

Summary of Audit Measures in the 5th Edition of the Renal Association Clinical Practice Guidelines (2009-2012)

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Audit Measures for the Clinical Practice Guideline on Detection, Monitoring and Management of Patients with Chronic Kidney Disease

1. Proportion of database entries or clinic letters related to patients with CKD that include an estimated GFR with the serum creatinine.
2. Proportion of patient record entries and clinic letters that include the modified K/DOQI CKD stage.
3. Proportion of CKD patients who had a urine protein or albumin to creatinine ratio measured at their first clinic visit.
4. Proportion of patients with significant risk factors for CKD who have been screened for CKD.
5. Proportion of patients screened for CKD who have had a) an assessment of estimated GFR, b) Urinalysis, c) Both an assessment of estimated GFR and urinalysis.
6. Proportion of initial abnormal estimated GFR results that are followed by a repeat test within 2 weeks and a further test at 90 days (where appropriate)
7. Proportion of patients with CKD stage 3 or worse in whom the diagnosis has been confirmed by two estimated GFR readings, at least 90 days apart.
8. Proportion of patients with a confirmed diagnosis of CKD in whom the rate of change in GFR has been evaluated with at least 3 assessments of GFR over not less than 90 days.
9. Proportion of patients with proteinuria equivalent to $<0.5\text{g/day}$ in whom the result has been confirmed with a repeat test performed on an early morning urine specimen.
10. Proportion of patients with a diagnosis of microalbuminuria in whom the diagnosis has been confirmed with at least 2 abnormal results.
11. Proportion of patients with initial detection of non-visible/microscopic haematuria with a urine culture result.
12. Proportion of patients with non-visible/microscopic haematuria in whom the result was confirmed with a total of at least 3 tests.
13. Proportion of patients with persistent non-visible/microscopic haematuria in the absence of significant proteinuria or a reduced GFR that were referred to a Urology Department.
14. Proportion of patients with CKD with regular monitoring of the estimated GFR at the frequency recommended by NICE or local guidelines.
15. Proportion of patients with CKD who have had a measurement of proteinuria within the previous 12 months.
16. Proportion of Nephrology Units with specific service agreements for the detection and monitoring of CKD within a defined organisational area.
17. Proportion of all new outpatient attendances that could have been avoided by appropriate non-visit-based specialist advice.
18. Number of requests for non-visit-based advice relative to the total number of referrals per month.
19. Proportion of patients with CKD and follow-up for at least 6 months, whose last recorded blood pressure was within the target range specified above unless specifically contraindicated.
20. Proportion of patients with CKD and hypertension, followed up for at least 6 months, with a systolic blood pressure $<120\text{mmHg}$ in the absence of cardiac failure.
21. Proportion of proteinuric CKD patients (as defined above) without contraindications who have an ACEI or ARB on their last recorded list of chronic medications.

22. Proportion of patients with CKD and proteinuria who achieve a decrease in proteinuria to <0.5g/day.
23. Proportion of patients with diabetes mellitus and microalbuminuria (without specific contraindications) who had an ACEI or ARB on their last recorded list of chronic medications.
24. Proportion of patients receiving an ACEI or ARB for diabetes and microalbuminuria who received the maximum licensed antihypertensive dose (or maximum dose tolerated without hypotension) on their most recent prescription.
25. Proportion of patients with diabetic nephropathy and follow-up for at least 6 months, whose last recorded HBA_{1C} was below their agreed target.
26. Average HBA_{1C} of all patients with diabetes mellitus and CKD.
27. Proportion of CKD patients with a formal assessment of cardiovascular risk factors documented in their records during the past year.
28. Proportion of CKD patients with indications for lipid lowering therapy as defined by NICE / JBS 2.
29. Proportion of CKD patients with indications for lipid lowering therapy as defined by NICE / JBS 2, who are receiving lipid lowering therapy.
30. Proportion of CKD patients who currently do not have an indication for lipid lowering therapy as defined by NICE / JBS 2 but who are receiving a lipid lowering agent.
31. Proportion of CKD patients with smoking status recorded in their last record entry.
32. Proportion of CKD patients who are current smokers that received an offer of assistance with smoking cessation during the past year of follow-up.
33. Proportion of smoking CKD patients who ceased smoking during the past year.
34. Proportion of patients with CKD and obesity who have received dietary advice to assist weight loss.
35. Proportion of patients with CKD who have received dietary advice to assist dietary sodium restriction.
36. Proportion of patients with CKD stages 4 and 5 who have received dietary advice to assist dietary restriction of potassium and phosphate.
37. Proportion of patients with CKD stages 1-3 and hyperkalaemia or hyperphosphataemia who have received dietary advice to assist dietary restriction of potassium and phosphate.
38. Proportion of patients with CKD who have received advice to undertake regular exercise.
39. Proportion of patients with CKD who report performing regular moderate exercise.
40. Proportion of patients on Primary Care CKD registers who have been referred to a Nephrology Department.
41. Proportion of patients on Primary Care CKD registers with an indication for referral to a Nephrology Department.
42. Proportion of patients on Primary Care CKD registers with an indication for referral who have been referred to a Nephrology Department.

Audit Measures for the Clinical Practice Guideline on Anaemia in Chronic Kidney Disease

1. Proportion of CKD patients with eGFR < 30ml/min by 4 variable MDRD method with an annual Hb level

2. Proportion of patients starting an ESA without prior measurement of serum ferritin and/or TSAT
3. Proportion of patients on renal replacement therapy with Hb level < 10 who are not prescribed an ESA
4. Each renal unit should audit the type, route and frequency of administration and weekly dose of ESA prescribed
5. The proportion of CKD stage 4-5 patients with Hb 10 -12 g/dl
6. The proportion of patients treated with an ESA with Hb > 12 g/dl
7. Each renal unit should monitor ESA dose adjustments
8. Proportion of patients with serum ferritin levels < 100ng/ml at start of treatment with ESA
9. Proportion of predialysis and PD patients receiving iron therapy; type: oral vs. parenteral
10. Proportion of HD patients receiving IV iron
11. Prevalence of resistance to ESA among renal replacement therapy patients
12. Proportion of HD patients who received a blood transfusion within the past year

Audit Measures for the Clinical Practice Guideline on Cardiovascular Disease in Chronic Kidney Disease

1. Compliance with recording of cardiovascular co-morbidity at the time of referral to a renal unit and when starting renal replacement therapy.
2. Proportion of patients smoking and proportion referred for active help regarding cessation.
3. Proportion of patients performing regular exercise on haemodialysis
4. Record of glycated haemoglobin concentrations in IFCC (mmol/mol) and HBA1C%.
5. Record of prescribed statins allied to indications and comorbidities of patients
6. Cholesterol concentrations in patients prescribed HMG CoA reductase inhibitors
7. Delay between referral to cardiology for an assessment for renal transplantation and the final cardiological sign-off indicating fitness to proceed should be less than 3 months.
8. Pre, post and interdialytic blood pressure in HD patients
9. Blood pressure in peritoneal dialysis patients
10. Home and/or ambulatory blood pressure recordings

Audit Measures for the Clinical Practice Guideline on Mineral and Bone Disorders in Chronic Kidney Disease

1. Serum calcium in dialysis patients (pre-dialysis for haemodialysis patients)
2. Serum phosphate in dialysis patients (pre-dialysis for haemodialysis patients)
3. Proportion of PTH values within range 0/4, 1/4, 2/4, 3/4, and 4/4 of the 4 annual measurements of PTH in CKD stage 5D patients.
4. Percentage of patients with all parameters (calcium/phosphate/PTH) within target range.

Audit Measures for the Clinical Practice Guideline on Nutrition in Chronic Kidney Disease

1. Percentage of dialysis patients assessed by a renal dietician within the last 6 months

2. Percentage of dialysis patients with a dry weight of <85% ideal body weight
3. Percentage of stage 4/5 patients not on dialysis with a dry weight of <85% ideal body weight
4. Percentage of dialysis patients with a BMI <20kg/m²
5. Percentage of stage 4/5 patients not on dialysis with a BMI <20kg/m²
6. Percentage of dialysis patients assessed by SGA in the last 12 months
7. Percentage of stage 4/5 patients not on dialysis assessed by SGA in the last 12 months
8. Percentage of dialysis patients with an SGA score of B/C or 1-5 on a 7-point scale
9. Percentage of stage 4/5 patients not on dialysis with an SGA score of B/C or 1-5 on a 7-point scale

Audit Measures for the Clinical Practice Guideline on Prevention of Blood Borne Virus Infection in Chronic Kidney Disease

1. National survey of dialyser re-use in dialysis units
2. How frequent is contamination of external pressure monitor filters with blood or saline observed during haemodialysis sessions and what are the factors associated with contamination?
3. What proportion of prevalent dialysis patients are known to be immune to HBV (anti HBs >10mIU/mL within the last year). Of the remainder, what proportion has a HBsAg test result from within the last 3 calendar months?
4. What proportion of patients known to be infected with HBV is dialysed in a segregated area (using the DoH definition of 'segregated')?
5. The proportion of incident patients starting regular hospital haemodialysis who have anti HBs antibody titre >10mIU/mL
6. The proportion of patients with eGFR <30ml/min and are expected to require RRT who have initiated a HBV immunisation schedule.

Audit Measures for the Clinical Practice Guideline on Planning, Initiation and Withdrawal of Renal Replacement Therapy

1. Percentage of patients commencing RRT referred <3months and <12months before date of starting RRT
2. Percentage of incident RRT patients followed up for >3 months in dedicated pre-dialysis or low clearance clinic
3. Proportion of incident patients on UK transplant waiting list at RRT initiation
4. Proportion of incident RRT patients transplanted pre-emptively from living donors and cadaveric donors
5. Mean eGFR at time of pre-emptive transplantation
6. Proportion of incident patients commencing peritoneal or home haemodialysis
7. Proportion of patients who have undergone a formal education programme prior to initiation of RRT
8. Proportion of haemodialysis patients who report that they have been offered a choice of RRT modality
9. Proportion of patients who have initiated dialysis in an unplanned fashion who have undergone formal education by 3 months.
10. Evidence of formal continuing education programme for patients on dialysis
11. Proportion of incident patients known to nephrology services for 3 months or more prior to initiation (planned initiation).

12. Proportion of planned initiations with established access or pre-emptive transplantation.
13. Inpatient/outpatient status of planned initiations.
14. Mean eGFR at start of renal replacement therapy
15. Units should have a register of patients with End of Life Care needs, including those patients undergoing conservative kidney management, those deteriorating despite dialysis, and those withdrawing from dialysis. The register should link with primary care End of Life Registers.
16. The number of patients with Stage 5 CKD who are undergoing conservative kidney management - as a proportion of all patients with Stage 5 CKD
17. The number of patients withdrawing from dialysis as a proportion of all deaths on dialysis.
18. The proportion of those patients identified as having End of Life Care needs who have a workable Advance Care Plan, which includes details of the nominated renal Key-Worker, patient preferences and choices with respect to priorities of care, and details of the individual needs of carers.
19. The proportion of all expected in-patient deaths in which the Integrated (Liverpool) Care Pathway for care of the dying has been utilised.
20. Units should participate in National End of Life Care audits such as the Integrated (Liverpool) Care Pathway: National care of the dying audit - hospitals.

Audit Measures for the Clinical Practice Guideline on the Assessment of the Potential Kidney Transplant Recipient

1. The proportion of patients with and without diabetes mellitus < 65 years old with CKD stage 5 listed for transplantation.
2. The proportion of transplant patients who receive a living donor transplant.
3. The time to placement on the UK Transplant national transplant list in relation to start date of dialysis.
4. The proportion of living donor transplant recipients transplanted before starting dialysis.
5. A comparison between renal units of the proportion of dialysis patients placed on the national transplant list corrected for differences in identified unit and patient specific variables including co-morbidity.
6. The proportion of CKD stage 5 patients with a transplant status recorded.
7. The proportion of CKD stage 5 dialysis patients with Type 1 diabetes mellitus listed for simultaneous kidney-pancreas transplantation.
8. The proportion of patients who smoke (or have given up within the last year)
 - a) while listed for transplantation
 - b) one year after renal transplantation.
9. The number of patients with BMI >40 kg/m² who are on the transplant waiting list and the reason for their inclusion.
10. The proportion of patients on the transplant waiting list whose viral status is known for CMV, EBV, VZV, hepatitis B and C and HIV.
11. The proportion of VZV and HBc antibody negative patients on the transplant waiting list who have been immunised against these viruses.

Audit Measures for the Clinical Practice Guideline on Vascular Access for Haemodialysis

1. 65% of all incident haemodialysis patients should commence dialysis with an arteriovenous fistula.
2. 85% of all prevalent patients on haemodialysis should receive dialysis via a functioning arteriovenous fistula.
3. The annual Staphylococcus aureus bacteraemia rate in the prevalent haemodialysis population should be less than 2.5 episodes per 100 HD patients and less than 1.0 for MRSA over 2 years.
4. Proportion of all patients with urgent access related complications treated according to locally agreed protocols by the multidisciplinary team.

Audit Measures for the Clinical Practice Guideline on Haemodialysis

1. The distance and travel time between the patient's home and the nearest satellite or main haemodialysis unit
2. The waiting time after arrival before starting dialysis and the waiting time for patient transport after the end of haemodialysis
3. The number of haemodialysis patients in the main renal unit and its satellite units expressed per million catchment population
4. The number of haemodialysis stations in the main renal unit and its satellite units expressed as a ratio of the total number of HD patients
5. The proportion of patients in the main renal unit and its satellite units who are on twice weekly haemodialysis
6. Cumulative frequency curves of urea reduction ratio measured using a standard method of post-dialysis sampling
7. The proportion of patient non-attendances for haemodialysis sessions and the proportion of dialysis sessions shortened at the patient's request
8. The proportion of thrice weekly haemodialysis sessions which have prescribed treatment times less than 4 hours
9. The proportion of hospital (main and satellite unit) and home haemodialysis patients who are prescribed more frequent than thrice weekly haemodialysis
10. Cumulative frequency curves of pre-dialysis serum potassium concentration
11. Cumulative frequency curves of pre-dialysis serum calcium and phosphate concentrations
12. Cumulative frequency curves of pre-dialysis haemoglobin concentration
13. The incidence of symptomatic hypotensive episodes during dialysis sessions
14. The proportion of haemodialysis patients who have ultrafiltration rates in excess of 10ml/kg/hour
15. The proportion of dialysis patients in the main renal unit and its satellite units who are on home haemodialysis

Audit Measures for Clinical Practice Guideline on Peritoneal Access

1. Catheter patency - more than 80% of catheters should be patent at 1 year (censoring for death and elective modality change).
2. Complications following PD catheter insertion -

Bowel perforation < 1%

Significant haemorrhage <1%

Exit site infection within 2 weeks of catheter insertion <5%

Peritonitis within 2 weeks of catheter insertion <5%

Functional catheter problem requiring manipulation or replacement or leading to technique failure <20%

Audit Measures for Clinical Practice Guidelines on Peritoneal Dialysis

1. Availability of modality choice
2. Monitoring of modality switching
3. Patient to peritoneal dialysis nursing staff ratio
4. Availability of assisted PD, utilisation and outcomes
5. Systems in place to check medical equipment
6. Systems in place to ensure purchase of dialysis fluid fulfil legal requirements
7. Use of non-standard systems with documentation of clinical indication
8. Use of biocompatible solutions and indication for use
9. Audit of care pathway for dialysis preparation to include information given (including proportion of patients offered PD), when and who delivers it.
10. Audit of information on modality options provided to patients presenting who urgently require RRT, and both initial and subsequent modality of RRT selected by these patients.
11. Audit of care pathway for catheter insertion to include timeliness and need for temporary haemodialysis
12. Catheter complications and their resolution
13. Frequency of solute clearance (residual and peritoneal) estimation
14. Cumulative frequency curves for the total solute clearance
15. Frequency of measurement of membrane function, residual urine and peritoneal ultrafiltration volume
16. Identify patients with fluid reabsorption in long dwell
17. Number of patients regularly requiring hypertonic (3.86% glucose) exchanges to maintain fluid balance
18. Identify patients with a total fluid removal <750 ml per day.
19. Routine annual audit of infection prevention strategies
20. Routine annual audit of PD peritonitis rates (including proportion of culture negative cases)
21. Routine annual audit of infection outcomes
22. Cumulative frequency curves of plasma bicarbonate
23. Processes in place to increase awareness of interference of assays by icodextrin metabolites

Audit Measures for the Clinical Practice Guideline on Post-operative Care of the Kidney Transplant Recipient

1. Proportion of blood results available for review, and reviewed, within 24 hours.
2. Proportion of units with a written follow-up schedule available to all staff and patients.
3. Percentage of patients accessing their results through Renal Patient View.
4. Percentage of total patients assessed in an annual review clinic.
5. Percentage of total patients receiving induction with ILRAs and TDAs
6. Percentage of de novo KTRs receiving tacrolimus.
7. Percentage of de novo KTRs receiving MPA based immunosuppression.
8. Percentage of de novo KTRs receiving corticosteroid maintenance therapy.
9. Use of generic agents.

10. Severity of biopsy proven acute rejection (BPAR) recorded by BANFF criteria.
11. Percentage of KTRs with BPAR in first 3 months and first 12 months.
12. Percentage of KTRs requiring TDAs to treat rejection in first year.
13. Complication rates after renal transplant biopsy.
14. Proportion of patients receiving a target blood pressure of 130/80mmHg or 125/75mmHg in the presence of proteinuria (PCR>100 or ACR>70).
15. Proportion of patients receiving an ACE inhibitor or angiotensin receptor blocker.
16. Proportion of patients with proteinuria assessed by dipstix and, if present, quantified at each clinic visit.
17. Proportion of renal transplant recipients with an annual fasting lipid profile.
18. Proportion of RTR taking statins (including the type of statin) for primary and secondary prevention of premature cardiovascular disease.
19. Proportion of patients on other lipid lowering agents.
20. Proportion of patients achieving dyslipidaemia targets.
21. Incidence of new onset diabetes after transplantation (NODAT) at three months and at annual intervals thereafter.
22. Proportion of patients who require insulin, and in whom remedial action is undertaken – minimisation of steroids and switching of CNIs.
23. Proportion of patients with ischaemic heart disease.
24. Proportion of patients suffering myocardial infarction.
25. Proportion of patients undergoing primary revascularisation.
26. Proportion of patients receiving secondary prevention with a statin, anti-platelet agents and RAS blockers.
27. Proportion of patients who are obese.
28. Proportion of patients having screening procedures for neoplasia at the annual review clinic.
29. Incidence of CMV disease.
30. Rate of EBV infection and PTLD.
31. Completeness of records for EBV donor and recipient serology.
32. Rates of primary VZV and shingles infection.
33. Completeness of records for VZV recipient serology.
34. Rates and outcomes of HSV infections.
35. Rates of BK viral infection in screening tests.
36. Rates and outcomes of BK nephropathy.
37. Frequency of bisphosphonate use.
38. Incidence of fractures.
39. Incidence of hyperparathyroidism.
40. Incidence of parathyroidectomy.
41. Use of cinacalcet.
42. Frequency of hyperuricaemia and gout.
43. Prevalence of anaemia.
44. Prevalence of polycythaemia.
45. Pregnancy rates and outcomes.
46. Prevalence of sexual dysfunction.

Audit Measures for the Clinical Practice Guideline on Acute Kidney injury (AKI)

It is recommended that the following audit measures are recorded for **all** patients diagnosed with acute kidney injury. However it is recognised that it may only be

possible for renal units to record these audit measures for patients that have been referred for a renal specialist opinion.

The Renal Association encourages other specialties to record these audit measures for all patients diagnosed with AKI irrespective of whether or not they are referred to renal services. From a pragmatic point of view in terms of available resources it is proposed that other specialties initially collect data on patients with AKI stage 3. Once a robust data collection system has been established an incremental collection of data extending to AKI stage 2 and then AKI stage 1 could follow.

1. Incidence and outcomes of patients diagnosed with:

- community-acquired AKI
- hospital acquired AKI

2. Incidence and outcomes of patients with different causes of AKI

3. Incidence of acute admissions/patients undergoing major surgery who had:

- the risk of AKI assessed on admission/pre-surgery
- electrolytes checked on admission/pre-surgery and rechecked within 24 hours

4. Proportion of patients who had a urinalysis performed within 24 hours of the diagnosis of AKI unless anuric

5. Proportion of patients where there has been a delay of >48 hours in recognising the diagnosis of AKI

6. Proportion of patients developing AKI secondary to obstruction who had a renal ultrasound examination < 24 hrs after a diagnosis of AKI established

7. Proportion of patients with or at risk of AKI who are prescribed intravenous fluids without an assessment of volume status

8. Proportion of patients with AKI who did not have the appropriate adjustment of medication doses

9. Proportion of patients with or at risk of AKI who receive nephrotoxic medications

10. Proportion of patients at high risk of contrast induced AKI (CI-AKI) who developed AKI and did not:

- receive pre-procedure volume assessment
- receive appropriate volume expansion
- have appropriate adjustments to medications

11. Proportion of patients with severe AKI where there is documented evidence of patient involvement in decision making with respect to commencing renal replacement therapy (RRT)

12. Incidence of delays of transfer of patients with AKI >24 hours following referral to renal services due to a lack of resources on renal unit

13. Incidence of patients with single organ AKI admitted to ICU for RRT due to a lack of resources on the renal unit

14. Number of AKI inpatient transfers requiring escalation of care within 24 hours of arrival on renal unit

15. Incidence of dialysis catheter-related bacteraemia and sepsis in patients with AKI

16. Incidence of heparin induced thrombocytopenia

17. Proportion of critically ill patients with AKI treated with alternate day haemodialysis who receive $eKt/V \geq 1.2$ per session
18. Proportion of critically ill patients with AKI treated with continuous renal replacement therapy who receive > 25 mls/kg/hr post dilution ultrafiltration
19. Proportion of patients with AKI receiving renal replacement therapy reviewed by dietician within 24 hours
20. Proportion of patients with AKI receiving renal replacement therapy prescribed the recommended nutritional support
21. Proportion of patients with AKI who recover kidney function within 90 days of episode as defined by:
 - return of serum creatinine to within 20% of baseline value (most recent value within 3 months but accepting value up to one year)
 - dialysis independence (if previously requiring dialysis)
22. Proportion of AKI survivors with residual chronic kidney disease with post-discharge CKD planning
23. Proportion of AKI survivors who are given information on the cause of AKI and how this might be avoided in the future
24. Outcome measures for patients developing AKI should include:
 - length of hospital stay
 - hospital mortality
 - 90 day mortality
 - one year mortality