

## ABSTRACT

The following proposal outlines our application for the ASHP New Investigator Program. Our proposal, "Effectiveness of Pharmacist-Driven Diuresis in the Intensive Care Unit" is a practice-based study assessing the implementation of a pharmacist-directed diuretic protocol in the medical intensive care unit (ICU). This study is of utmost importance because, while early fluid administration is recommended for initial resuscitation of critically ill patients, fluid overload is a common problem after the first 24 hours. Patients who have an overall net-positive volume status in the ICU have increased durations of mechanical ventilation and ICU stay, likely secondary to pulmonary edema, as well as higher rates of mortality. Fluid overload has been correlated with decreased renal function, impaired cognition, diastolic dysfunction, and decreased wound healing secondary to organ system edema. To counteract volume overload, loop diuretics are often administered. While previous studies have evaluated diuresis in acute respiratory distress syndrome (ARDS), data supporting a standardized approach to diuresis in the general critically ill population are lacking. By in large, the current approach to volume management in the ICU tends to be reactive rather than proactive and diuresis is often withheld until patients start showing signs of fluid overload. Further problems with the current approach to diuresis management are numerous. Volume status, like most labs and objective values, is typically assessed daily. The initiation of diuresis is often prescribed with a one-time dose of a loop diuretic when patients are found to have a net-positive fluid balance. Lack of appropriate evaluation of urine output within the first hours following a dose often leaves the dose titration until the following morning, resulting in another 24 hours without adequate fluid removal. Additionally, doses prescribed are usually inadequate within the population and dose titration is not aggressive secondary to fear for adverse events and metabolic disturbances. A pharmacist-driven protocol is an ideal solution to ensure volume status is continuously assessed, and safe and effective diuresis occurs.

This is a quasi-experimental pilot study evaluating the implementation of a pharmacist-driven diuresis protocol in a 56-bed medical ICU consisting of three closed-unit pulmonary critical care services within a large 900-bed specialty referral academic medical center. Patients admitted to the pilot unit will receive protocolized diuretic therapy driven by the clinical pharmacist on the team (group A). After determining protocol eligibility with the medical team, the pharmacist will initiate the diuresis protocol and evaluate clinical response and safety via a standing collaborative practice agreement. To ensure uniform application of this protocol and 24-hour assessment and dose titrations, an order set has been created within the hospital's electronic medical record system, and nursing staff will be educated on how to appropriately titrate doses according to the volume removal goals established by the pharmacist during the hours in which the clinical pharmacist is not in-house. Data for the pilot group will be collected prospectively by pharmacists on the medical ICU team and will be compared to a retrospective cohort (group B). The primary research outcome will be fluid balance at 72 hours following resolution of shock with secondary objectives focused on clinical outcomes, including days of mechanical ventilation, electrolyte disturbances, and hemodynamic adverse effects.

This research is valuable in order to further quantify the benefit of a clinical pharmacist in the ICU. It is also the first of its kind to set the precedent for a standardized approach to diuresis within the general critically ill population. The results of this study will establish a protocol to fluid de-resuscitation after shock resolution while advancing pharmacist practice within the ICU. The intent is to utilize the information gathered to implement the protocol in a multi-site study and hopefully provide data to be used for further grant funding through the National Institutes of Health (NIH). Potential future aims could expand on the clinical impact of diligent monitoring and prevention of fluid overload on end organ function early in the ICU stay.