Cost-Effectiveness and Value of an IV Switch

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Summary
A few antibiotics (i.e. metronidazole, clindamycin and ciprofloxacin) are available in both parenteral and oral formulations, and have good bioavailability, ensuring equivalent systemic drug concentrations. During a 4-year period subsequent to the initiation of a parenteral to oral (IV-PO) stepdown programme for metronidazole and clindamycin, Vancouver General Hospital saved approximately $C85 000. However, many parenteral antibacterials lack an oral formulation, requiring oral stepdown to a different antibacterial with a similar spectrum of activity. Alternatively, the oral formulation of a parenteral antibacterial may have poor bioavailability (i.e. cefuroxime axetil, ampicillin, cloxacillin, erythromycin, and tetracycline) and it is not possible to maintain equivalent systemic drug concentrations. While rigid criteria are not applicable to all clinical scenarios, the general criteria for oral stepdown include the following: the patient 1) continues to need an antibiotic; 2) is clinically stable; 3) is capable of tolerating the oral dosage form; and 4) has no factors present (e.g. gastrointestinal abnormalities or drug interactions) that would adversely affect oral bioavailability. A review of subsequent IV-PO stepdown programmes at Vancouver General Hospital revealed that 1) not all patients receiving parenteral therapy are candidates for oral stepdown; 2) oral stepdown is delayed in a large proportion of treatment courses; 3) oral stepdown is not occurring in many patients for whom it is deemed appropriate; and 4) in a very few treatment courses stepdown may occur prematurely and may contribute to clinical deterioration. In 1991, acquisition costs for ceftriaxone, ceftazidime, and imipenem amounted to $C81 0000, which represented 34% of total antibacterial drug expenses at Vancouver General Hospital. Cefixime, the first oral third generation cephalosporin marketed in Canada, can be used for oral stepdown in selected patients receiving ceftriaxone, ceftazidime, or ceftizoxime, resulting in decreased acquisition and delivery costs. Cefixime has been shown to be effective in the treatment of urinary tract infections, upper and lower respiratory tract infections, bacterial sinusitis and otitis media caused by susceptible pathogens; however, inadequate cerebrospinal fluid penetration precludes its use for the treatment of meningitis, and it lacks dependable activity against Pseudomonas aeruginosa, Staphylococcus aureus, and anaerobes. When applied judiciously, IV-PO stepdown can dramatically impact upon drug, drug delivery, and hospitalisation costs, lessen the incidence of IV-associated complications (e.g. phlebitis, infection), and facilitate early discharge.

Anti-infective drugs continue to account for a major portion of Canadian drug expenditures. According to the 1991 report of the Patented Medicine Prices Review Board (Patented Medicine Prices Review Board 1991), 159 of the 744 (21%) patented medicines offered for sale in Canada were systemic anti-infectives (fig. 1). These drugs accounted for $C307 million in revenue from sales, which was second only to revenues from patented cardiovascular drugs ($C325 million).

The relative magnitude of anti-infective drug costs is striking, when one considers that antibiotics are typically employed on a short term basis (e.g. 7 to 10 days), whereas cardiovascular drugs...
are usually administered as chronic therapy for periods of months to years. The ratio of available antibiotics to cardiovascular drugs (nearly 2 : 1) is also significant. The high number of available antibiotics may contribute to confusion regarding anti-infective product selection.

At Vancouver General Hospital, a 1000-bed tertiary care referral centre, drug costs are increasing at a rate of approximately 15% per year (fig. 2). Total drug expenditure for the 1991 fiscal year was $C10.5 million. Approximately 32% of these costs were associated with anti-infective drugs (fig. 3), which is similar to the percentage contribution to total expenditures described by most similar institutions (Kunin 1990).

While total drug costs are escalating, anti-infective drug expenditures at Vancouver General Hospital have plateaued as a result of a variety of cost containment programmes (Bachand et al. 1987; Bunz et al. 1989, 1990a,b; Frighetto et al. 1992; Gupta et al. 1988, 1989; Gutensohn et al. 1991; Jewesson et al. 1985, 1993a,b; Jewesson & Chow 1983a,b; Martinusen et al. 1993; Reesor et al. 1993; Shalansky et al. 1989; Stiver et al. 1987; Zaremba et al. 1988). These programmes are in accordance with the subsequently published Canadian Health and Welfare guidelines (Health Services Directorate 1990).

At most hospitals, a few agents are responsible for a large portion of the total antibacterial drug expenditures. In 1991, the newer broad spectrum cephalosporins, ceftriaxone and ceftazidime, and the new broad spectrum carbapenem, imipenem, accounted for $C810 000, which represented 34% of the total antibacterial drug expenses at Vancouver General Hospital. Because of their cost and potential for misuse in the treatment of infections likely to respond to agents with a narrower spectrum, these 3 antibacterial agents have been designated as reserved drugs requiring written justification for their use, which is limited to approved indications (Bachand et al. 1987). Needless to say, any cost containment strategy resulting in a reduction in the use of these 3 antibacterials could have a significant impact on the overall drug budget.