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Prescribing Safety Indicators in Patients with Chronic Kidney Disease: A Systematic Review

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Introduction

People with chronic kidney disease (CKD) have high levels of co-morbidity and polypharmacy which increase their risk of developing drug related problems. A systematic review published in 2014⁽¹⁾ collated indicators of prescribing safety in the general adult population. Whilst all prescribing safety indicators (PSIs) may be relevant to people with CKD, the number and nature of PSIs relevant only to people with CKD has not been studied in detail.

Objectives

To perform an updated systematic review, collating PSIs of importance to people with CKD from the published literature to make the first step in generating a CKD-focused PSI library.

Identifier	Explanation	Example PSI
GO	PSI relevant to general population with potential harm as a result of omission	Patient with mild-moderate COPD should be prescribed regular inhaled β 2 agonist
CD	PSI relevant only to people with CKD or end stage renal failure with potential harm being a direct effect	For allopurinol prescription in patients with renal dysfunction doses should be: <200 mg/day if Cr-Cl 20-60 ml/min, 100 mg/day if CrCl <20ml/min
SO	PSI relevant to general population but with special relevance in CKD patients and potential harm a result of omission	Patients aged >65 years old should receive influenza and pneumococcal vaccination

Table 1: Examples of extracted PSIs

Methods

PSIs were defined as statements describing a prescribing event that puts a patient at risk of potential harm, with emphasis placed on prescribing safety for adults (age >18) with CKD.

Two systematic processes were used to identify PSIs:

1. General literature search:

The latest systematic review looking at PSIs in the general outpatient population⁽¹⁾ was used to inform an updated search strategy that involved accessing the primary literature found in this index review and replicating the search strategy to find PSIs published up to 2018.

2. CKD specific literature search:

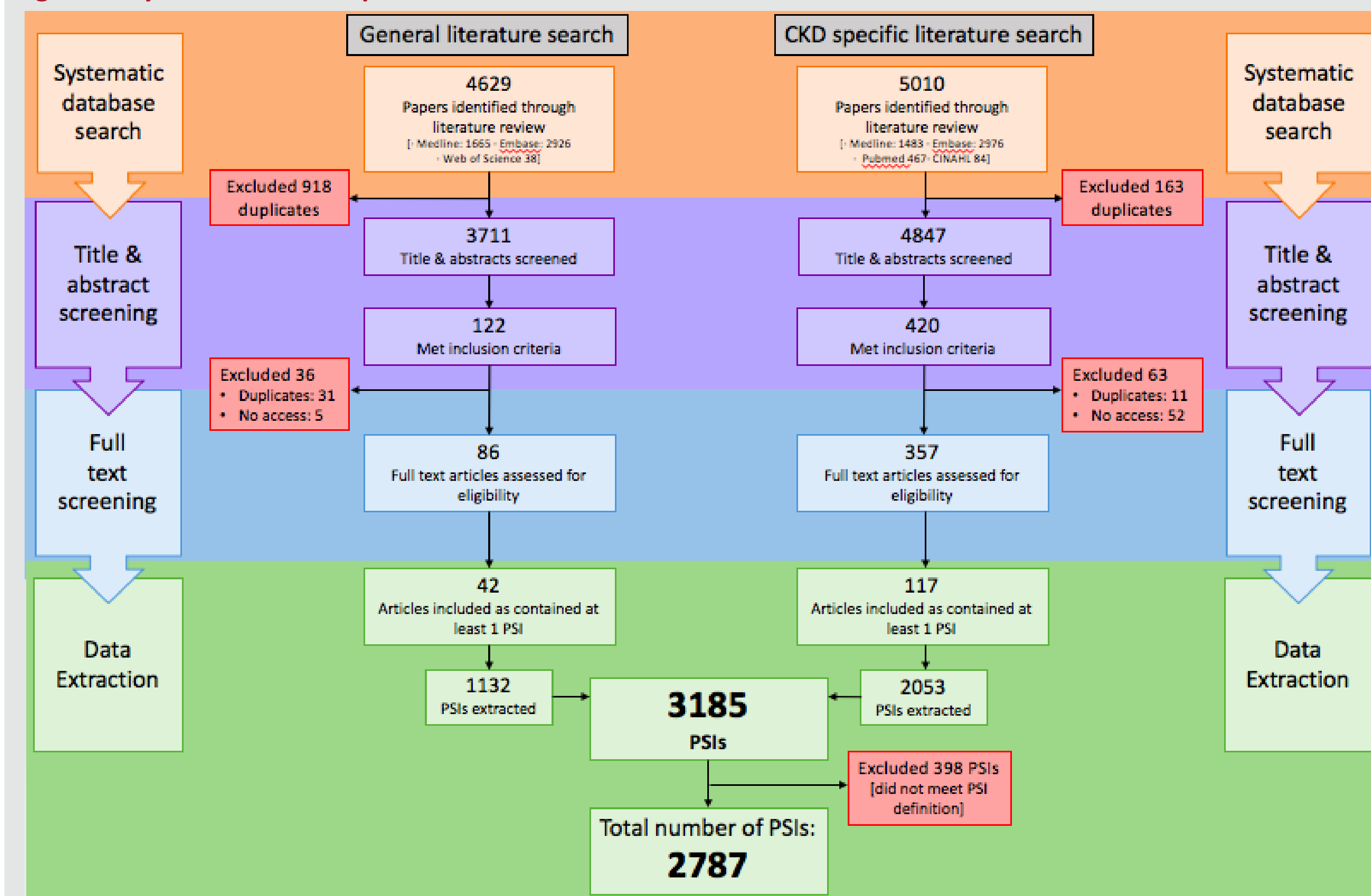
A second systematic strategy looking for CKD specific PSIs by including terms relating to CKD with no data limits.

Every statement where a prescribing recommendation was made was extracted from the main text, abstract or tables of the publications.

Each PSI was screened by one of three specialist assessors (two renal physicians and a senior renal pharmacist). Indicators were graded as being relevant to the general population (G), relevant only to people with CKD/end stage kidney disease (C), or relevant to the general population, with special relevance to individuals with CKD (S). Additionally, PSIs were categorised in terms of whether the potential harm was direct (D) or through omission (O). Examples of PSIs are demonstrated in Table 1.

Results

Figure 1: Systematic review process and PSI extraction



Potential Harm

2622 (94.1%) indicators resulted in direct harm and in 165 (5.9%) indicators harm was secondary to omission.

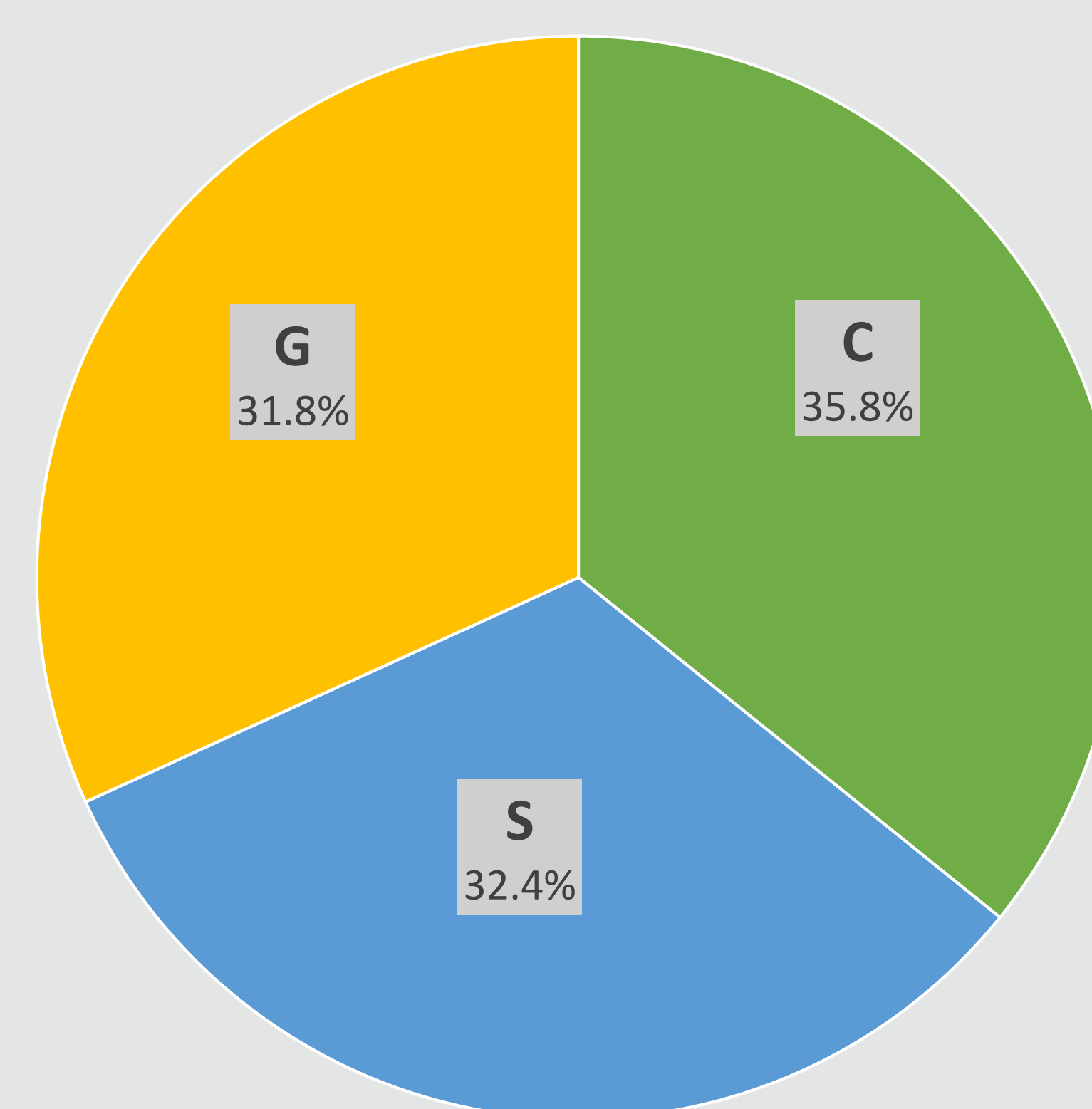
From PSIs distinctive to patients with CKD (C), 963 (96.5%) resulted in direct harm and omission resulted in harm in 35 (3.5%).

PSI Grading

PSIs were graded into various categories:

- C = relevant only to people with CKD (998 PSIs, 35.8%)
- S = relevant to general population, with special relevance to individuals with CKD (902 PSIs, 32.4%)
- G = relevant to general population (887 PSIs, 31.8%)

Figure 2: PSI grading



Potential Harm	Direct	Omission
All PSIs	94.1	5.9
CKD specific PSIs	96.5	3.5

Table 2: Percentage of PSIs categorised as causing potential harm

Discussion

This study has systematically identified indicators of prescribing safety and shown that over one third of PSIs are only relevant in people with impaired renal function. By identifying PSIs more applicable to individuals with CKD it highlights the importance of renal function to prescribing safety.

Further work is being conducted to subcategorise the CKD specific PSIs based on drug class with the aim to create a defined list of PSIs relevant to the CKD population. This list can be used alone, or alongside general population PSIs, to assess prescribing quality within a population of interest and forms a foundation step in the development of tools to assess prescribing safety within the CKD population.

References

- (1) Spencer, R., Bell, B., Avery AJ., et al., Identification of an updated set of prescribing-safety indicators for GPs. *British Journal of General Practice*. 2014; **64** (621): e181-e190.