) is being developed and practised in an increasing number of acute hospitals within the United Kingdom. This article is a review of the OPAT service delivered by a large inner city hospital over the last two years. The service demonstrates the key elements of OPAT demonstrating different delivery models, aspects of patient selection, spectrum of infections treated, choice and delivery of antimicrobials, efficacy, patient safety, outcomes, and the cost-effectiveness of this programme.

Keywords

Outpatient antibiotic therapy (OPAT), OPAT efficacy and safety, cost-effectiveness

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Introduction

Outpatient antimicrobial therapy was first developed and practised in the United States. It was initially described in the 1970s and 1980s in the management of cystic fibrosis in children and adults.[1,2] Subsequently, pilot studies in Canada[3] and United States[4] suggested a wider spectrum of use. The Infectious Diseases Society of America (IDSA) (2004)[5] describes outpatient antimicrobial therapy as the provision of parenteral antimicrobial therapy in at least two doses on different days without intervening hospitalisation. In the United Kingdom, it is slowly emerging as a core part of the healthcare delivery system and is becoming increasingly important as more patient care is delivered in the community setting.

The main aim of this article is to review the nurse-led outpatient antibiotic therapy ('OPAT') service that we have developed and delivered in our busy inner city hospital.

Delivery model

There are three main delivery models for OPAT –

a) the administration of therapy in a hospital-based facility,
b) the administration of therapy by a community nurse visiting patients' homes and
c) the self-administration of IV therapy by patients/carers themselves.

Owing to the set up of the local services all three models of care are utilised.

City Hospital is an inner city district general hospital in Birmingham, United Kingdom. It has approximately 17,500 acute medical admissions per year and serves multiple primary care trusts (PCTs). 80% of the referrals to the admission unit come via the Emergency Department. A team of specialist nurse practitioners in acute medicine (SPAM) based on the acute medical unit was initially formed in 2002 to diagnose and manage thromboembolic diseases in the outpatient setting.[6] The success of this prompted an extension of the services to include the provision of parenteral outpatient antibiotic therapy and a pilot scheme was subsequently introduced in 2007 for the treatment of cellulitis. A pathway for the intravenous treatment of cellulitis was established in partnership with one of the Primary Care Trusts (see Figure 1).

Since the introduction of OPAT in July 2007 until the end of February 2010, a total of 140 patients have been treated using intravenous antibiotics on an outpatient basis, predominantly for the treatment of cellulitis. Of this number, 94 (67%) patients who were not in the participating PCT returned to the hospital daily for IV antibiotics; 46 (33%) patients were given their IV antibiotics in the community by district nurses.

Patient selection and suitability

The ages of this cohort of patients (89 males, 51 females) ranged from 17 to 89 years old, (see Figure 2). The important elements in our assessment process for a safe and successful outcome are the status of the patient's infection and pre-existing medical conditions. The patient must be clinically stable and systemically well. Patients are required to be cognitively intact, be willing to comply with the treatment regimen and have the means to make daily trips for their infusions if needed. Psychosocial factors are important, such as the

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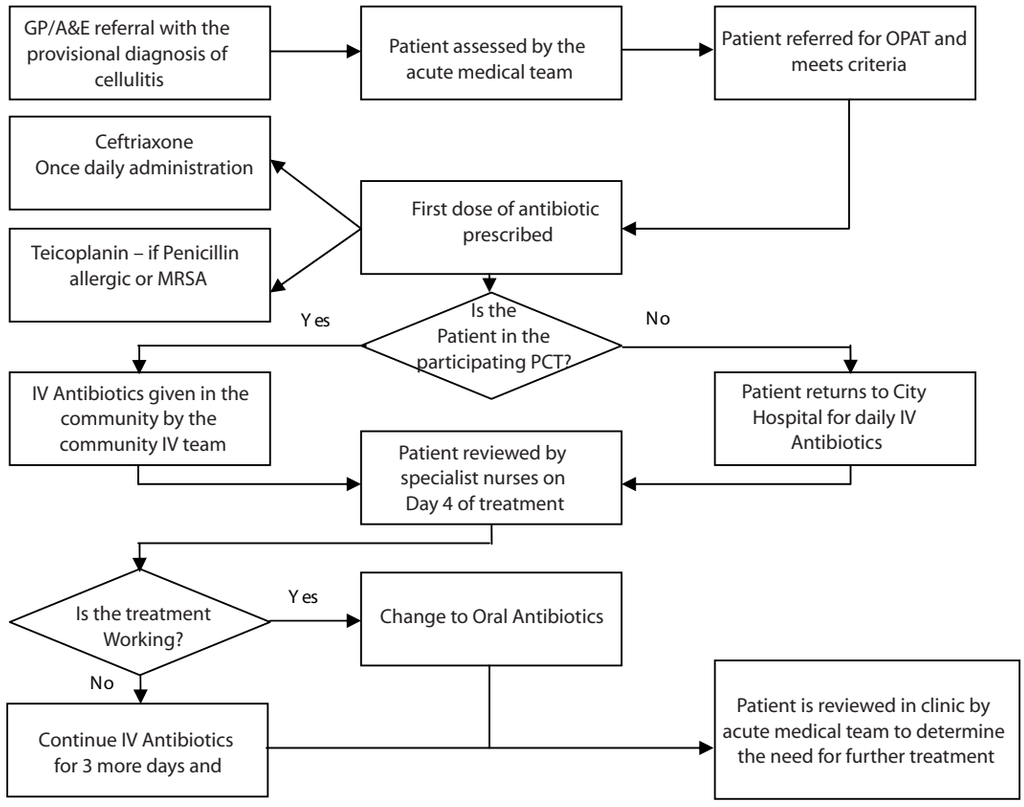


Figure 1.

availability of running water, electricity and telephone. Caution is required in providing the service to intravenous drug abusers who commonly present to the service with cellulitis or abscesses requiring prolonged treatment.

Spectrum of diseases treated with OPAT

The OPAT service was initially launched in City Hospital for the treatment of patients with lower limb cellulitis. With the success of this pilot scheme, it has been extended to include other diseases shown in Table 1. Additional diseases that are routinuely treated in this manner in the US[7] include septic arthritis/bursitis, pyelonephritis, pneumonia and sinusitis.

Although we generally treat infections requiring two weeks of therapy or less, there may be a greater benefit in conditions requiring a longer duration of therapy, such as endocarditis and osteomyelitis.[8]

Antibiotic selection

Choice of antimicrobial for OPAT requires consideration of:

- the infecting organism and condition being treated;
- the pharmacokinetic and pharmacodynamic properties of drugs used;
- drug stability.[5]

The antibiotic choice is often different to those used for inpatient therapy. Besides being efficacious against the likely organism, it should also have a long half-life allowing once daily administration, hence minimising disruption to the patient's daily activities. The commonest antibiotic we prescribe is ceftriaxone (over 95% of prescriptions). However other antibiotics also used in this manner include ertapenem (used in resistant urinary tract infections), teicoplanin (alternative agent for patients allergic to beta-lactams), amikacin (resistant tuberculosis) and vancomycin.

Antibiotic delivery – Intravascular devices

The IDSA practice guidelines for OPAT[5] suggest the use of peripheral short catheters for patients with good vein status. These patients usually receive a short course of therapy (generally <2 weeks for adults) with an agent that has low potential for causing phlebitis or soft tissue damage if infiltrated. From our own practice we have had few problems with peripheral cannulae. In contrast, percutaneous IV cutaneous catheters (PICC) are more appropriate in circumstances where the need for prolonged (more than 2 weeks) vascular access is needed and the risks and expense of other types of central lines are not warranted.

Most of our patients had their antibiotic therapy delivered via a peripheral cannula. We have occasionally used PICCs (Groshong lines). In some cases intramuscular injections have been given.

Monitoring of therapy – Efficacy and patient safety

The patients are referred either by the general practitioner, a member of the acute medical team or via the Emergency Department. The process is then predominantly nurse-

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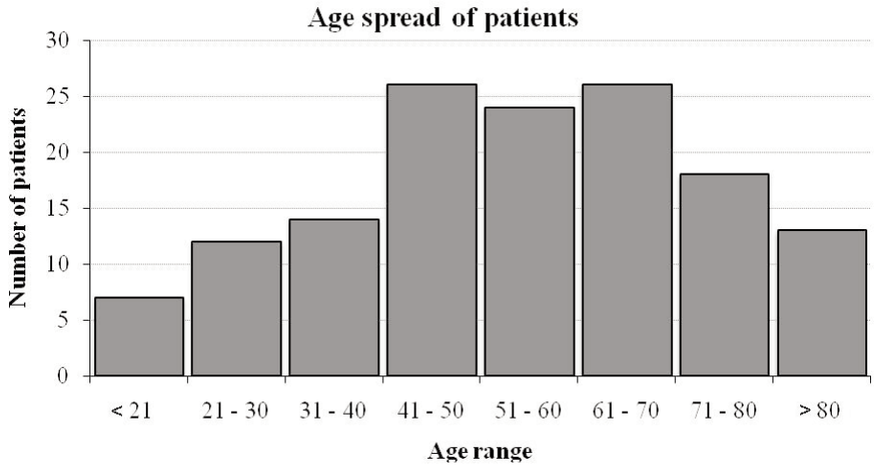


Figure 2. Patient demographics.

led, though contact with the acute medical team is maintained in case complications arise. Patients completing the course of antibiotics may be referred back for a further medical opinion particularly in the case where chronic antibiotics are required or to a speciality medical team if input is required in their on-going management (such as bacterial endocarditis).

Regular review of patients receiving OPAT is essential to ensure a safe and successful treatment outcome. All of our patients are reviewed every three days. There must also be access to laboratory facilities to monitor parameters as needed including drug concentrations. One of the main concerns with OPAT is the issue of patient safety in terms of discharging patients home with peripheral cannulae in situ. The failure/complication rate among the 140 patients we have cared for has been low (5.7% of patients). There were no reported complications related to the use of intravascular catheters in all 140 patients, though some patients had inadvertently removed their cannula at home. Five (3.6%) patients required hospital admission due to an inadequate response. Three of these required referral to the orthopaedic/surgical team due to abscess formation and tracking of cellulitis. Three (2.1%) patients developed a rash in response to ceftriaxone. In each case ceftriaxone was stopped, the need for intravenous therapy reviewed and alternative treatment commenced.

Patient Satisfaction

A patient satisfaction survey was completed following the introduction of the OPAT pilot scheme City Hospital.[9] The showed that 88% of the patients were pleased with the service which enabled an earlier discharge from hospital even if this meant daily trips back to the hospital.

Duration of therapy

In our cohort of patients, approximately 60% of the patients received intravenous antibiotics for 3 days or less (see Figure 3). The mean duration of intravenous treatment for patients with cellulitis was 4.4 days. The small group of patients who required prolonged intravenous therapy included those with positive blood cultures or treatment of other more chronic infections such as osteomyelitis, tuberculosis and sacroilitis.

Cost-effectiveness of OPAT

Our results translate into a total of 740 hospital bed days saved over a period of approximately 2.5 years. As the service has expanded from pre-existing resources the service is estimated to have so far saved approximately £100,000 per annum. Moreover, a prolonged hospital stay exposes patients to the risks of acquiring nosocomial infections.

Other authors have found similar savings. Chapman and colleagues[10] evaluated an outpatient infusion centre. 87% of the patients responded to OPAT. 6.3% of the patients were readmitted. Overall, they concluded that OPAT was cost-effective when compared with equivalent inpatient care in the UK healthcare setting. Nathwani[11] showed similar results. His review of 125 patients showed that OPAT saved the hospital 665 bed days.

Conclusions

OPAT is slowly becoming established in the United Kingdom as an alternative to inpatient management of certain infections in selected patients. This is timely, in view of the National Health Service focus on more health care delivery in the community. Physicians in Acute Medicine are in an ideal position to lead in the development of safe and

Diseases treated	Cellulitis	Urinary Tract Infection	Salmonella	Tuberculosis	Osteomyelitis	Sacroilitis
Number of patients (n=140)	128	3	6	1	1	1

Table 4. Spectrum of infections treated.

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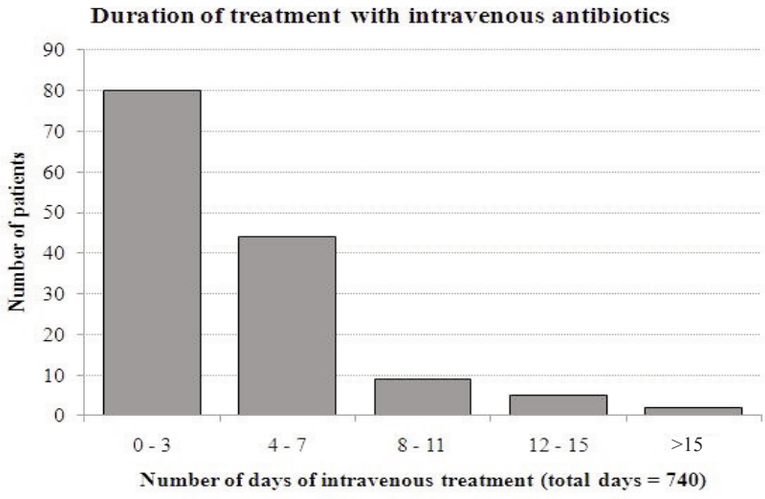


Figure 3. Duration of treatment with intravenous antibiotics.

effective OPAT services. Our experiences have shown the benefits of this approach in delivering a, safe, cost effective service which is popular with our patients. We plan further expansion of the service, which will include the treatment of a wider variety of infections such as wound infections, endocarditis and osteomyelitis in the future.

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