# Pharmacist Quick Reference Guide: Medicines and reduced kidney function

**1 in 3 people** with reduced kidney function are prescribed medicines that are contraindicated due to kidney function or used at inappropriately high doses.[1]

**Think 'kidney function' during every medication review, especially when things change.**

## Consider the following when making dosage adjustment recommendations:[2]

### 1 Patient-related considerations:

**What is the kidney function trend?**

- what is the baseline eGFR and is it stable, rising or declining
- is reduced kidney function acute, chronic or acute-on-chronic

**Does the person have liver impairment?**

**Is the person:**

- elderly or paediatric
- at extremes of muscle mass or body size
- having exceptional dietary intake e.g. high-protein diet
- pregnant
- obese or underweight
- dehydrated or septic

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Both adjusted eGFR (CKD-EPI) and CrCl (Cockcroft-Gault) are **estimates** of kidney function.

Despite its limitations, automated eGFR can be used for dosing of most medicines if adjusted* in people with extremes of body size.[2,3]

* $\text{Adjusted eGFR (mL/min)} = \frac{\text{eGFR (mL/min/1.73 m}^2\text{) x BSA (m}^2\text{)}}{1.73}$

### 2 Medicine-specific considerations:

- Is the medicine:
  - eliminated by the kidneys
  - nephrotoxic
  - known to affect kidney function when combined with certain other medicines
- are there pharmacokinetic differences in reduced kidney function
- are dosing guidelines available
- does it have a narrow therapeutic index
- is there a risk of adverse effects from accumulation
- is validated therapeutic drug monitoring available

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### 3 Disease-related considerations:

- what is the indication for the medicine
- is there clinical significance to under or over- dosing
- what is the expected duration of therapy
- are there other, more suitable, treatment options available

Response to changes in therapy should be assessed by monitoring signs and symptoms in the patient, disease outcomes and for the emergence of adverse reactions or medicine-induced disorders.[2]

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**When making dosage adjustment recommendations in those with reduced kidney function, pharmacists should consider patient-related, medicine-specific and disease-related characteristics and not just focus on which equation to use to estimate kidney function.**

# The Pharmacist's role during a medication review[4]

1. Create a Best Possible Medication History (BPMH). Review all medicines used by the patient
2. Identify medicines that can worsen kidney function or potentially cause acute kidney injury
3. Identify medicines that can accumulate as a result of slower elimination in reduced kidney function and cause adverse effects
4. Identify medicines that are less effective in reduced kidney function
5. Highlight for review, or calculate appropriate dosing of medicines based on the patient's current estimated kidney function
6. Identify medicines that may need to be stopped

# Keep medicines front of mind

| Commonly** prescribed medicines that require review in reduced kidney function | | | | | |
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| Medicines that can accumulate | Anticoagulants<br>• apixaban<br>• rivaroxaban<br>• dabigatran<br>• enoxaparin | Antidepressants<br>• duloxetine<br>• venlafaxine<br>• desvenlafaxine | Diabetes<br>• DPP-4 inhibitors (except linagliptin)<br>• metformin<br>• sulfonylureas | Opioids<br>• codeine<br>• morphine<br>• oxycodone<br>• hydromorphone | Others<br>• allopurinol<br>• tramadol<br>• pregabalin<br>• gabapentin |

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| Medicines with a narrow safety margin that require dose reduction and therapeutic drug monitoring | • digoxin<br>• lithium |
| Nephrotoxic medicines | • NSAIDs (including COX-2 inhibitors) |
| Medicines that can affect kidney function via fluid and electrolyte balance | • diuretics<br>• ACE inhibitors and ARBs<br>• SGLT2 inhibitors |
| Medicines that are less effective in people with reduced kidney function | • loop diuretics (eg. furosemide)<br>• SGLT2 inhibitors<br>• thiazide diuretics |
| Certain antibiotics that may require a lower starting dose or withdrawal | • trimethoprim<br>• ciprofloxacin<br>• nitrofurantoin |
| Medicines that may need to be temporarily withdrawn during a sick day (SADMANS)<br>**How to...**<br>**Sick Day Action Plan**<br>SCAN ME | • **S**ulfonylureas<br>• **A**CE inhibitors<br>• **D**iuretics<br>• **M**etformin<br>• **A**RBs<br>• **N**SAIDs<br>• **S**GLT2 inhibitors |

AMH[5] CKD Management[6]
** this table is not intended to be an exhaustive list.

## Additional resources and guidelines:

- Pharmaceutical Society of Australia. Australian Pharmaceutical Formulary and Handbook (APF). Dosing in renal impairment. At: https://apf.psa.org.au/medicines-issues-practice/dosing-renal-impairment
- Rossi S, ed. Prescribing in renal impairment. Australian medicines handbook; [updated 2023 Jan]. At: https://amhonline.amh.net.au/guides/guide-renal-impairment?menu=vertical
- Australian Medicines Handbook. See specific medicine monographs for dosing guidance.
- eviQ. International Consensus Guideline on Anticancer Drug Dosing in Kidney Dysfunction (ADDIKD). 2022. At: https://www.eviq.org.au/clinical-resources/addikd-guideline/4174-anticancer-drug-dosing-in-kidney-dysfunction
- Kidney Disease: Improving Global Outcomes (KDIGO). International guidelines and resources. At: https://kdigo.org/

References:

1. Castelino R, Saunder T, Kitsos A, Peterson G, Jose M, Wimmer B, et al. Quality use of medicines in patients with chronic kidney disease. BMC Nephrol. 2020;21(1):216.
2. Mirkov S, Scuderi C, Lloyd J et al. Estimation of kidney function for medication dosing in adult patients with chronic kidney disease: a practice update. Journal of Pharmacy Practice and Research. November 2023. At: https://onlinelibrary.wiley.com/doi/full/10.1002/jppr.1884
3. Stefani M, Singer RF, Roberts DM. How to adjust drug doses in chronic kidney disease. Aust Prescr 2019;42:163–7.https://doi.org/10.18773/austprescr.2019.054
4. Veteran's MATES. Therapeutic brief: Medicines and your kidneys. September 2019. At: https://www.veteransmates.com.au/topic-56-therapeutic-brief
5. Australian Medicines Handbook. Adelaide. Australian Medicines Handbook Pty Ltd 2024. Available at: amhonline.amh.net.au [Accessed June 2024]
6. Chronic Kidney Disease (CKD) Management in Primary Care (5th edition). Kidney Health Australia, Melbourne, 2024

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