Evaluating Utilization and Effectiveness of Intravenous to Oral Linezolid Protocol

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Background

- Linezolid is an antibiotic indicated for vancomycin resistant enterococcal infections, pneumonia, and skin and skin structure infections.[1]
- Absorption of linezolid is rapid and complete with a bioavailability of approximately 100%.[2]
- Intravenous (IV) to oral (PO) conversion has many potential benefits such as reduced hospital length of stay, expedited removal of IV access, reduced possibility for thrombophlebitis, and decreased cost.[3]
- Memorial Health University Medical Center (MHUMC) has recently revised the IV to PO protocol for linezolid.
    - Linezolid no longer has to meet the following criteria: temperature ≤100° F for 24 hours, SBP ≥90 mmHg, WBC declining (if initially elevated), and patient has received at least 24 hours of IV therapy.

Table 1. Criteria for IV to PO Linezolid

Inclusion Criteria *Patient must meet at least one*	• Tolerating other oral/tube medication • Tolerating clear liquid or more advanced diet (at least 2 consecutive meals) • Tolerating 24 hours of enteral feeding • Additional criteria: Patient has received at least one IV dose
Exclusion Criteria *Do not switch therapy if patient meets any of the following*	• **Per protocol, tolerating other oral/tube medication will serve as a surrogate measure for a patient not having any of the below mentioned conditions.** • Vomiting • Severe nausea & vomiting as indicated by receiving >2 anti-emetics in the past 24 hours • Patient with a current diagnosis of an active gastrointestinal bleed • Risk of aspiration • Patient has continuous nasogastric suction or with NG output > 150 mL for 2 or more times in a 24 hour period • Patient has gastric residual volume > 200mL • No bowel sounds, short bowel syndrome, gastrectomy, gastric outlet or bowel obstruction, or other disease known to alter GI absorption. • Patient with an acute exacerbation of a malabsorption syndrome diagnosis

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Objective

To evaluate the utilization and effectiveness of the IV to PO linezolid protocol at reducing the number of IV doses in relation to PO doses.

Methods

- Retrospective chart review approved by the MHUMC Institutional Review Board.
- Included adult inpatients who received at least one dose of IV linezolid admitted from May 1, 2020 to July 31, 2020 (before the revision of the protocol) and May 1, 2021 to July 31, 2021 (after the revision of the protocol).
- Data points collected include indication for use, number of patients that met criteria for IV to PO conversion, number IV and PO linezolid doses administered, hospital length of stay, and mortality during hospital admission.

Results

Table 2. Baseline Characteristics

	Pre-revision (n=25)	Post-revision (n=25)
Age, years, median (IQR)	58 (47.5 – 72.5)	63 (48 – 71.5)
Gender, male, n (%)	16 (64)	12 (48)
Weight, kg, median (IQR)	90.4 (84.6 – 117.2)	88.5 (61.1 – 115)
BMI, median (IQR)	30.7 (26.4 – 36.1)	28.9 (22.0 – 37.3)
COVID-19 positive, n (%)	15/24 (62.5)	4/18 (22.2)
Linezolid days of therapy, median (IQR)	3.9 (1.8 – 5.9)	4.9 (2.3 – 7.8)
IV to PO candidate, n (%)	19 (76)	25 (100)

Figure 1. Pre-revision Linezolid Doses in IV to PO Candidates, no. (%)

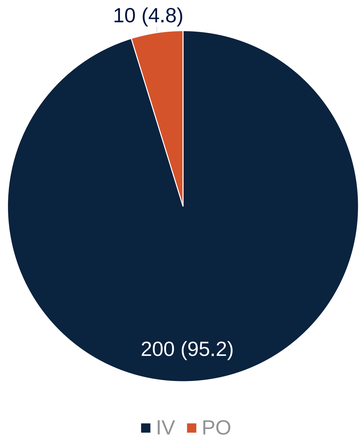
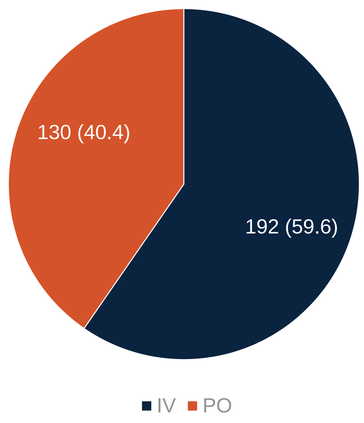


Figure 2. Post-revision Linezolid Doses in IV to PO Candidates, no. (%)



Results

Table 3. IV and PO Linezolid Doses in Whole Population

	Pre-revision (n=25)	Post-revision (n=25)
IV doses, n (%)	240 (96)	130 (40.4)
PO doses, n (%)	10 (4)	192 (59.6)

Table 4. Indication for use

	Pre-revision (n=25)	Post-revision (n=25)
Nosocomial pneumonia, n (%)	16 (64)	10 (40)
Sepsis, n (%)	3 (12)	4 (16)
Urinary tract infections, n (%)	2 (8)	5 (20)
Skin and soft tissue infection, n (%)	1 (4)	3 (12)
Other, n (%)	3 (12)	3 (12)

Table 5. Safety Outcomes

	Pre-revision (n=25)	Post-revision (n=25)
Hospital length of stay, days, mean ± SD	30.3 ± 27.0	17.9 ± 12.8
Mortality during hospital admission, n (%)	12 (48)	5 (20)

Discussion

- Based on the data collected, revision of the IV to PO linezolid protocol did not increase adverse outcomes such as hospital length of stay and mortality.
- More patients in the pre-revision group were positive for COVID-19.
- The percentage of IV doses in relation to PO doses was lower after revision of the protocol even when only analyzing patients that met criteria for IV to PO conversion.
- Expanding the revised IV to PO protocol to other rapidly absorbed and highly bioavailable antibiotics, should be considered.

References

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3. Yen YH, Chen HY, Wuan-Jin L, Lin YM, Shen WC, Cheng KJ. Clinical and economic impact of a pharmacist-managed i.v.-to-p.o. conversion service for levofloxacin in Taiwan. *Int J Clin Pharmacol Ther*. 2012;50(2):136-141.