Improving Medication Safety in Primary Care Using an Electronic Drug-Dosing Decision Support Tool for Chronic Kidney Disease: An Implementation Study

Authors: *Jo-Anne Wilson,[1] Katie Halliday,[1] Natalie Ratajczak,[1] Marisa Battistella,[2] Karthik K. Tennankore,[1] Penelope Poyah,[1] Steven Soroka,[1] Keigan More,[1] Cynthia Kendell,[1] Jaclyn Tran,[3] Maneka Sheffield,[3] Daniel Rasic[4]

1. Dalhousie University, Halifax, Canada
2. University of Toronto, Canada
3. Nova Scotia Health Authority, Halifax, Canada
4. Virtual Hallway, Halifax, Canada

*Correspondence to Jo-Anne.Wilson@dal.ca

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BACKGROUND AND AIMS

Chronic kidney disease (CKD) affects 10% of the global population.[1,2] Medication dosing errors in people with impaired kidney function are common and can lead to serious harm. Community pharmacy-based interventions may help improve medication safety in this population.[3,4] An electronic drug-dosing and decision-support kidney (eDoseCKD) intervention integrated 30 validated algorithms into a digital health platform to support dosing.[5] This study aimed to implement and evaluate the effectiveness and safety of the eDoseCKD intervention in primary care pharmacies over a 6-month period.

MATERIALS AND METHODS

Using a mixed-methods design guided by the Reach, Effectiveness, Adoption, Implementation, and Maintenance (RE-AIM) framework, the intervention was evaluated across 12 urban and rural pharmacies. Adults (≥18 years) with kidney disease were eligible if prescribed an intervention medication requiring kidney-based dose adjustment; participants received educational materials on medication safety. Reach was assessed via the at-risk kidney population and participation rates. Effectiveness was measured by the number of medication changes, unexpected adverse events, and patient and pharmacist satisfaction assessed using a 5-point Likert survey. Adoption was measured by site and pharmacist participation, implementation fidelity by consistency of intervention use, and maintenance at 3 months post-dose change and tool use at 6 months.

RESULTS

Eighteen pharmacists from six urban and six rural pharmacy sites participated. All

were female (mean±SD age: 41±11 years), and over half had greater than 15 years of experience. Eighty-six of 91 participants at-risk of kidney disease (57% female; mean±SD age: 78±7.5 years; mean±SD eGFR: 32±10.7 mL/min) consented and were enrolled, yielding a 94.5% participation rate. Ninety-three medication adjustments were made, most commonly metformin, sitagliptin, gabapentinoids, rivaroxaban, apixaban, rosuvastatin, and famotidine. Dose reductions worsened symptoms in two patients with gabapentin. Overall mean±SD patient and pharmacist participant satisfaction was 4.66±0.58 and 4.83±0.3, respectively. Adoption was high, with only two sites and three pharmacists declining. The intervention was implemented as intended in all but four people. All but one adjustment persisted at 3 months, with all pharmacists using the tool at 6 months.

CONCLUSION

The eDoseCKD intervention demonstrated high reach, adoption, acceptability, implementation fidelity, and short-term maintenance across urban and rural pharmacies. The intervention was effective in identifying and implementing kidney-based medication dose adjustments, with minimal adverse effects, supporting eDoseCKD as a safe, feasible, and scalable tool for community pharmacy practice.

References

1. Wilson JW et al. Improving medication safety in primary care using an electronic drug-dosing decision support tool for chronic kidney disease: an implementation study. Abstract 787. ERA Congress, 3-6 June, 2026.
2. GBD 2023 Chronic Kidney Disease Collaborators. Global, regional, and national burden of chronic kidney disease in adults, 1990-2023, and its attributable risk factors: a systematic analysis for the Global Burden of Disease Study 2023. Lancet. 2025;406(10518):2461-82.
3. Tran J et al. Community pharmacists' perspectives on assessing kidney function and medication dosing for patients with advanced chronic kidney disease: a qualitative study using the theoretical domains framework. Can Pharm J (Ott). 2023;156(5):272-81.
4. Wilson JA et al. Medications for community pharmacists to dose adjust or avoid to enhance prescribing safety in individuals with advanced chronic kidney disease: a scoping review and modified Delphi. BMC Nephrol. 2024;25(1):386.
5. Halliday K et al. Improving medication safety and prescribing of higher-risk medications in individuals with chronic kidney disease: a validation study. Can Pharm J (Ott). 2025;158(5):312-25.