ASSESSING POLYPHARMACY AND DRUG INTERACTIONS IN CHRONIC KIDNEY DISEASE PATIENTS AT A PRIVATE HOSPITAL IN SOUTH AFRICA

Marnette Loots

Mediclinic Southern Africa: Clinical Pharmacist

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INTRODUCTION

Chronic kidney disease (CKD) patients often require multiple drugs for their management. There is limited knowledge about the current prescribing patterns, prevalence and consequences of polypharmacy in this population. Therefore, an investigation into the extent of polypharmacy and potential drug interactions in CKD patients is necessary to improve clinical decision-making and patient safety.

AIM/OBJECTIVES

This study aimed to comprehensively examine the phenomenon of polypharmacy and potential drug-drug interactions in CKD patients to enhance understanding and optimise drug management in this population.

METHODS

This study followed a retrospective, descriptive cross-sectional study design and was conducted at a private hospital in the Western Cape Province, South Africa. All prescriptions with five medications or more between July 2020 and June 2021 were evaluated for potential drug-drug interactions using Lexicomp® and EMGuidance® electronic medication interaction checkers.

Multivariate logistic regression was used to determine the association between the drug-drug interaction category and the number of medications prescribed. Linear regression analysis was used to determine the relationship between the number of drug-drug interactions and the number of medications prescribed.

Although the EMGuidance® interaction checkers detected several interactions, they were primarily of theoretical value and were not further analysed to compile a list of common interactions. Instead, the Lexicomp® data was revised, and interactions were evaluated and amended based on clinical judgement. Interactions that could not have occurred due to the route of administration or medication that was not absorbed systemically after oral administration were excluded. The t-test was used to determine the association between drug-drug interactions found by Lexicomp® and the revised list of drug-drug interactions from Lexicomp®.

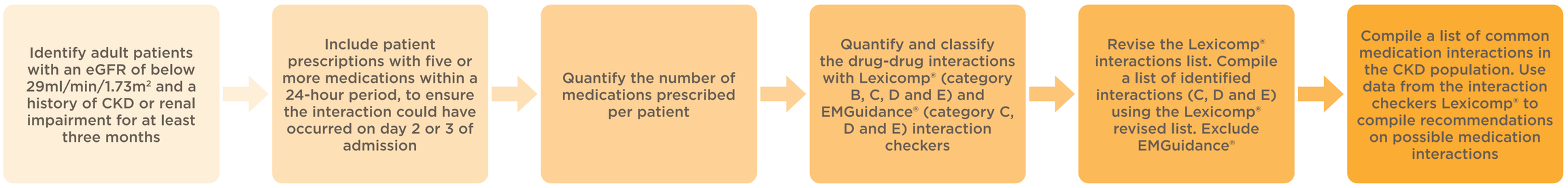

Figure 1: Data collection process

RESULTS

The study included 212 patients with a mean of 11.34 (±4.147) medications prescribed per patient. The range of the number of interactions found using linear regression by Lexicomp® was 0 to 37 with a mean of 9.32 (±7.824). EMGuidance® linear regression range found a maximum of 106 interactions with a minimum of one, a mean of 27.06 (± 20.279).

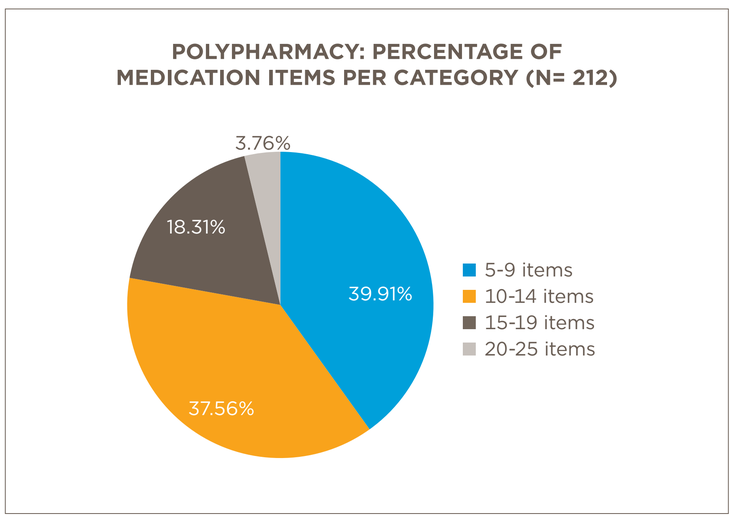

Figure 2: Polypharmacy – percentage of the number of medication items per prescription

	Interactions	Maximum per patient	Mean	Std. Deviation
Interactions triggered total				
Lexicomp® interactions (n= 212)	1 975	37	9.32	7.824
EMGuidance® interactions (n= 212)	5 737	106	27.06	20.279
Monitor therapy				
Lexicomp® cat C (n= 204)	1 123	24	5.5	5.238
Lexicomp® cat C Revised (n= 193)	858	19	4.45	4.334
EMGuidance® cat C (n= 212)	3 440	67	16.23	13.324
Consider therapy modification				
Lexicomp® cat D (n= 204)	341	10	1.67	1.958
Lexicomp® cat D Revised (n= 193)	264	9	1.37	1.557
EMGuidance® cat D (n= 212)	1 548	49	7.3	6.798
Avoid combination				
Lexicomp® cat E (n= 204)	44	6	0.22	0.593
Lexicomp® cat E Revised (n= 193)	25	4	0.13	0.428
EMGuidance® cat E (n= 212)	749	49	3.53	5.528

Table 1: Drug-drug interaction results using Lexicomp® and EMGuidance®

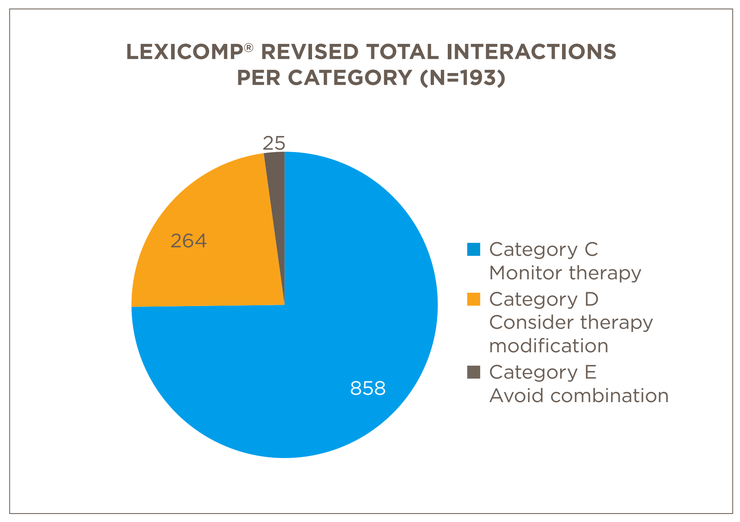

Figure 3: Lexicomp® revised total interactions per category

A multivariate logistic regression of the Lexicomp® data showed that the total number of medications per prescription and a decreased eGFR were associated with a significant increase in the number and category of potential drug-drug interactions ($p < 0.001$, beta coefficient = 1.5 and 0.14, Adjusted R square = 0.637). Other variables, such as age, gender, and dialysis type, did not significantly affect the number of potential drug-drug interactions.

Multiple linear regression of the EMGuidance® data showed that the total number of medications per prescription was associated with a significant increase in the number and category of potential drug-drug interactions ($p < 0.001$, beta coefficient = 4.1, Adjusted R square = 0.679). Other variables such as age, gender, dialysis type and decreased eGFR did not significantly affect the number of drug-drug interactions.

Only Lexicomp® data were further analysed. The independent t-test showed that the average number of category C drug interactions according to Lexicomp® was significantly higher than Lexicomp® category C revised (5.3 vs 4.3, $p = 0.029$). Compared to the revised lists, no significant relationship existed between the average number of category D and E drug interactions.

Based on the findings of this study, the researcher recommends the early detection of possible drug-drug interactions, where the combination is advised to be avoided. Avoiding the concomitant use of apixaban with any other anticoagulant is recommended. Magnesium sulfatefound in some laxatives may enhance the adverse effects of sodium polystyrene sulfonate. Codeine may enhance the serotonergic effect of monoamine oxidase inhibitors (MAOIs). This enhancement of the serotonergic effects could result in serotonin syndrome.

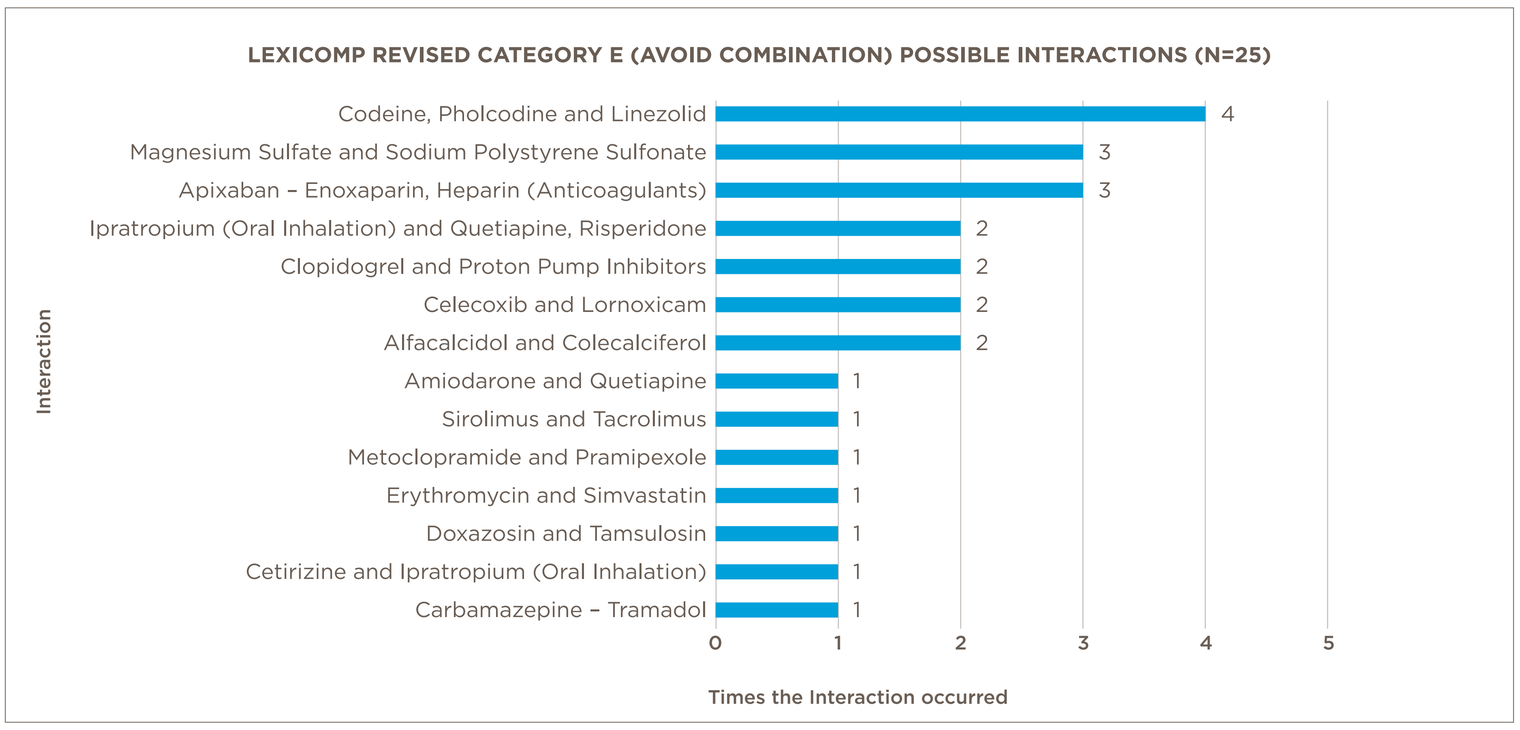

Figure 4: All possible Lexicomp® category E (avoid combination) interactions

CONCLUSION

The study showed that polypharmacy and a decreased eGFR were associated with a significant increase in the number and category of drug-drug interactions, indicating the vulnerability of the CKD population. The study found that an electronic medication interactions checker program could assist the clinician and clinical pharmacist in identifying possible drug-drug interactions; however, clinical judgement is still vital and discussions around the best possible treatment plan with the least risk for drug-drug interactions should occur to optimise patients' pharmaceutical care plans.