

## Standardization of Oral Liquid Concentrations Between Inpatient and Outpatient Pharmacies at a Tertiary Care, Academic Medical Center.

**Background:** Many patients are unable to swallow pills due to age, dysphagia, or requiring doses of medications that do not conform to a manufactured tablet or capsule size. For this reason, the inpatient and outpatient pharmacies of University of Missouri Health Care (MUHC) must compound many liquid dosage forms. The inpatient and outpatient pharmacies use individualized recipes involving multiple concentrations of a variety of compounded medications. According to the American Society of Health-System Pharmacists (ASHP), consistent medication concentrations reduce the potential for errors during transitions of care and resolve operational differences, ultimately increasing efficiency and overall communication between pharmacy settings.<sup>1</sup> Medication errors from incorrect conversions of concentrations or doses of oral liquid medications can be life threatening.<sup>2</sup> In one example, reported from the Institute for Safe Medication Practices (ISMP), a 3-month-old infant inadvertently received ten times the appropriate dose of levetiracetam upon discharge from the hospital. One reason for this error was that the dose was entered by volume (ml) only, which is a current limitation in some electronic medical records when oral concentration doses are not prebuilt, due to no established standard.<sup>3</sup> The purpose of this initiative is to standardize concentrations of oral liquids and recipes in the MUHC system through a data review process thereby decreasing the risk of serious medication errors.

**Methods:** Data regarding unique medication types and concentrations used for oral liquid doses was collected from Simplifi 797®, a web-based application system used by MUHC as a system-wide Master Formulation Record (MFR). Data was then compared between inpatient and outpatient pharmacies, and to recommended, evidence-based standardizations from ASHP, the Michigan Pediatric Safety Collaborative, and tertiary sources to identify discrepancies and optimization opportunities. The Patient Safety Network (PSN) within the MUHC system was used to identify relevant medication errors during the previous five years with keywords “oral solution”, “oral liquid” and “oral suspension.” The primary outcome is the number of unique oral liquid medication types and concentrations used between inpatient and outpatient MUHC pharmacies. The secondary outcome is the number of patient safety reports related to oral liquid medications from January 1, 2015 to December 31, 2020.

**Results:** The total number of compounded oral liquid medications is 75. Among these medications, the number of concentrations used is 82. The number of recommended concentrations is 76. The compounded oral liquid included commercially available products and compounding kits. The number of identified errors from January 1, 2015 to December 31, 2020 is six. A limitation is that oral liquids from Simplifi 797® MFR was included and not all compounded oral liquids are recorded.

**Conclusions:** Standardization will decrease the number of various concentrations of compounded oral liquid in outpatient and inpatient pharmacies of MUHC system. The use of recommended concentrations of oral liquid in the MUHC system will reduce potential error in the future. Next step for reducing error is to standardize the recipes of oral liquids and then implement the standardization to the MUHC system.

## References:

1. Standardize 4 Safety. ASHP. Available at: <https://www.ashp.org/Pharmacy-Practice/Standardize-4-Safety-Initiative#national>. Accessed December 10, 2020.
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3. Institute For Safe Medication Practices. Available at: <https://www.ismp.org>. Accessed December 20, 2020.