Antibiotic Stewardship Program Perspective

Oral Antibiotic Therapy for Common Infectious Diseases

Cheston B. Cunha, MD

KEYWORDS

• Antimicrobial stewardship • Antibiotics • IV-to-oral • Oral therapy
• Pharmacokinetics • Pharmacodynamics

KEY POINTS

- If chosen properly, oral therapy provides many benefits over intravenous therapy.
- Skin soft tissue infections, community-acquired pneumonia, and urinary tract infections are relatively low-hanging fruit for oral-only therapy.
- Applying pharmacokinetic and pharmacodynamic principles, oral therapy can be used to treat even severe infectious diseases.

INTRODUCTION

Traditionally, for many bacterial infectious diseases, initial antibiotic therapy was administered intravenously (IV). Over the past 3 decades, there has been increased understanding, appreciation, and application of pharmacokinetic (PK) and pharmacodynamic (PD) principles in antibiotic therapy.

The utilization of PK/PD parameters as applied to antimicrobial therapy has led to optimizing dosage regimens as well as increased awareness and experience with oral antibiotic therapy.[1,2]

The antibiotics that lend themselves to oral administration are those that are well absorbed orally such that serum/tissue levels are essentially the same IV or orally. Clearly, if an oral antibiotic, given at the same dose as its IV formulation, results in the same serum/tissue levels, why not treat with oral antibiotics whenever possible?

In recent years, there has been an evolution from predominantly IV therapy to IV-to-oral switch therapy to entirely oral therapy for noncritical inpatients as well as outpatients.[3–5]

Antibiotic Stewardship Program, Division of Infectious Disease, Rhode Island Hospital, 593 Eddy Street, Physicians Office Building, Suite #328, Providence, RI 02903, USA
E-mail address: ccunha@lifespan.org

Med Clin N Am ■ (2018) ■–■
https://doi.org/10.1016/j.mcna.2018.05.006 **medical.theclinics.com**

However, physicians are creatures of habit and do not readily accept change. Most doctors were trained to begin therapy via the IV route. This practice assures rapid attainment of serum/tissue levels. Certainly, in critically ill patients in danger of dying in the next half hour should receive initial antibiotic therapy IV.[3–5]

Patients are often admitted for IV antibiotic therapy, for example, osteomyelitis, as if the route of administration is of paramount importance over PK/PD considerations and resistance potential concerns.[2] Optimal therapy does not depend on the route of antibiotic administration. Even with critically ill patients in the intensive care unit, oral antibiotics administered via nasogastric tube are not only well absorbed but absorption may also be better than in noncritically ill individuals.[6–8]

Even though there is a long experience in treating some serious systemic infections exclusively with oral antibiotics, for example, plague, rocky mountain spotted fever, there persists the mistaken notion that somehow IV is more effective than oral antibiotic therapy.[9,10]

The many advantages of oral antibiotic therapy have been realized in IV-to-oral switch programs. Advantages of the oral portion of IV-to-oral switch therapy includes lower drug costs, no phlebitis, increased patient satisfaction, no peripherally inserted central catheter lines (with their associated complications of bacteremia, fungemia), earlier discharge, and decreased length of stay (LOS)[11–16] (**Table 1**).

If IV-to-oral switch is good, then entirely oral therapy is even better.[2–5] Sometimes medical practice needs prompting, and the Centers for Disease Control and Prevention's mandated antibiotic stewardship programs (ASPs) have provided the impetetus.[17–19]

Although IV-to-oral switch is a recommended part of hospital ASPs, practitioners can take ASPs to the next level by using oral antibiotic therapy whenever possible.[2,3]

There are only 2 clinical scenarios, when IV is the preferred therapy, that is, inadequate absorption, and in critically ill patients likely to die in a half hour or less.[2,5,6] Otherwise, all other patients are candidates for entirely oral antibiotic therapy. ASPs should provide practitioners with antibiotics and doses that have the relevant PK/PD properties that essentially makes oral equivalent to IV therapy (high bioavailability: 90% absorption). The equivalence of oral therapy with IV therapy is straightforward with antibiotics of the same class, that is, oral levofloxacin = IV levofloxacin (at the same dose) with the same serum/tissue levels. Using oral antibiotics with high bioavailability (>90% absorbed), oral therapy = IV therapy pharmacokineticly[1,2,20,21] (**Table 2**).

ASPs should provide guidance when no same drug oral equivalent is available, for example, ceftriaxone. The oral equivalent (same spectrum) of ceftriaxone would be levofloxacin or Trimethoprim-sulfamethoxazole (TMP-SMX).[2–4] Shortening duration

Table 1
Clinical and pharmacoeconomic advantages of oral antibiotic therapy

	Advantages	Comments
Oral antibiotic therapy	Lower *antibiotic acquisition* cost (at same dose) No *IV antibiotic administration* costs ($10/dose) *Rapid gastrointestinal absorption* (~1 h even in critical ill patients) Eliminates phlebitis and IV line–related infections Decreases LOS Patients pleased with earlier discharge	Avoid if markedly impaired gastrointestinal absorption *If therapeutic effect is* needed in <1 h (patient in shock), begin therapy IV and later switch to PO to complete therapy