# Validation of a Renal Dosing Protocol

**James Unverferth, PharmD; Becca Nolen, PharmD, BCPS, AAHIVP; Davina Dell-Steinbeck, PharmD, BCPS**
**SSM Health St. Mary's Hospital – St. Louis, Missouri**

**Background:**

Both acute kidney injury (AKI) and chronic kidney disease (CKD) have been associated with profound alterations in the pharmacokinetics and pharmacodynamics of drugs. CKD patients have poorer health outcomes than patients with normal renal function and the non-optimization of drug therapy may be one of the contributing factors. Since 2017, SSM Health St. Mary's Hospital St. Louis has been refining a renal function monitoring and dose adjustment system. The primary objective of this study is to determine the percentage of patients taking specified DOACs and antimicrobials that were dosed appropriately in a time period since the most recent update to the renal dosing protocol.

This is a single center, retrospective study that has been approved by the Institutional Review Board. Data will be collected via chart review in EPIC at SSM Health-St. Mary's Hospital St. Louis to identify patients receiving one of the following medications: apixaban, cefazolin, ciprofloxacin, dabigatran, enoxaparin, levofloxacin, meropenem, oseltamivir, piperacillin/tazobactam, rivaroxaban from April 1, 2019 through October 1, 2019. Once identified the primary investigator will determine if dose adjustments to aforementioned medications were made appropriately for patient renal function and according to SSM Health-St. Mary's Hospital St. Louis Renal Dose Adjustment Policy. The primary outcome will be the percentage of patients in which dose adjustments were made appropriately by pharmacists. Secondary outcomes will look at the percentage of renal-dosed medications appropriately dosed throughout hospital stay and adverse events attributable to renal-dosed medications.

**Methods:**

- **Study Design:** Single-center, retrospective study
- **Inclusion Criteria:**
  - Patient >18 years old
  - Admitted between April 1, 2019 and October 1, 2019
  - Receiving one of the following: apixaban, cefazolin, ciprofloxacin, dabigatran, enoxaparin, levofloxacin, meropenem, oseltamivir, piperacillin/tazobactam, rivaroxaban
  - Record of documented interventions by pharmacy for renal dose adjustment
- **Exclusion Criteria:**
  - N/A
- **Primary Outcome:**
  - Percentage of interventions made appropriately by pharmacists
- **Secondary Outcomes:**
  - Percentage of patient dosed correctly throughout hospital stay
  - Adverse events attributable to renal-dosed medication

**Results:**

Between April 1, 2019 and October 1, 2019 a total of 257 renal-dose adjustment interventions were made to the aforementioned medications. Approximately 94% (242 of 257 interventions) were made appropriately according to the Renal Dose Adjustment policy. Appropriate interventions for individual medications analyzed were as follows: apixaban 100% (n = 9), cefazolin 100% (n = 13), ciprofloxacin 86% (n = 7), enoxaparin 93% (n = 139), levofloxacin 100% (n = 5), meropenem 100% (n = 21), oseltamivir 100% (n = 6), piperacillin/tazobactam 94% (n = 53), and rivaroxaban 75% (n = 4).

For secondary outcomes investigated there was a total of 200 patients that had renal-dose adjustments made to their therapy. Out of these 200 patients, approximately 68% (135 out of 200 patients) had medications monitored and dosed appropriately by pharmacists throughout their hospital stay. There were 0 medication events attributable to renal-dosed medications, whether dosed appropriately or inappropriately.

**Conclusions:**

- 94% of all interventions made were deemed to be appropriate according to the renal dosing protocol, however only 68% of patients analyzed were dosed appropriately throughout hospital stay
- Possible causes for inappropriate interventions include:
    - EPIC rounding SCr up to 1 mg/dL in patients >65 y/o with SCr < 1mg/dL
    - Adjusting therapy based off CrCl assigned by EPIC for patients on dialysis
    - Using outdated Renal Dosing Protocol
    - Resistance to changing orders without consulting physician first
- Discrepancy between appropriate interventions and appropriate course of therapy: inappropriate initial verification, lag in therapy modification, insufficient monitoring of renal function
- No incidence of adverse effects were identified in patients analyzed
- Takeaways/Moving Forward:
    - Discussion about removing SCr rounding function and adding notification for patients with dialysis orders in EPIC
    - Education to pharmacists about per protocol capabilities
    - Encourage documentation of renal-dose adjustments