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Medication management during sick days: No differences between patients with and without impaired renal function

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KEYWORDS

dehydration, elderly, impaired renal function, medication management, polypharmacy, sick days

1 | INTRODUCTION

Due to the ageing of the population, the number of patients with polypharmacy and impaired renal function is increasing.^{1,2} These patients often use high-risk drugs including diuretics, angiotensin-converting enzyme (ACE) inhibitors, angiotensin receptor blockers (ARBs), NSAIDs and metformin. These drugs are labelled high-risk due to the risk of acute renal failure in case of dehydration due to vomiting, diarrhoea and high fever (so-called *sick days*). This rapid loss in renal function can be explained through the mechanism of action of these drugs, including dilatation of the efferent arteriole of the glomerulus (ACE-inhibitors, angiotensin receptor blockers), inhibition of prostaglandin synthesis in the afferent arteriole (NSAIDs) and hypovolemia (diuretics).³ Continued use of these drugs during sick days poses a particular risk for patients with pre-existing impaired renal function. To prevent acute deterioration of renal function, treatment guidelines recommend temporarily adjusting or discontinuing high-risk drugs during sick days.^{4,5} Thus far, however, it is unknown whether patients with impaired renal function are aware of and adhere to these recommendations.

Therefore, this study assessed how elderly patients managed their drugs during sick days and whether this differed between patients with and without pre-existing impaired renal function.

2 | METHODS

An online questionnaire was sent to the AMP patient panel in the Netherlands.⁶ The panel consisted of approximately 24,000 individuals most of whom use one or more prescribed drugs for chronic diseases. The questionnaire focused on patients' management of their prescribed drugs during sick days and their contact with healthcare professionals within these periods. A sick day was defined to the participant as an acute illness with severe diarrhoea, vomiting or fever. Patients with impaired renal function received additional questions regarding their diagnosis, lifestyle adjustments and information they had received from healthcare professionals. Additionally, they were asked whether they had been prescribed any of the specific high-risk drugs referred to above.

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3 | RESULTS

A total of 5713 patients completed the questionnaire of whom 45.4% were female and had a median age of 69 (62–75). As shown in Table 1, 822 patients reported having impaired renal function. These patients were on average slightly older, used more chronic drugs and had more chronic comorbidities including greater incidence of cardiovascular disease, hypertension and diabetes.

4 | CONTACT WITH HEALTHCARE PROFESSIONALS AND DRUG MANAGEMENT DURING SICK DAYS

In total, of the patients without impaired renal function, 22% mentioned they would immediately contact a healthcare professional if they experience fever, diarrhoea or vomiting; 43% would contact a healthcare professional if

they were still unwell after a few days and 35% would not contact a healthcare professional at all. Responses from patients with impaired renal function were similar, being 27%, 44% and 29%, respectively.

Figure 1 shows how patients managed their drugs during previously experienced sick days. Patients who reported no previous experience with sick days ($n=2182$) were excluded from this analysis.

5 | IMPAIRED RENAL FUNCTION AND INFORMATION PROVISION

Additional information was requested from patients with impaired renal function ($n=822$). Three out of four patients with impaired renal function used at least one high-risk drug. They reported having received information from a healthcare professional regarding general food and fluid intake (42%), salt intake (28%) and drug intake (16%), regardless of sick days. However, almost 24% said

TABLE 1 Self-reported patient characteristics of respondents ($n=5713$).

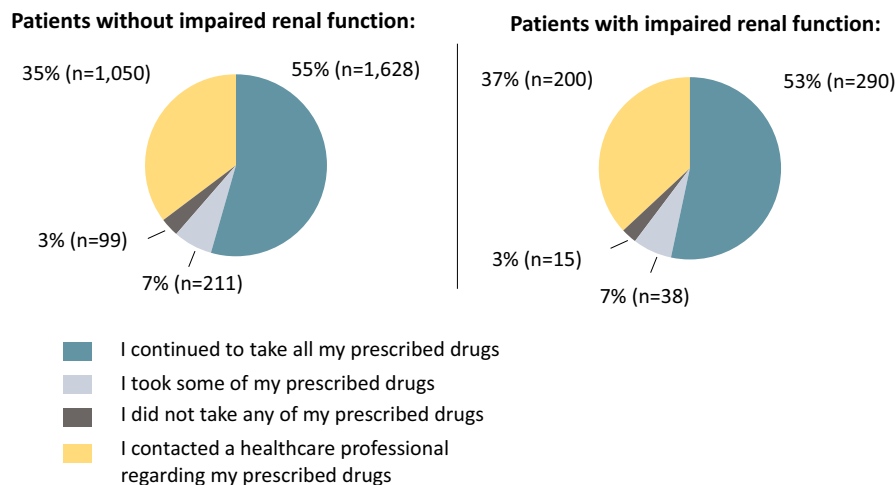
Variable	All patients ($n=5713$)	Patients without impaired renal function ($n=4891$)	Patients with impaired renal function ($n=822$)
Female, % (n)	45.5 (2593)	46.1 (2255)	41.1 (338)
Age in years, median (IQR)	69 (62–75)	68 (61–74)	72 (66–78)
Educational level ^a			
Primary education, % (n)	1.6 (89)	1.5 (73)	1.9 (16)
Secondary education, % (n)	10.3 (588)	10.3 (502)	10.5 (86)
Upper secondary education, % (n)	44.1 (2519)	43.4 (2122)	48.3 (397)
Higher/tertiary education, % (n)	42.1 (2407)	44.0 (2103)	37.0 (304)
Other, % (n)	1.9 (110)	1.9 (91)	2.3 (19)
Number of chronic drugs in use, median (IQR)	4 (3–6)	4 (2–5)	6 (4–8)
Diuretics, % (n)	2	2	38.2 (314)
ACE-inhibitor ^b , % (n)	2	2	29.2 (240)
ARB, % (n)	2	2	24.8 (204)
NSAID, % (n)	2	2	6.7 (55)
Metformin, % (n)	2	2	24.9 (205)
None of the above, % (n)	2	2	25.1 (206)
Number of comorbidities treated with a drug, median (IQR)	3 (2–4)	2 (2–4)	4 (2–5)
Cardiovascular disease, % (n)	39.9 (2277)	37.8 (1848)	52.2 (429)
Hypertension, % (n)	54.3 (3104)	51.6 (2524)	70.6 (580)
Diabetes, % (n)	20.0 (1141)	17.8 (870)	33.0 (271)
Number of patients who have experienced a sick day in the past, % (n)	62.5 (3571)	62.0 (3020)	67.0 (551)

Abbreviations: ACE-inhibitor, angiotensin-converting enzyme inhibitor; ARB, angiotensin receptor blocker; NSAID, non-steroidal anti-inflammatory drug.

^aPrimary education: elementary school, secondary education: high school, upper secondary education: specialization, technical education or preparation for higher/tertiary education, higher/tertiary education: university of applied sciences and university.

^bHigh-risk drug use was not requested from patients without impaired renal function.

FIGURE 1 Management of physician-prescribed drugs during sick days among patients with ($n = 543$, right) and without ($n = 3531$, left) impaired renal function.



they had not received any additional information related to their impaired renal function.

5.1 | Educational level and sick day management

An exploratory analysis on the impact of educational level showed that a similar proportion of the patients with only primary or secondary education patients continued to take their usual drug regimen, including high-risk drugs, as patients with a higher educational level (32% vs. 35%). Remarkably, the patients with only primary or secondary education stated that during sick days they consulted a healthcare professional more often compared to a higher educational level (27% vs. 19%).

6 | DISCUSSION

Patients with and without impaired renal function reported similar drug management during sick days. More than half of the patients continued to take their usual drug regimen, including high-risk drugs, while only 35% of patients sought guidance from a healthcare professional during sick days. Ten percent of patients decided to adjust their drugs themselves, without consulting a healthcare professional. Continued use of high-risk drugs in a situation with a negative fluid balance due to fever, vomiting, diarrhoea or a combination of these symptoms puts patients at risk for acute deterioration of renal function.

A similar lack of knowledge regarding sick day guidance was shown in a previous study among elderly polypharmacy patients, underlining the need for additional research into the awareness of healthcare professionals and the way of information provision.⁷ It could be that patients, especially those who are older and use multiple drugs, have difficulty

recalling medical information and instructions provided by healthcare professionals.^{8,9} Previous research showed low health literacy among patients with impaired renal function.¹⁰ Both higher age and impaired renal function may impact cognitive functioning resulting in lower adherence to situation-specific recommendations.

In daily practice, healthcare professionals should improve information provision to support patients in their drug management, especially in high-risk situations. Several aspects should be taken into account when implementing this in practice. First, the information should be repeated on several occasions, for example, during consultation with the physician, during a check-up with the practice nurse and during drug dispensing or medication review in the pharmacy.¹¹ However, information provision should preferably not always be provided during standardized consultations because of the information density during these moments. Second, patient education and information materials should be harmonized between the prescribers, pharmacists and nurses to improve recognition by patients and to ensure similar information and advice are given. Lastly, homecare nurses, physicians and pharmacists should improve their awareness in signalling sick days of patients and instruct them to temporarily adjust their drugs.

Equally important is the involvement of informal caregivers, as sick day guidance information may be complicated in more vulnerable patients as it concerns situation-specific instructions. Patients should be able to recall this information and apply it when they are sick, which may present additional challenges as it can be difficult to remember the instructions when they are not feeling well. Furthermore, there is a gap between knowledge and behaviour, as first knowledge needs to be accepted and retained, followed by an intention to act accordingly. Here, informal caregivers can play a central role, for example, in signalling sick days in patients under their care, and in notifying healthcare

professionals or empowering patients to adjust their drugs correctly.

Although this study had a large sample size, the self-reported nature of the responses constitutes a limitation. Some respondents might have had impaired renal function without being aware of it. The prevalence of comorbidities and drugs may also have been underreported, resulting in an underestimation of the number of high-risk patients.

In conclusion, no differences in medication management during sick days were detected between patients with and without impaired renal function. This poses patients with impaired renal function at an increased risk of acute kidney injury. We thus recommend that healthcare professionals increase their efforts to implement sick day guidance in clinical practice by harmonizing the information provided across healthcare professionals and by repetitively providing tailored information to both individual patients and their informal caregivers while being alert to signs of patient sick days.

AUTHOR CONTRIBUTIONS

Study conception and design: EK, MB. *Data collection:* DP, TC. *Analysis and interpretation:* EK, MB, TG and TC. *Draft manuscript preparation:* EK, MB, TG, DP and TC. All authors approved the final version of the manuscript.

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CONFLICT OF INTEREST STATEMENT

All authors declared no competing interests.

DATA AVAILABILITY STATEMENT

Data is available upon reasonable request by contacting the corresponding author. The data is not readily accessible to the public by default because the AMP panel is regularly used for various research purposes. The standard exposure of this data could potentially facilitate the linking of sensitive information.

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SUPPORTING INFORMATION

Additional supporting information can be found online in the Supporting Information section at the end of this article.

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