

Once-Daily Ceftriaxone Outpatient Therapy in Adults with Infections

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Abstract. Since 1981 our physicians' office has developed an outpatient parenteral antibiotic therapy programme which has shown advantages in patient care and provided significant cost savings. While we were able to provide any parenteral antibiotic available, the mainstay of our programme was ceftriaxone because of its broad range of activity, safety, and once-daily administration. Two hundred and ninety cases of outpatient ceftriaxone usage were recorded between January 1989 and March 1990. Ceftriaxone was found to be most useful for bone, soft tissue, and gynaecological infections. Not only was it highly clinically successful, but it was safe to use in the twice-weekly monitoring parameters we routinely perform in our office. The use of ceftriaxone alone during the 15-month period accounted for savings of over US \$ 1.2 million compared to the cost of hospitalization during this period.

Introduction

Outpatient use of parenteral antibiotics has important implications for the quality of life of a patient. It is advantageous both emotionally and socially for patients, adults as well as children, to be at home as opposed to confined to hospital [1].

Substantial cost savings can result from such a programme as a consequence of each day that a person is kept out of hospital [2]. In adults, fees can also be lessened

by reducing the number of physician visits a patient receives.

Outpatient parenteral antibiotic treatment allows better and more appropriate use of hospital space, as beds are free for people who really need them. It also enables patients to return earlier to work or school [3].

A investigational study with outpatient parenteral ceftriaxone for the treatment of osteomyelitis was begun at our practice during 1981. At first, all patients were

Table 1. Patient selection criteria

Appropriate infection and antibiotic
Clinically stable or improving
Adequate home environment
Able and interested patient and family member
Antibiotic tested and tolerated well
Must demonstrate ability to provide antibiotic

Table 2. Parenteral antibiotics used for outpatient therapy

Antibiotic	Treatment courses	Patient days
Ceftriaxone	290	4,120
Imipenem	68	996
Clindamycin	56	787
Cefazolin	50	1,057
Vancomycin	38	695
Penicillins	29	500
Aminoglycosides	15	388
Antivirals	11	425
Antifungals	4	136
Other	31	406
Total	592	9,510

treated in the hospital, but many were subsequently allowed to attend the office daily for injection instead. By the end of the study, over half of the treatment days were as outpatients, and many patients were never hospitalized during their course of treatment.

These findings led to the development of an outpatient parenteral antibiotic therapy programme which has provided antibiotics for over 1,500 patients since it started in 1984. We now find that one third of our patients who need parenteral antibiotics can be treated at home instead of in the hospital.

Patients and Methods

Outpatient antibiotic therapy was administered by an infectious disease team headed by an infectious disease physician and consisting of an intravenous therapy nurse and in-house pharmacy and laboratory services [4].

Patient selection for outpatient management was performed according to the criteria listed in table 1. The majority of the patients were trained in self-administration of intravenous antibiotics and sent home with medication and supplies. In 5-10% of the cases medication was provided daily in the office. The patients returned to the office twice weekly for examination and intravenous site changing. A full blood count was also obtained on a twice-weekly basis. Renal function studies were performed once a week in the patients treated with ceftriaxone.

More than 9,000 patient days were carried out in our physicians' office in Tacoma, Washington, over a 15-month period between January 1989 and March 1990. The antibiotics used are listed in table 2. Of the 592 courses of therapy, 290 involved the use of ceftriaxone.

The mean duration of ceftriaxone therapy was 14 days with a range from 1 to 57 days. The mean age of the patients treated was 42 years with a range from 10 months to 79 years. Twenty percent of the patients received an antibiotic in addition to ceftriaxone therapy: either clindamycin, metronidazole, or doxycycline.

Results

Two hundred and ninety courses and 4,120 patient days of once-daily ceftriaxone therapy were provided over the 15-month period either in the office or in the patients' home (table 3).

The most frequent use of ceftriaxone was in osteomyelitis, usually caused by staphylococcal or gram-negative bacteria. Prolonged therapy of these bone infections (average duration 21 days) was well tolerated. Skin and soft-tissue infections were usually due to staphylococcal or

streptococcal pathogens and responded well. In the case of gynaecological infections, a combination of ceftriaxone and clindamycin was often used for recurrent or relapsing pelvic inflammatory disease. Combination therapy was also useful in abdominal infections.

The side-effects noted with outpatient ceftriaxone over this period are listed in table 4. Most patients had some changes in their bowel flora and occurrence of loose stools within a few days of beginning ceftriaxone therapy. Normal bowel function was regained in most cases within 1-2 weeks. However, in 1 case ceftriaxone treatment was discontinued due to severe diarrhoea caused by *Clostridium difficile* colitis. Eosinophilia was a relatively frequent occurrence, but was not clinically significant.

Ceftriaxone was discontinued because of adverse effects in 12 out of the 290 cases (4%). The most frequent reason for discontinuation was the development of rash (10 patients). However, in many of these cases ceftriaxone was not the sole antibiotic administered.

Leucopenia is a cephalosporin-related problem, but due to our extensive experience with ceftriaxone, treatment was not suspended in this study until the granulocyte count fell below 1,000. This happened in 1 case, and the drug was discontinued.

Discussion

By providing outpatient parenteral antibiotic therapy for more than 9,000 days over the 15-month period of this study, we estimated savings of greater than US\$ 2.7 million in community health care costs

Table 3. Ceftriaxone usage

Site of infection	Treatment courses	Patient days
Bone	73	1,533
Skin and soft tissue	71	710
Gynaecological	63	882
Joint and bursa	32	384
Chest	17	204
Abdomen	9	90
Bacteraemia	6	96
Ear, nose, and throat	5	45
Central nervous system	4	112
Urinary tract	3	18
Other	7	94
Total	290	4,120

Table 4. Ceftriaxone – adverse effects

	n	%
Courses of therapy:	290	
Discontinued due to adverse effects		
Rash	10	3.4
Diarrhoea	1	
Leucopenia	1	
Total	12	4.1

when viewed in the light of hospitalization costs of over US \$ 300 per day. More than 4,000 patient treatment days were provided by ceftriaxone alone which accounted for savings of approximately US \$ 1.2 million.

Our experience with outpatient paren-

teral antibiotic therapy has demonstrated its effectiveness for the administration of any antibiotic that could be provided by the hospital. Specific efficacy studies have not been carried out, as results with outpatient antibiotic therapy are expected to be similar to those for hospitalized patients. In general, the patients who fulfil the criteria for outpatient therapy are in better health and, therefore, more likely to be cured of the infection than those who must remain in the hospital.

Ceftriaxone has proved to be the most useful antibiotic for outpatient parenteral therapy in our practice, accounting for nearly half of the treatment courses provided. We have used it for a wide variety of serious infections, ranging from osteomyelitis to abdominal infections, Lyme disease, and the final stages of meningitis. Ceftriaxone has been particularly useful in bone, wound, and gynaecological infections, as the patients are often young and otherwise in good health.

It has also been possible to extend ceftriaxone's spectrum of activity in outpatients by the addition of other parenteral or oral antibiotics such as metronidazole or doxycycline.

The adverse effects noted with the outpatient usage of ceftriaxone have been similar to those seen in hospitalized patients

and consisted primarily of a rash. It is important, however, to continue close monitoring for bowel disturbances and leucopenia, as these could become significant.

In our experience, ceftriaxone is ideally suited for the outpatient care of serious infections due to its efficacy against a wide range of clinical syndromes of infection, its good safety profile, and its once-daily administration by the intramuscular or intravenous routes.

References

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