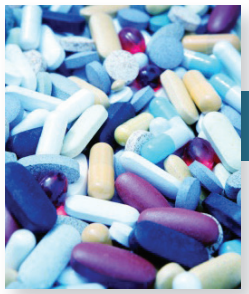



By Jerry Siegel, PharmD, FASHP, and Jason C. Lovero, PharmD

# Implementing an **IV to PO Conversion Program:** Motivation, Methods, and Myths

Oftentimes when cost-saving initiatives are discussed in a hospital setting, two chief topics of conversation are the use of generic versus brand name medications (including therapeutic substitution) and the conversion of intravenous (IV) medications to their oral (PO) counterparts. There are many reasons to initiate an IV to PO conversion program, but more often than not, the main one is cost savings. The IV to PO acquisition cost ratio varies between medications, but IV medications can at times be upwards of 100 times more costly than their PO counterparts (see Table 1), and this does not take into account all the other expenses associated with intravenous medications, including intravenous tubing, medication pumps, and labor costs related to preparation and administration. There have been many strategies for initiating IV to PO conversion programs introduced over the past few decades, but the most successful are invariably those where the prescriber, the preparer, and the administrator of the medication are equally motivated.

## Motivation for IV to PO Conversion

Whenever the transition from IV to PO is being considered, cost savings is usually a primary motivating factor. Successfully converting IV medications to their oral equivalents reduces drug costs in several ways. In addition to being cheaper than their IV counterparts (see Table 2), oral medications incur less risk. Since oral medications do not require an IV line for administration, the risk of hospital-acquired infection decreases.[1] Reducing this type of infection has a significantly positive affect on patient safety, cost savings, and third-party payer reimbursement.

### Patient Safety

According to the US Centers for Disease Control, 1.75 million patients end up with hospital-acquired infections, annually. Of those, 175,000 involve the bloodstream and 26,250 result in death.[2] Appropriate IV to PO conversions can reduce hospital mortality by reducing the risk of infection.

**Table 1. IV to PO Cost Ratios for Selected Medications**

| Medication | IV:PO cost ratio (WAC) | IV:PO cost ratio (AWP) |
|---|---|---|
| Esomeprazole | 5.2 | 5.2 |
| Furosemide | 2.9 | 1.2 |
| Metoprolol | 112.3 | 17.5 |

Abbreviations: WAC=wholesale acquisition cost; AWP=average wholesale price

**Table 2. Cost-comparison between Selected IV and PO Medications**

| Medication Regimen* | Cost/Unit (WAC) | Cost/Unit (AWP) |
|---|---|---|
| Esomeprazole 40 mg IV daily | 26.13 | 32.66 |
| Esomeprazole 40 mg PO daily | 5.01 | 6.26 |
| Furosemide 40 mg IV daily | 0.55 | 0.54 |
| Furosemide 80 mg PO daily | 0.19 | 0.45 |
| Metoprolol 10 mg IV Q6 hour | 20.90 | 20.00 |
| Metoprolol 50mg PO BID | 0.19 | 1.14 |

Abbreviations: WAC=wholesale acquisition cost; AWP=average wholesale price

*Daily medication regimens are based upon IV:PO bioequivalence (esomeprazole 1:1, furosemide 1:2, and metoprolol 1:2.5)

### Cost Savings

Patients with hospital-acquired infections have prolonged lengths of stay; this results in opportunity costs since beds and other resources are used to provide patient care. Estimates suggest that the annual economic cost of hospital-acquired infections to the US health care system is $6.7 billion per year. The costs of prevention are lower than the value of resources used to treat hospital infection. At Brigham and Women's Hospital, an intervention strategy to promote IV to PO conversion of six medications resulted in an estimated drug cost savings of over $850,000 per year.[3]

### Third-party Payer Reimbursement

With the advent of Medicare's prospective payment system (PPS) and diagnosis-related group (DRG) classification of cases,[4] providers are incentivized to reduce costs and discharge patients more quickly. Since oral medications are cheaper than IV medications, this is one way to reduce the overall cost of each case. Furthermore, the Medicare Hospital-Acquired Conditions Initiative will impact providers by reducing reimbursement rates for treating patients with certain hospital-acquired infections.[5] IV to PO programs have been proven to reduce the rate of catheter-related infections, so this is yet another strategy to consider to maximize reimbursement from Medicare cases.

## Methods for Success

Every hospital has its own unique culture, and the essential elements of each IV to PO program will differ between institutions. There are a variety of examples

in the literature, and they can serve as a model for providers who are interested in implementing similar programs.

### Manual

A manual approach to an IV to PO program involves the relationship between a prescribing physician and other health care providers. Some programs use nurse interventionists or clinical pharmacists who screen patients for the appropriateness of prescribed IV medications.[6] The manual approach is the least formal system since the responsibility for converting IV medications is not clearly delineated.

### Protocol

Some institutions have drafted IV to PO protocols to guide clinicians on the appropriateness of IV medications. These protocols may include flow charts that display the functions of each person involved, as well as criteria for patients who are eligible to be switched from IV to PO. At Huntington Memorial Hospital, an intervention form was developed to guide pharmacists in determining whether patients receiving IV levofloxacin could be switched to PO.[1] Patients eligible for conversion had to meet the following criteria according to the protocol drafted:

- Able to adequately absorb other oral medications
- Able to eat or tolerate enteral feeding
- No nausea or vomiting
- Condition is improving

### CPOE Support

Hospitals with computerized physician order entry (CPOE) systems may have the capability to include decision support for prescribers. Instituting this can be an extremely effective way to promote IV to PO conversion since the intervention is made when the prescriber is entering the order. At Brigham and Women's Hospital, auto-

# IV to PO Conversion

**Hospitals with computerized physician order entry (CPOE) systems may have the capability to include decision support for prescribers. This can be an extremely effective way to promote IV to PO conversion since the intervention is made at the time of order entry.**

mated computer-generated reminders were incorporated into the order entry system to alert physicians of the potential for making an IV to PO conversion; out of the five medications targeted for this program, 36% of the prompts resulted in either a conversion to PO or discontinuation of the order.[6]

### Formalized Multidisciplinary Model

One innovative way to implement an IV to PO conversion program is by creating a service dedicated to this initiative. At Vancouver General Hospital, a pharmacist-managed IV to PO Dosage Form Conversion Service was formed to reduce inappropriate use of IV ciprofloxacin. This service successfully used a multidisciplinary approach by having pharmacists, physicians, and other health care providers collaborate and convert patients to PO ciprofloxacin when it was deemed appropriate. As a result of this service, inappropriate use of IV ciprofloxacin decreased, which resulted in cost savings for the institution.[7]

The IV to PO acquisition cost ratio varies between medications, but IV medications can at times be upwards of 100 times **more costly** than their PO counterparts.

### Myths

So, if oral medications are significantly less expensive and safer than their intravenous counterparts, then why is IV to PO conversion so challenging? Oftentimes when a well-designed IV to PO program produces less than expected results, several obstacles or "myths" are revealed that may not have been accounted for in the planning process. It is pharmacy's job to identify and dispel these myths.

**Myth #1: "Oral medications are not as potent as IV medications, and my patient is too sick for oral meds."**

While some oral medications do have bioavailabilty ratios of less than 1.0 (Table 2), dosing can be adjusted to account for this when switching from IV to PO. An order that simply states "change from IV to PO" will not work if the dose needs to be adjusted for bioequivalence. Simple products such as furosemide are 50% as potent in oral dosage as IV, and therefore the oral dose needs to be twice that of the IV dose. The myth that it is not as "potent" may simply be related to incorrectly converting for bioequivalence. Any successful IV to PO program must include information and education related to dosage form comparisons. There are certainly situations where the patient may not absorb the drug as predicted or liver function may either impact metabolism or create a "first pass" effect. These points are all part of the necessary clinical considerations when determining if a patient is an appropriate candidate for IV to PO conversion.

**Myth #2: "If I convert the patient to oral medications they will have to be discharged from the hospital and they are way too sick for that!"**

One of the functions of utilization review is to determine the medical necessity for continued hospitalization or even admission to the hospital setting. While the need for intravenous medications is often cited as the reason for

### Elements of a Successful IV to PO Conversion Program

An IV to PO conversion program must have at least some, if not all, of the following elements in order to succeed:

- Take a team approach, including physicians, nurses, pharmacists, dietitians, and often social workers
- Create clearly defined goals and measurable targets
- Start small (with one medication) and then expand the program
- Select the easiest medication to convert (IV to PO ratio of 1:1) with a relatively high impact factor
- Use automatic trigger points, such as the order to the dietitian, to convert a patient from NPO (nothing by mouth) to advance the diet as tolerated
- Make IV to PO decisions as a standard component of daily rounding
- Develop a protocol for each medication that allows easy implementation of the IV to PO conversion
- Build order sets in computerized order entry systems to facilitate the process
- Place an "IV to PO protocol eligible" label on IV bags for products appropriate for conversion to PO
- Work with discharge planning services to facilitate patient discharge or placement
- Most importantly, present the program to hospital administration for continued support



> Oral medications are not only cheaper than their IV counterparts but they also **incur less risk**.

continued hospitalization, it is rarely the single factor that determines medical necessity. There are many options for home care or skilled nursing facility care that can accommodate the need for intravenous medications, such as antibiotics for the prolonged treatment of osteomyelitis. Most of the concern about recommendations for discharge by utilization review revolves around the failure to document true need for continued hospitalization. One of the major advantages of IV to PO conversion programs is decreasing the length of stay (LOS), which has a much greater impact on health care costs (compared to just the medication costs). Collaboration among all health care providers is necessary for appropriate patient care resource management to plan for both IV to PO conversion and discharge planning.

### Myth #3: "It is easier to give the meds intravenously than to disturb the patient at night to take oral meds."

This obstacle can be a real "show stopper" if the nursing staff does not buy-in to the real goals of the IV to PO program. While it may, in fact, be "easier" to simply hang the IV without disturbing the patient at night, the prolongation of IV medications also increases the risk of hospital-acquired infection, phlebitis, and extravasation. The IV pole and computerized pumps also limit patient mobility and increase dependability on nursing staff for access to the bathroom or anything else in the room. While the nurse may spend less time passing medications, they will spend more time addressing collateral patient needs. If a patient is asked whether he or she would like to listen to the IV pump beeping throughout the night or be aroused periodically to take oral medication (thus providing freedom from the IV), it is likely the patient will be in favor of taking medications orally.

> One innovative way to implement an IV to PO conversion program is by **creating a service dedicated to this initiative**.

### Myth #4: "I have more important things to worry about than if the patient is taking the med IV or PO!"

This quote is not limited to any single health care professional. The physicians are focused on diagnosis and outcome, and the nurse is focused on everything else. Meanwhile, pharmacists are not always in the best position to judge the oral intake ability of a patient and are not usually empowered to change the physician's order on their own. So the problem then is one of ownership: Who is, or should be, the driving force for a successful IV to PO program?

### The Pharmacy-only Approach vs the Team Approach

Pharmacy-only approaches are doomed from the start because there are too many obstacles to overcome, and sustained effort is difficult to maintain. While pharmacists are best suited to determine the most appropriate product and conversion ratio, they may not be in the best position to evaluate the current condition of the patient. Programs that are lock-stepped at conversion in four days, for example, will miss many early opportunities for conversion and may force some inappropriate changes inadvertently. Furthermore, depending on the state or institution, pharmacists may not have the legal authority to change the order without physician approval, and the pharmacist may be hesitant to "bother" the physician for such a simple request. Therefore, taking a team approach (including physicians, nurses, pharmacists, dietitians, and often social workers) to IV to PO conversion can help ensure the success of such programs. ■

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