Multi-Drug Resistant Organism (MDRO) Infections in Liver Transplant Recipients 30 Days Post-Transplant

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Introduction
Liver transplantation is a treatment option for decompensated cirrhosis, acute liver failure, and primary malignancy (i.e. HCC). The leading cause of morbidity and mortality in liver transplant recipients across transplant centers is bacterial infection, with the highest rate seen in the first 30 days after transplant. Furthermore, there has been an increasing number of multi drug resistant organism (MDRO) infections identified, the majority of which are now gram negative organisms. Risk factors for bacterial infection include clinical severity of the disease, exposure to health care facilities, surgical complexity, breach of the mucosal barrier, improper hygiene techniques, immunosuppression, and patient colonization prior to transplant. Additionally, a history of broad-spectrum empiric antibiotic therapy leads to selective drug resistance. We performed a retrospective chart review of the clinical characteristics of patients undergoing liver transplant to determine risk factors for the development of MDROs post transplantation. Our secondary analysis attempted to determine the role of rifaximin in the development of MDRO infections given its known antimicrobial properties.

Methods
We performed a retrospective chart review on adult patients identified through the Transplant Institute Database at MedStar Georgetown University Hospital (MGUH) from January 1, 2012 to December 31, 2016. Inclusion criteria were age greater than 18 and first time liver transplant recipients. We excluded combined liver/kidney transplants, multi-visceral transplants, and re-transplants. Demographic, clinical, and MDRO-specific data was collated. We reviewed the MGUH microbiology database to confirm and document culture data 3 months prior to and 1 month after transplantation. Relative risk and confidence intervals were calculated based on collected data.

Results
Our results demonstrate that only 10.9% of patients who underwent liver transplant developed an MDRO infection; however, this rate may be lower due to our 30 day post transplant cut off. The majority of MDRO infections were due to gram negative rods (62%) followed by VRE (23.8%) and Klebsiella pneumoniae (19%). After univariate analysis, we observed that pre transplant risk factors including any antibiotic exposure, piperacillin/tazobactam, 3rd and 4th generation cephalosporins, and ICU admission increased the relative risk of MDROs. Post transplant, a prolonged ICU stay, return to the OR, RRT, and mechanical ventilation were statistically significant for the development of an MDRO. Overall, the relative risk of developing an MDRO infection in regards to post transplantation length of stay (LOS) was 33.87 (SD 27.61 to 40.33) days with a p-value of <0.0001. Previous studies, such as that by Zhong et al., have similarly found that pre-transplant broad spectrum antibiotics and mechanical ventilation are independent risk factors for MDROs. Despite univariate analysis suggesting an increased relative risk of MDROs with rifaximin use, multivariate analysis shows that rifaximin does not independently correlate with an increased risk of MDRO infection (odds ratio = 1.970, 95%CI: 0.82-4.73).

Discussion
Our study is consistent with what has been reported in the literature in regards to risk factors for MDROs. Despite the ongoing concern for MDRO infections in the transplant population, we observed that our overall bacterial infection rate and the rate of MDROs has remained essentially stable over our observation period (2012 – 2016). Rifaximin does not appear to independently increase the risk of MDROs.

Conclusion
Our study is consistent with what has been reported in the literature in regards to risk factors for MDROs. Despite the ongoing concern for MDRO infections in the transplant population, we observed that our overall bacterial infection rate and the rate of MDROs has remained essentially stable over our observation period (2012 – 2016). Rifaximin does not appear to independently increase the risk of MDROs.

References