Pharmacist Driven Intravenous (IV) to Oral (PO) Conversion Protocol

A. Background

1. Intravenous (IV) to oral (PO) therapy interchange programs are often used in hospital settings to promote cost-effective utilization of medications.[1] Research shows that appropriately transitioning from IV to PO antimicrobial therapy can shorten hospital stays without compromising patient outcomes.[2-4] Moreover, this approach may enhance patient care by reducing the risk of catheter-related infections and offering advantages such as increased comfort, reduced nursing demands, and improved mobility. As patients progress and prepare for discharge, transitioning from parenteral to oral therapy becomes a viable option, provided the medication achieves the required concentrations in the bloodstream or targeted areas. The conversion from IV to PO formulations of the same medication while maintaining equivalent potency is known as “sequential therapy”. The medications outlined in Table 1 are appropriate antibiotics to perform a sequential IV to PO therapy interchange.

B. Procedure:

1. **Pharmacist Driven Protocol**: Upon meeting the established criteria for transitioning to oral therapy (Section C) the pharmacist will determine if it is clinically appropriate to perform a sequential IV to PO therapy interchange for the antibiotics outlined in Table 1 only. Additionally, the pharmacist will conduct a screening for any exclusion criteria stipulated in the protocol (Section D). It is important to note that the term "PO" encompasses various enteral routes such as feeding tube, nasogastric tube (ensuring it's not under continuous suction), G tube, and other applicable routes.
2. If an interchange is deemed appropriate by the pharmacist, the following sequence of events will take place:
    i. The Pharmacist will notify the prescriber that the patient is eligible for an IV to PO conversion as per hospital policy.
        - Notification can be received via SPOK, phone call, verbal, etc.
    ii. The pharmacist will document the IV-to-PO conversion intervention as a note in Cerner PowerChart, demonstrating that the applicable inclusion and exclusion criteria were met.
    iii. Within PharmNet, the Pharmacist will discontinue the IV antibiotic eligible for IV to PO conversion, and then enter the PO order under the prescriber’s name that was notified.
        - Within the PO antibiotic order, the “Communication Type” will be changed to “As Per Hospital Policy”.
    iv. The end time of the order for the oral medication will reflect the same duration of therapy for the medication as indicated in the original intravenous order
        - Stop Type: Soft Stop

C. Inclusion Criteria

1. Patient is improving clinically.
    i. Improvement is evident based on subjective and objective signs and symptoms of infection (i.e., fever trending down and white blood cell count it returning to normal levels)
        - Afebrile for at least 24 hours (≤38.0°C)
        - Hemodynamically stable based on SIRS criteria (see exclusion criteria)
        - WBC 4 – 15 K/uL and improving WBC
            a. Improving WBC (decrease of > 2 K/uL + WBC between 4 – 20 K/uL) and/or improving differential counts
2. Patient has been on IV therapy for > 48 hours.
3. Patients are tolerating food or enteral feeding, oral medications.
    i. Able to adequately absorb oral medications via the oral, gastric tube, or nasogastric tube route.

D. Exclusion Criteria:
1. NPO Status
2. NG tube in place not receiving full rate tube feeds
    i. NG tubes on suction or gravity drainage
    ii. NG tube is a KO/Dobhoff feeding tube (Suspensions and crushed oral meds clog)
3. Absorption issues: Known/suspected ileus, known malabsorption syndrome, proximal resection of small intestine, and jejunal tube feeds.
    i. Persistent/active nausea and vomiting, or diarrhea (>5 liquid stools/day)
4. Presence of dysphagia or mucositis and unable to tolerate oral meds
5. Day 1 or 2 of Antibiotic
6. Patients admitted to ICU units (i.e. 05CC, 06W1, 07W1, 08W1, 09W1, or 17S).
7. Hemodynamically unstable based on SIRS criteria:
    i. 2 or more of the following present: Heart rate > 90, Respiratory rate > 20, Systolic blood pressure < 90 mmHg, Temperature > 38.3°C or <36°C, WBC > 12,000 or < 4,000 (k/uL) or > 10% bands
    ii. Lactate > 2mmol/L
    iii. Acute respiratory failure requiring invasive mechanical ventilation
    iv. Requiring vasopressors
    v. Physician, NP or PA documentation of severe sepsis defines severe sepsis, regardless of the presence of the above criteria.
8. Infectious disease consult specifying IV route only
    i. If route is not specified by Infectious disease, patient is eligible for conversion if criteria met.
9. Presence of select clinical conditions where an oral agent may not achieve adequate levels:
    i. Bacteremia*, CNS infection, Endocarditis, Necrotizing fasciitis, Osteomyelitis*, Sepsis, C. difficile infection (metronidazole)
    ii. Leukocytosis and trending up
    iii. Leukopenia (Neutropenic)
    iv. Pre-op prophylaxis

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*Existing evidence supporting oral therapy but often requires discussion with prescriber and is therefore excluded from the IV to PO conversion protocol

E. Please consult SBUH Antibiogram for institutional susceptibility patterns when selecting therapy
1. https://renaissance.stonybrookmedicine.edu/medicine/asp

Table 1: IV to PO Direct Conversion Table:

Medication	Common IV Dose	Oral Equivalent
Azithromycin	250-500 mg IV q24h	250-500 mg PO daily
Ciprofloxacin*	400 mg IV q12h 200mg IV q12h	500 mg PO BID 250mg PO BID
Doxycycline	100 mg IV q12h	100 mg PO BID
Fluconazole	100-400 mg IV q24h	100-400 mg PO daily
Levofloxacin	500-750 mg IV q24h	500-750 mg PO daily
Linezolid	600 mg IV q12h	600 mg PO BID
Metronidazole	500 mg IV q6h-q8h	500 mg PO TID-QID

*Ciprofloxacin oral suspension - Should not be administered through feeding tubes (suspension is oil-based and adheres to the feeding tube)

F. References

1. Ho BP, Lau TT, Balen RM, et al. The impact of a pharmacist-managed dosage form conversion service on ciprofloxacin usage at a major Canadian teaching hospital: a pre- and post-intervention study. *BMC Health Serv Res.* 2005;5:48.
2. Vogel F. Sequential therapy in the hospital management of lower respiratory infections. The American journal of medicine. Dec 29 1995;99(6B):14S-19S.
3. Davey P, Nathwani D. Sequential antibiotic therapy: the right patient, the right time and the right outcome. The Journal of infection. Jul 1998;37 Suppl 1:37-44.
4. Ramirez JA, Vargas S, Ritter GW, et al. Early switch from intravenous to oral antibiotics and early hospital discharge: a prospective observational study of 200 consecutive patients with community-acquired pneumonia. *Arch Intern Med.* 1999;159:2449–54.