COST EFFECTIVENESS OF CEFTRIAXONE

Marina Fenech

Ceftriaxone is the first of the newer cephalosporins that can be administered safely and effectively in once-daily (or twice-daily) dosing schedule and that, in addition, possesses the broad spectrum of activity characteristic of the third generation cephalosporins. Given the pressures for cost containment that are now a major part of hospital life, drugs with favourable pharmacokinetic properties, should make it possible to realise considerable savings related to decreases in costs of administration.

Methodology

In an attempt to evaluate the cost-effectiveness of ceftriaxone, four studies were carried out:

Study 1

In this study, the daily dosage costs of ceftriaxone were compared with those of formulary and emergency/special requisition parenteral antibiotics currently used at St Luke's Hospital, G'Mangia.

Study 2

In the second study, the administration costs required for a four-daily dosage regimen, were compared to those required for a once-daily dosage regimen. Such costs per patient per day, included professional time necessary for drug administration and material costs. The total cost savings achieved through once-daily dosing regimen was applied to a minimum therapy duration of 1 week.

Study 3

The net hospital costs for inpatient and outpatient (ceftriaxone) antimicrobial therapy were calculated, where the difference is equivalent to the potential cost savings possible through ceftriaxone outpatient therapy. The net hospital costs estimated included:

> The approximate cost of a training session. (On an outpatient basis, patients are trained to self-administer the medicament at home).

- Cost of actual supplies used.
- An approximate evaluation of a follow-up visit.
- Bedding costs.

Study 4

This involved a clinical evaluation of ceftriaxone in surgical prophylaxis in gynaecological and obstetric surgery and urological surgery. The study thus consisted of two parts and involved a total of 70 patients. It was carried out over a period of 8 months (June 1991 - February 1992) and it was a random, single blind study.

Results

Study 1

82.75% of the special requisition parenteral antibiotics are more expensive than ceftriaxone, on a daily dosage cost basis; these included also third generation cephalosporins like ceftazidime. On the other hand, only 25% of the formulary parenteral antibiotics have a more expensive daily dosage cost, when compared to ceftriaxone. These included cephalothin and cefotaxime (first and third generation respectively).

Study 2

Table 1. Comparison of administration costs

	Once-daily	Four-daily	Savings
Cost/week/patient includes professional time, syringes, etc.	Lm13.21	Lm59.92	Lm39.76

Study 3

Table 2. Potential cost-savings possible through outpatient therapy

	Inpatient cost	Outpatient cost	Savings
Cost/week/patient includes bedding, tests, training, supplies	Lm20.00	Lm21.00	Lm399.00

Study 4

Table 3. Perioperative surgical prophylaxis

TAH	Success	Failure	Dubious Failure
Ceftriaxone group (n=25)	75%	12%	12%
Control group (n=25)	80%	4%*	16%
PCNL		Success	Failure
Ceftriaxone group (n=10)		80%	20%
Control group (n=10)		80%	20%**

TAH: Total abdominal hysterectomy (obstetric and gynaecological surgery)

PCNL: Percutaneous nephrolithotripsy (urological surgery)

Control group in TAH surgical prophylaxis included a range of parenteral antimicrobials, given both in combination and as monotherapy, or no antibiotic therapy at all (3 cases)

Control group in PCNL surgical prophylaxis included patients either on cefuroxime or norfloxacin or amoxycillin-clavulanate

* patient excluded from study because of concomitant diverticular disease during surgery; a strong predisposing factor to infection

** one patient is this category (=10%) excluded because of pre-operative sepsis

Discussion

All cephalosporins except cefuroxime, are more expensive than ceftriaxone on a daily dosage cost basis, when given in doses indicated for serious/life-threatening infections. Antimicrobial spectra for cefuroxime and ceftriaxone are also similar, and this explains why cefuroxime is a strong competing agent for ceftriaxone on the local market.

As seen from Study 2, the administration costs saved through once-daily ceftriaxone therapy, are significant and may in fact balance out the extra costs incurred in those instances where ceftriaxone was found to have a superior daily dosage cost.

Outpatient therapy with ceftriaxone is possible because of its favourable pharmacokinetics which afford a once daily dosing. Such outpatient programmes are not without limitations and patient compliance is perhaps the most important. Outpatient therapy again, compensates for cases shown in Study 1 where ceftriaxone was found to have a more expensive dosage. Therapeutic efficacy of ceftriaxone compares extremely well with that of othr antibiotics used as controls. Therapeutic success rates were similar or even identical in Study 4, although the incidence of dubious therapeutic failure and therapeutic failure cases did indicate a somewhat less superior nature of ceftriaxone - as shown especially in the case of TAH surgical prophlaxis. However, it should be emphasised that the study was characterised by a number of limitations which influenced the outcome, interpretation and credibility of such results, appreciably.

Conclusions

Ceftriaxone given on a once-daily basis is cost-effective and if used as a monotherapeutic agent this cost-effectiveness would be much augmented. However, the various cost benefits and other associated advantages achieved though monotherapy would prove futile and even life-threatening if resistance were to emerge during therapy. Ceftriaxone monotherapy is thus indicated for non-nosocomial infections (mild-moderate) and peri-operative surgical prophylaxis. Reinforcement of a clinical-pharmacist - infectious-disease physician team, instituted to review all cases of patients on antibiotic therapy may lead to a more regulated control of hospital expenses without meanwhile compromising

therapeutic efficacy. Certain antimicrobials may effectively be replaced by more cost-effective agents such as Ceftriaxone.

References

Moellering R.C. Ceftriaxone: A Long-Acting Cephalosporin. The American Journal of Medicine 1984; 77:1.