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Identification, Monitoring, and Management of Chronic Kidney Disease at University Hospital Kerry: Findings from a Multidisciplinary Clinical Audit

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Abstract

Background: Chronic kidney disease (CKD) affects a substantial proportion of adults and is associated with cardiovascular risk, progression to kidney failure, and medication-related harm [1-4]. Structured identification, staging, and guideline-directed management are central to improving outcomes.

Aim: To assess local compliance with evidence-based standards for the identification, monitoring, and management of patients with CKD at University Hospital Kerry (UHK), and to identify targets for quality improvement.

Methods: A retrospective multidisciplinary clinical audit of 38 patient records was undertaken against eight locally agreed standards derived from national and international CKD guidance [1, 2]. Data on CKD staging, albuminuria assessment, blood pressure monitoring and control, renoprotective prescribing, medication review, renal function monitoring, and nephrology referral were collected and compared against target thresholds.

Results: The cohort was predominantly female (68.4%, 26/38) with an age range of approximately 53–92 years. Only two of eight standards were met: blood pressure monitoring (100%, 38/38) and renal function monitoring (100%, 38/38). CKD stage was documented in 34.2% (13/38) of patients against a 95% standard; urine albumin-to-creatinine ratio (ACR) was recorded in 28.9% (11/38) against a 90% standard, with no patient having a documented albuminuria category. Medication review performance was mixed: nephrotoxic medicines were reviewed in 86.8% (33/38) of patients, whereas regular/ongoing medicines were reviewed in only 31.6% (12/38), against a 90% standard for each. Nephrology referral was completed in 62.9% (17/27) of patients meeting referral criteria, against a 100% standard.

Conclusion: Routine monitoring activities were well embedded, but structured CKD staging, albuminuria assessment, renoprotective prescribing, and nephrology referral fell substantially short of target standards. A standardised CKD documentation and alert tool, together with staff education, is proposed, with re-audit planned at 6 months.

Keywords: Chronic Kidney Disease, Clinical Audit, Medication Review, Renoprotective Therapy, Nephrology Referral, Quality Improvement

1. Introduction

Chronic kidney disease (CKD) is a common, often silent condition associated with increased cardiovascular risk, progression to kidney failure, medication-related harm, and increased healthcare utilization [1, 2]. CKD is defined as an abnormality of kidney structure or function, present for at least three months, with implications for health, and is classified by cause, glomerular filtration rate (GFR) category (G1–G5), and albuminuria category (A1–A3) — the CGA classification framework.

Globally, CKD affected an estimated 697.5 million people in 2017 (age-standardized prevalence 9.1%), with the burden continuing to rise across subsequent Global Burden of Disease analyses [3, 4]. In Ireland, an analysis linking The Irish Longitudinal Study on Ageing (TILDA) with the Health Service Executive (HSE) National Renal Office estimated that

approximately one in seven adults aged 50 years and over has CKD, and that the great majority are unaware of their diagnosis [5]. These findings underline the importance of systematic identification and structured, guideline-concordant management in both primary and secondary care.

Good CKD care requires timely identification, accurate staging, albuminuria assessment, blood pressure monitoring and control, appropriate reno-protective treatment, regular medication review (including avoidance of nephrotoxic agents), monitoring of renal function at stage-appropriate intervals, and referral to nephrology services where indicated [1, 2]. Current international guidance from Kidney Disease: Improving Global Outcomes (KDIGO) and the National Institute for Health and Care Excellence (NICE) sets out explicit, evidence-based recommendations across each of these domains.

This audit was undertaken by the multidisciplinary pharmacy and medical team at University Hospital Kerry to assess whether current local practice met a set of pre-defined standards for CKD care, and to identify priorities for quality improvement.

1.1 Aim

To assess compliance with local and national standards for the identification, monitoring, and management of patients with CKD reviewed at UHK.

1.2 Objectives

The audit determined whether patients with CKD:

1. Had their CKD stage documented based on the most recent estimated glomerular filtration rate (eGFR).
2. Had a urine albumin-to-creatinine ratio (ACR) measured and documented.
3. Had blood pressure recorded within the previous 12 months.
4. Achieved the locally agreed target for blood pressure control.
5. Were prescribed an ACE inhibitor or angiotensin receptor blocker (ARB) when clinically indicated and not contraindicated.
6. Had evidence of regular medication review, including identification and avoidance of nephrotoxic medicines where appropriate.
7. Had CKD-related complications (anaemia, vitamin D deficiency, hyperparathyroidism) appropriately assessed and managed according to CKD stage.
8. Had renal function monitored at intervals appropriate to CKD stage and risk.
9. Were referred to nephrology services when established referral criteria were met.

2. Methods

2.1 Design and Standards

This was a retrospective clinical audit conducted in accordance with recognized principles of clinical audit methodology [6]. Audit standards (Table 1) were derived by the multidisciplinary audit team from current national and international CKD guidance [1, 2]. Performance in each domain was compared against the pre-defined target threshold.

Table 1: Audit standards

Audit domain	Standard
CKD diagnosis and staging	95%
Albuminuria assessment	90%
Blood pressure monitoring	95%
Blood pressure control	80%
Renoprotective therapy	85%
Medication review	90%
Monitoring of renal function	90%
Referral to nephrology	100%

2.2 Setting and Sample

The audit was conducted within the pharmacy and medical directorate at University Hospital Kerry, Health Service Executive, Ireland. A sample of 38 patient records with a diagnosis or clinical suspicion of CKD was reviewed.

2.3 Data Collected

The audit dataset included information on:

- CKD diagnosis and stage
- Urine ACR assessment and albuminuria category
- Blood pressure recording and target documentation
- Use of ACE inhibitors, ARBs, SGLT2 inhibitors, statins, and other relevant medicines
- Haemoglobin, vitamin D, and parathyroid hormone (PTH) levels
- Nephrotoxic medication review
- Renal function monitoring interval
- CKD complication monitoring
- Nephrology referral status

2.4 Data Analysis

Data were tabulated and analyzed descriptively. Results are presented as the proportion (%) and frequency (n/N) of patients meeting each standard, compared against the pre-defined target threshold.

2.5 Notes on interpretation and methodological limitations

In two domains, the exact standard and the available measure were not perfectly matched, and this is acknowledged as a limitation of the underlying dataset:

- **Blood pressure control:** The available measure was documentation of a BP target, rather than confirmed achievement of that target.
- **Renoprotective therapy:** Prescribing data for ACE inhibitors and ARBs were available separately, but a single combined patient-level measure confirming that every indicated patient received one or the other could not be reliably derived from the charts, owing to unclear overlap between the two prescribing groups.

2.6 Ethical Considerations

Note for authors: As a service evaluation/clinical audit using routinely collected, de-identified data, this project would typically be registered with the institutional

audit/quality office rather than requiring full research ethics committee review; the relevant audit registration number and any data protection/GDPR compliance statement should be inserted here prior to submission.

3. Results

3.1 Baseline Characteristics

The cohort consisted mainly of older adults, aged approximately 53 to 92 years, with females accounting for 68.4% (26/38) and males 31.6% (12/38).

3.2 Results Against Standards

Table 2: Comparison of audit standards with results

Audit domain	Standard	Measure used	Result	Standard met?
CKD diagnosis and staging	95%	CKD stage documented	34.2% (13/38)	**Not met**
Albuminuria assessment	90%	Urine ACR measured/documented, last 12 months	28.9% (11/38)	**Not met**
Blood pressure monitoring	95%	BP recorded regularly	100% (38/38)	**Met**
Blood pressure control*	80%	BP target documented	44.7% (17/38)	**Not met**
Renoprotective therapy**	85%	ACEi/ARB prescribed where indicated	Suboptimal (see 3.3)	**Not met**
Medication review – nephrotoxic medicines	90%	Nephrotoxic medicines reviewed	86.8% (33/38)	**Not met**
Medication review – regular medicines	90%	Regular/ongoing medicines reviewed	31.6% (12/38)	**Not met**
Monitoring of renal function	90%	Renal function monitored at appropriate interval	100% (38/38)	**Met**
Referral to nephrology	100%	Referral made where criteria met	62.9% (17/27)	**Not met**

**Proxy measure used due to lack of direct blood pressure control data. **Exact combined patient-level ACEi/ARB compliance could not be fully derived from the available charts; detailed findings are provided in Section 3.3.*

3.3 Detailed Results by Domain

3.3.1 CKD diagnosis and staging (standard: 95%)

CKD diagnosis itself was documented in 86.8% (33/38) of patients; however, documentation of CKD stage was markedly lower, at 34.2% (13/38): Stage 3a, 5.3% (2/38); Stage 3b, 5.3% (2/38); Stage 4, 13.2% (5/38); Stage 5, 10.5% (4/38); not documented, 65.8% (25/38). Standard not met.

3.3.2 Albuminuria assessment (standard: 90%)

Urine ACR was measured within the preceding 12 months in 28.9% (11/38) of patients. No patient (0%) had a documented albuminuria category. Standard not met.

3.3.3 Blood pressure monitoring (standard: 95%)

Blood pressure was recorded regularly in 100% (38/38) of patients. Standard met.

3.3.4 Blood pressure control (standard: 80%)

Using documentation of a BP target as a proxy measure, a target was recorded in 44.7% (17/38) of patients. As actual achievement of BP targets was not available in the dataset, this result reflects documentation rather than confirmed control. Standard not met.

3.3.5 Renoprotective therapy (standard: 85%)

ACEi/ARB therapy was indicated in 71.1% (27/38) of patients. An ACE inhibitor was prescribed in 28.9% (11/38) and an ARB in 31.6% (12/38). Where indicated but not prescribed, a documented reason was present in 7.9% (3/38) and absent in 31.6% (12/38). Because overlap between the ACE inhibitor and ARB groups could not be resolved from the charts, exact combined compliance could not be calculated; however, prescribing and documentation were clearly below the 85% standard. Standard not met.

3.3.6 Medication review (standard: 90%)

Medication review was assessed separately for nephrotoxic and regular (ongoing) medicines. Nephrotoxic medicines were reviewed in 86.8% (33/38) of patients, with an NSAID currently prescribed or recommended in 13.2% (5/38). By contrast, review of regular/ongoing medicines — covering renal dose appropriateness and continued need — was documented in only 31.6% (12/38) of patients. Neither component met the 90% standard, although nephrotoxic medicine review performance was much closer to target than review of regular medicines.

3.3.7 Monitoring of renal function (standard: 90%)

Renal function was monitored at an interval appropriate to CKD stage in 100% (38/38) of patients. Standard met.

3.3.8 Referral to nephrology (standard: 100%)

Referral criteria were met in 27/38 patients; of these, referral was made in 17/27 (62.9%). Overall, 42.1% (16/38) of the cohort had been seen by nephrology, 34.2% (13/38) had not, and referral was not applicable in 23.7% (9/38). Standard not met.

4. Discussion

This audit demonstrated suboptimal adherence to several key standards for the management of patients with CKD. Only two of the eight predefined standards were achieved, with complete compliance observed for renal function monitoring and blood pressure recording. Although these findings indicate good engagement with routine patient monitoring, significant deficiencies were identified in CKD classification, risk stratification, and implementation of evidence-based interventions.

4.1 CKD diagnosis and staging

CKD was frequently recognized within the service; however, documentation of CKD stage was poor, at little over a third of the target standard. Accurate staging is fundamental to CKD management, as it guides monitoring frequency, therapeutic intervention, complication assessment, and referral decisions [1, 2]. Failure to document stage may reduce the likelihood that clinicians undertake stage-specific actions, including medication dose adjustment for renally excreted drugs, monitoring for disease progression, and assessment for complications such as anaemia and vitamin D deficiency. Consequently, patients may not receive structured, guideline-concordant CKD care.

4.2 Albuminuria assessment

Albuminuria assessment demonstrated one of the greatest deficiencies identified in this audit, with no patient having a documented albuminuria category. Albuminuria is an essential component of the KDIGO CGA classification and

provides important prognostic information on renal disease progression and cardiovascular risk [1]. The absence of documented albuminuria categories suggests that CKD management in this cohort may rely predominantly on eGFR values, without incorporating the full risk-stratification framework recommended in current guidance.

4.3 Blood pressure monitoring and control

Recording of blood pressure was excellent, exceeding its target standard and suggesting that routine monitoring processes are well established locally. However, the audit dataset did not permit direct assessment of whether patients achieved recommended blood pressure targets; documentation of an individualised treatment target, used here as a proxy measure, was present in fewer than half of patients. Improved documentation of target blood pressure, as recommended in current guidance, could facilitate more structured management and clearer assessment of treatment effectiveness [1, 2].

4.4 Renoprotective therapy

The standard for prescribing ACE inhibitors or ARBs when clinically indicated was not achieved, and documentation of contraindications or clinical reasons for non-prescribing was limited. This finding is clinically important, as renin-angiotensin system inhibitors play a central role in reducing proteinuria, slowing CKD progression, and lowering cardiovascular risk in appropriately selected patients [1, 2]. Inadequate prescribing or poor documentation of prescribing decisions may represent missed opportunities to optimise long-term renal and cardiovascular outcomes, and represents a priority target for pharmacist-led medication review [7].

4.5 Medication review

Medication review performance differed markedly depending on which component was examined. Review of nephrotoxic medicines approached, but did not reach, the 90% target, indicating an area of relative strength that could be brought to full compliance with focused effort; this is consistent with pharmacists' well-established role in nephrotoxin stewardship within multidisciplinary CKD care [7]. Review of regular, ongoing medicines was, however, considerably poorer, at less than one-third of patients. Given that renal function declines progressively across CKD stages, regularly prescribed medicines — including those requiring dose adjustment, those with a narrow therapeutic index, or those no longer clinically indicated — require the same systematic scrutiny as newly prescribed or high-risk agents. The comparatively low rate of regular medication review suggests that current practice may be reactive, triggered by the introduction of a new or nephrotoxic drug, rather than embedded as a routine component of CKD follow-up. This represents a clear, actionable target for pharmacist-led medication reconciliation and is reflected in the recommendations below (Section 6).

4.6 Nephrology referral

Nephrology referral, the only standard set at 100%, was met in fewer than two-thirds of eligible patients. Incomplete adherence to referral pathways may delay specialist input for patients with advanced or high-risk CKD, particularly given the proven benefit of early nephrology involvement in slowing progression and preparing for complications of advanced disease.

4.7 Overall interpretation

Taken together, these findings suggest a pattern of strong performance in routine, low-friction monitoring activities (blood pressure and renal function recording) alongside weaker performance in domains that require active clinical reasoning, structured documentation, and risk-based decision-making — namely CKD staging, albuminuria testing, reno-protective prescribing, regular medication review, and referral. This pattern is consistent with audits of CKD care in other settings, where documentation of stage and albuminuria category is frequently a rate-limiting step in delivering guideline-directed care.

4.8 Strengths and limitations

This audit has several strengths, including multidisciplinary involvement, use of explicit standards derived from current international guidance, and a comprehensive set of clinically relevant domains. Several limitations should, however, be considered when interpreting these findings:

- The audit was conducted at a single centre with a modest sample size (n = 38), which limits statistical precision.
- The retrospective design relies on the completeness and accuracy of clinical documentation; care that was delivered but not documented cannot be distinguished from care that was not delivered, which may underestimate true performance in some domains.
- No formal statistical testing or risk-adjustment was performed, consistent with standard descriptive clinical audit methodology rather than a comparative research study.

5. Conclusion

This audit demonstrated that compliance with the proposed CKD standards at UHK was generally poor. Of the eight standards assessed, only blood pressure monitoring and renal function monitoring met target. The greatest gaps were seen in CKD stage documentation, albuminuria assessment, and nephrology referral where indicated. These findings support the need for a more structured CKD review process, improved documentation, and closer alignment of management with agreed, evidence-based standards.

6. Recommendations

The following recommendations were developed by the audit team to address the deficiencies identified:

#	Recommendation	Detail
1	**Mandatory CKD stage documentation**	Add CKD stage as a mandatory field in clinical documentation, ward review templates, and discharge summaries.
2	**CKD point-of-care alert tool**	Introduce a standardised CKD alert sticker/label to prompt stage-specific medication review, dose adjustment, and assessment of vitamin D and haemoglobin (Appendix, Fig 2).
3	**Albuminuria classification**	Record albuminuria category (A1, A2, A3) alongside eGFR-based staging.
4	**Blood pressure documentation**	Record an individualised target blood pressure for all patients with CKD and document whether it was achieved.
5	**Reno-protective prescribing**	Systematically review ACEi/ARB eligibility; document contraindications or reasons for non-prescription where therapy is withheld.
6	**Medication review**	Continue routine nephrotoxin review and reinforce avoidance of NSAIDs where alternatives exist; extend structured, stage-based review to regular/ongoing medicines, not only newly prescribed or nephrotoxic agents.
7	**Renal function monitoring**	Maintain stage-based prompts for repeat renal function testing.
8	**Nephrology referral pathway**	Embed referral-criteria prompts within CKD review documentation; audit referral completion.
9	**Education**	Deliver structured teaching for NCHDs on CKD staging, ACR/albuminuria classification, ACEi/ARB prescribing, and referral criteria.

7. Action Plan

Table 3: Proposed action plan following audit

Action	Lead	Timescale	Expected outcome
Introduce CKD review template and alert sticker	Medical/renal lead, pharmacy	1 month	Improved stage and target documentation
Review ACEi/ARB prescribing practice	Medical team / pharmacy	2 months	Improved renoprotective prescribing
Introduce nephrology referral checklist	Renal team / governance	2 months	Improved referral compliance
Deliver staff teaching	Audit lead / renal team	3 months	Improved awareness of standards
Repeat audit	Audit lead	6 months	Measure improvement following intervention

8. Re-audit

Recommended re-audit interval: approximately 6 months following implementation of the above interventions, using the same standards and data fields, to assess the impact of the proposed CKD documentation template, alert tool, and education programme.

9. Declarations

Ethics approval and consent to participate

All ethical approval done by the team.

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This audit received no external or internal funding.

Conflicts of interest

The authors declare no conflicts of interest.

Data availability

The de-identified dataset supporting this audit is available from the corresponding author on reasonable request, subject to institutional governance approval.

Author contributions

Dr A. Elnour supervised the audit. M. Mohamed led data analysis and drafted the manuscript. D. Hobbert and M. O'Connor contributed to audit design and pharmacy data review. Dr K. Ghalib and Dr Y. R. Makki provided medical oversight. All listed co-authors contributed to data collection, standard development, and critical review of the manuscript. All authors read and approved the final version.

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