Clinical Guidelines
for the State of Qatar

The assessment and management of chronic kidney disease in adults

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The assessment and management of chronic kidney disease in adults
(Date of next revision: March 2019)
1 Information about this guideline

1.1 Objective and purpose of the guideline
The purpose of this guideline is to define the appropriate diagnosis and management of chronic kidney disease in adults. The objective is to improve appropriate investigation, prescribing, and referral of patients presenting to provider organisations in Qatar. It is intended that the guideline will be used primarily by physicians in primary/generalist care and secondary/specialist care settings.

1.2 Scope of the guideline
Aspects of care included within the scope of the guideline are:

- The management approach to CKD in adults (aged 18 years and over), including the diagnosis, investigation, classification, and management of all stages of chronic kidney disease (CKD).

Aspects of care not included in this guidelines are:

- Screening for chronic kidney disease.
- Chronic kidney disease in pregnancy.
- Acute kidney injury (AKI)
- The detailed investigation or management of any underlying cause for CKD, e.g.:
  - Polycystic kidneys.
  - Post-renal obstruction.
  - Structural kidney disease.
  - Diabetes.
  - Hypertension.
- Specialist management of patients with renal transplant or dialysis.

1.3 Editorial approach
This guideline document has been developed and issued by the Ministry of Public Health of Qatar (MOPH), through a process which aligns with international best practice in guideline development and localisation. The guideline will be reviewed on a regular basis and updated to incorporate comments and feedback from stakeholders across Qatar.

The editorial methodology, used to develop this guideline, has involved the following critical steps:

- Extensive literature search for well reputed published evidence relating to the topic.
- Critical appraisal of the literature.
- Development of a draft summary guideline.
- Review of the summary guideline with a Guideline Development Group, comprised of practising physicians and subject matter experts from across provider organisations in Qatar.
- Independent review of the guideline by the Clinical Governance body appointed by the MOPH, from amongst stakeholder organisations across Qatar.

Explicit review of the guideline by patient groups was not undertaken.

Whilst the MOPH has sponsored the development of the guideline, the MOPH has not influenced the specific recommendations made within it.

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1.4 Sources of evidence

The professional literature published in the English language has been systematically queried using specially developed, customised, and tested search strings. Search strategies are developed to allow efficient yet comprehensive analysis of relevant publications for a given topic and to maximise retrieval of articles with certain desired characteristics pertinent to a guideline.

For each guideline, all retrieved publications have been individually reviewed by a clinical editor and assessed in terms of quality, utility, and relevance. Preference is given to publications that:

1. Are designed with rigorous scientific methodology.
2. Are published in higher-quality journals (i.e., journals that are read and cited most often within their field).
3. Address an aspect of specific importance to the guideline in question.

Where included, the ‘goal length of stay’ stated within this guideline is supported by and validated through utilisation analysis of various international health insurance databases. The purpose of database analysis is to confirm the reasonability and clinical appropriateness of the goal, as an achievable benchmark for optimal duration of inpatient admission.

1.5 Evidence grading and recommendations

Recommendations made within this guideline are supported by evidence from the medical literature and where possible the most authoritative sources have been used in the development of this guideline. In order to provide insight into the evidence basis for each recommendation, the following evidence hierarchy has been used to grade the level of authoritativeness of the evidence used, where recommendations have been made within this guideline.

Where the recommendations of international guidelines have been adopted, the evidence grading is assigned to the underlying evidence used by the international guideline. Where more than one source has been cited, the evidence grading relates to the highest level of evidence cited:

- **Level 1 (L1):**
  - Meta-analyses.
  - Randomised controlled trials with meta-analysis.
  - Randomised controlled trials.
  - Systematic reviews.

- **Level 2 (L2):**
  - Observational studies, examples include:
    - Cohort studies with statistical adjustment for potential confounders.
    - Cohort studies without adjustment.
    - Case series with historical or literature controls.
    - Uncontrolled case series.
  - Statements in published articles or textbooks.

- **Level 3 (L3):**
  - Expert opinion.
  - Unpublished data, examples include:
    - Large database analyses.
    - Written protocols or outcomes reports from large practices.
In order to give additional insight into the reasoning underlying certain recommendations and the strength of recommendation, the following recommendation grading has been used, where recommendations are made:

- **Recommendation Grade A1 (RG A1):** Evidence demonstrates at least moderate certainty of at least moderate net benefit.
- **Recommendation Grade A2 (RG A2):** Evidence demonstrates a net benefit, but of less than moderate certainty, and may consist of a consensus opinion of experts, case studies, and common standard care.
- **Recommendation Grade B (RBG):** Evidence is insufficient, conflicting, or poor and demonstrates an incomplete assessment of net benefit vs harm; additional research is recommended.
- **Recommendation Grade C1 (RG C1):** Evidence demonstrates a lack of net benefit; additional research is recommended.
- **Recommendation Grade C2 (RG C2):** Evidence demonstrates potential harm that outweighs benefit; additional research is recommended.
- **Recommendation of the GDG (RG GDG):** Recommended best practice on the basis of the clinical experience of the Guideline Development Group members.

### 1.6 Guideline Development Group members

The following table lists members of the Guideline Development Group (GDG) nominated by their respective organisations and the Clinical Governance Group. The GDG members have reviewed and provided feedback on the draft guideline relating to the topic. Each member has completed a declaration of conflicts of interest, which has been reviewed and retained by the MOPH.

<table>
<thead>
<tr>
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<th>Title</th>
<th>Organisation</th>
</tr>
</thead>
<tbody>
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</tr>
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</table>

¹ Dr Ahmed Babiker attended the MOPH in his capacity as a Clinical Pharmacist and advisor on the availability of medications in Qatar.

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1.7 Responsibilities of healthcare professionals
This guideline has been issued by the MOPH to define how care should be provided in Qatar. It is based upon a comprehensive assessment of the evidence as well as its applicability to the national context of Qatar. Healthcare professionals are expected to take this guidance into account when exercising their clinical judgement in the care of patients presenting to them.

The guidance does not override individual professional responsibility to take decisions which are appropriate to the circumstances of the patient concerned. Such decisions should be made in consultation with the patient, their guardians, or carers and should consider the individual risks and benefits of any intervention that is contemplated in the patient’s care.

1.8 Abbreviations used in this guideline
The abbreviations used in this guideline are as follows:

<table>
<thead>
<tr>
<th>Abbreviation</th>
<th>Description</th>
</tr>
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<tbody>
<tr>
<td>aAPD</td>
<td>Assisted automated peritoneal dialysis</td>
</tr>
<tr>
<td>ACC / AHA</td>
<td>American College of Cardiology / American Heart Association</td>
</tr>
<tr>
<td>ACR</td>
<td>Albumin:creatinine ratio</td>
</tr>
<tr>
<td>AKI</td>
<td>Acute kidney injury</td>
</tr>
<tr>
<td>APD</td>
<td>Automated peritoneal dialysis</td>
</tr>
<tr>
<td>ASCVD</td>
<td>Atherosclerotic cardiovascular disease</td>
</tr>
<tr>
<td>BMI</td>
<td>Body mass index</td>
</tr>
<tr>
<td>BP</td>
<td>Blood pressure</td>
</tr>
<tr>
<td>CAPD</td>
<td>Continuous ambulatory peritoneal dialysis</td>
</tr>
<tr>
<td>CKD</td>
<td>Chronic kidney disease</td>
</tr>
<tr>
<td>CKD-EPI</td>
<td>Chronic Kidney disease Disease Epidemiology Collaboration</td>
</tr>
<tr>
<td>eGFR</td>
<td>Estimated glomerular filtration rate</td>
</tr>
<tr>
<td>eGFRcreat</td>
<td>Creatinine-based estimated glomerular filtration rate</td>
</tr>
<tr>
<td>eGFRcys</td>
<td>CystatinC-based estimated glomerular filtration rate</td>
</tr>
<tr>
<td>ESRD</td>
<td>End-stage renal disease</td>
</tr>
<tr>
<td>GFR</td>
<td>Glomerular filtration rate</td>
</tr>
<tr>
<td>HbA1c</td>
<td>Glycated haemoglobin level</td>
</tr>
<tr>
<td>KDIGO</td>
<td>Kidney Disease Improving Global Outcomes Group</td>
</tr>
<tr>
<td>NSAIDs</td>
<td>Non-steroidal anti-inflammatory drugs</td>
</tr>
<tr>
<td>PCR</td>
<td>Protein:creatinine ratio</td>
</tr>
<tr>
<td>PCV13</td>
<td>13-valent Pneumococcal conjugate vaccine</td>
</tr>
<tr>
<td>PPCV23</td>
<td>23-valent Pneumococcal polysaccharide vaccine</td>
</tr>
<tr>
<td>RBC</td>
<td>Red blood cell count</td>
</tr>
<tr>
<td>RCC</td>
<td>Renal cell carcinoma</td>
</tr>
<tr>
<td>RRT</td>
<td>Renal replacement therapy</td>
</tr>
<tr>
<td>SLE</td>
<td>Systemic lupus erythematosus</td>
</tr>
</tbody>
</table>
2 Organisation of care in Qatar

2.1 Role of the Ministry of Public Health
The Ministry of Public Health of Qatar (MOPH) has been given the responsibility to guide reform in Qatar in order to establish one of the world’s most admired and renowned healthcare systems. The MOPH’s role is to create a clear vision for the nation’s health direction, set goals and objectives for the country, design policies to achieve the vision, regulate the medical landscape, protect the public’s health, set the health research agenda, and monitor and evaluate progress towards achieving those objectives.

The MOPH has the dual mandate to develop policies and programmes to improve the people’s health so that they may enjoy longer and more productive lives, and to lay the foundation for a vibrant country for decades to come.

The MOPH does not provide clinical services. Instead its goal is to vest responsibility for care in the hands of both public and private sector healthcare institutions, whilst regulating, monitoring, and evaluating this care against agreed upon outcomes. The MOPH is committed to establishing an environment that promotes quality and wellness through policies in such areas as public health, health insurance, information technology, licensure and credentialing; and continuing medical education.

2.2 Provision of care
Healthcare provision in Qatar comprises of the following main entities:

- **Public Sector:**
  - Primary care health centres - provided by the Primary Health Care Corporation of Qatar.
  - Secondary and tertiary care hospitals and outpatient clinics - provided by the Hamad Medical Corporation (HMC).
  - Paediatric Emergency Care provided by specialist Paediatric Emergency Centres within HMC.
  - QP Clinics for personnel and families of Qatar Petroleum.
  - Sports Medicine centre provided by a specialist Sport Medicine Hospital – Aspetar.
  - Ministry of Interior clinics for personnel and families of Qatar’s police services.
  - Ministry of Defence clinics for personnel and families of Qatar’s armed forces.
  - Specialist obstetric, gynaecological and paediatric care provided by Sidra Medical & Research Center.

- **Private sector:**
  - A range of single-handed generalist and specialist clinics.
  - Polyclinics.
  - Specialist hospitals.

The aim of the MOPH’s National Health Strategy is to rebalance healthcare delivery with a greater emphasis on primary and community care and an expansion of the role played by the private sector.
3  Key recommendations of the guideline

The key recommendations of this guideline are:

Blood pressure management:
- In patients with CKD, with or without diabetes mellitus, and an ACR of < 3 mg/mmol, aim to keep the BP at the following levels [2]:
  - Systolic BP ≤ 140 mmHg; and diastolic BP ≤ 90 mmHg.
- In patients with CKD, with or without diabetes mellitus, and an ACR of ≥ 3 mg/mmol, aim to keep the BP at the following levels [2]:
  - Systolic BP ≤ 130 mmHg; and diastolic BP ≤ 80 mmHg.
- Treatment with a renin-angiotensin antagonist is indicated in the following patients with CKD [2]:
  - Patients with diabetes mellitus with a urinary ACR of 3-30 mg/mmol.
  - Non-diabetic hypertensive patients and a urinary ACR of ≥ 3 mg/mmol.

Lipid management:
- Initiate statin therapy in the following patients [17,18]:
  - All patients with established ASCVD.
  - All patients aged ≥ 50 years with an eGFR < 60 mL/min/1.73m², but not treated with dialysis or kidney transplantation.
  - All patients aged ≥ 50 years with an eGFR ≥ 60 mL/min/1.73m², but who have albuminuria or other manifestations of CKD (e.g. polycystic kidney disease).
  - All patients aged < 50 years with CKD and a 10-year ASCVD risk of > 7.5% (assessed using ACC/AHA Pooled Cohort Equations).
  - All patients aged > 18 years with CKD and diabetes mellitus.

Antiplatelet therapy:
- Antiplatelet therapy is indicated in the following patients [2,18]:
  - All patients with established ASCVD.
  - All patients with CKD who at risk of ASCVD, unless there is an increased bleeding risk that needs to be balanced against the possible cardiovascular benefits.

Monitoring patients with CKD:
- See Section 7.6 for recommendations on the frequency of monitoring by stage of CKD.
- Monitor for progression of CKD [2]:
  - Progression of CKD is defined as a fall in eGFR category accompanied by a ≥ 25% decline in eGFR from baseline.
  - Rapid progression is defined by a sustained decline in eGFR of > 5 mL/min/1.73m² within one year.
- Monitor and treat complications, including [2,12,20]:
  - Renal anaemia.
  - Undernutrition.
  - Abnormalities of bone metabolism

Referral to nephrology:
- See Section 7.8 for criteria for routine and urgent referral to nephrology.
Specialist management:
- Patients with progressive CKD should be managed in a multidisciplinary care setting with a interdisciplinary team [2,3].

Renal replacement therapy:
- Patients with ESRD who are likely to need RRT within 6 months should referred urgently to receive education and information, and to prepare for RRT [R-GDG].
- There is no good evidence for the superiority of one RRT option over another [24,25].
- Decisions on which intervention to use will depend upon patient preferences, availability, and clinical contraindications [24,25].

Renal transplant:
- Renal transplantation should be the RRT of choice for patients with ESRD who are fit for renal transplant [27][L2, RGA2].
- Consideration for renal transplant should be addressed on an individualised basis [R-GDG].

Peritoneal dialysis:
- May be delivered safely and effectively at home or another location of the patient's choice [28].
- Treatment modalities include [28]:
  - Assisted automated peritoneal dialysis (aAPD).
  - Automated peritoneal dialysis (APD).
  - Continuous ambulatory peritoneal dialysis (CAPD).

Conservative management:
- Conservative kidney management should be provided to patients with advanced CKD who opt not to have dialysis [2,24].

Palliative care:
- Recognise patients struggling to cope on long term dialysis due to a deterioration of underlying clinical problems or a sudden catastrophic clinical event. Either may indicate an imminent or immediate need of end of life care [24][L2, RGA2].
- Decisions to discontinue dialysis should be made jointly by the patients and their consultant and should involve relatives and carers and other members of the team [24][L2, RGA2].
4 Background information

4.1 Definition
Chronic kidney disease (CKD) is defined as:

- Abnormalities of kidney structure or function, present for more than 3 months, with implications for health [1-3].

Criteria for CKD (any of the following present for more than 3 months) [2,3]:
- Markers of kidney damage (one or more):
  - Albuminuria (albumin:creatinine ratio (ACR) ≥ 3 mg/mmol).
  - Urine sediment abnormalities.
  - Electrolyte and other abnormalities due to tubular disorders.
  - Abnormalities detected by histology.
  - Structural abnormalities detected by imaging.
  - History of kidney transplantation.
- Decreased GFR:
  - GFR < 60 mL/min/1.73m² (GFR categories G3a-G5).

4.2.1 Epidemiology
Incidence and prevalence in Qatar [4,5]:
- Diabetes mellitus, hypertension, and CKD are major emerging epidemics.
- The incidence of end-stage renal disease (ESRD) is 202 patients/million/year.
- The prevalence of ESRD is 624 patients/million.
- Diabetic nephropathy is the commonest cause of ESRD (48%), followed by primary glomerulonephritis and hypertensive glomerulonephropathy.

4.3 Staging
To identify the rate of progression in a newly diagnosed CKD patient, it is recommended to obtain a minimum of three eGFR measurements over a period of not less than 90 days [1][L2]:
- If a large and unexplained fall in eGFR is observed, more frequent monitoring is needed.

Staging of CKD [1,6]:
- Staging of CKD is based upon the 5 stages of GFR as well as the 3 categories of albuminuria.
- An increased risk of adverse outcomes is associated with increased ACR and decreased GFR.
- Increased ACR and decreased GFR in combination multiply the risk of adverse outcomes.

GFR categories [1]:

<table>
<thead>
<tr>
<th>Category</th>
<th>Description</th>
<th>GFR</th>
</tr>
</thead>
<tbody>
<tr>
<td>G1</td>
<td>Normal or increased GFR</td>
<td>≥ 90 mL/min/1.73m²</td>
</tr>
<tr>
<td>G2</td>
<td>Mild reduction</td>
<td>60-89 mL/min/1.73m²</td>
</tr>
<tr>
<td>G3a</td>
<td>Mild to moderate reduction</td>
<td>45-59 mL/min/1.73m²</td>
</tr>
<tr>
<td>G3b</td>
<td>Moderate to severe reduction</td>
<td>30-44 mL/min/1.73m²</td>
</tr>
<tr>
<td>G4</td>
<td>Severe reduction</td>
<td>15-29 mL/min/1.73m²</td>
</tr>
<tr>
<td>G5</td>
<td>Established renal failure</td>
<td>&lt; 15 mL/min/1.73m²</td>
</tr>
</tbody>
</table>

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ACR categories [1]:

<table>
<thead>
<tr>
<th>Category</th>
<th>Description</th>
<th>ACR</th>
</tr>
</thead>
<tbody>
<tr>
<td>A1</td>
<td>Normal to mildly increased ACR</td>
<td>&lt; 3 mg/mmol</td>
</tr>
<tr>
<td>A2</td>
<td>Moderately increased ACR</td>
<td>3-30 mg/mmol</td>
</tr>
<tr>
<td>A3</td>
<td>Severely increased ACR</td>
<td>&gt; 30 mg/mmol</td>
</tr>
</tbody>
</table>

4.4 **Natural history**

Causes of CKD include [1]:

- Conditions associated with intrinsic kidney disease, e.g.:
  - Hypertension.
  - Diabetes mellitus.
  - Glomerulonephritis.
- Conditions associated with urinary outflow obstruction, e.g.:
  - Structural renal tract disease.
  - Recurrent renal calculi.
  - Prostatic hypertrophy.
- Nephrotoxic drugs, e.g.:
  - Non-steroidal anti-inflammatory drugs (NSAIDs).
  - Lithium.
- Multi-system diseases that may involve the kidney:
  - Systemic Lupus Erythematosus (SLE).
  - Vasculitis.
  - Autosomal dominant polycystic kidney disease.
  - Alport syndrome.

Prognosis [1,7,8]:

- CKD can progress to ESRD in a small but significant number of patients.
- Patients with CKD are 20 times more likely to die of atherosclerotic cardiovascular disease (ASCVD) than progress to ESRD.
- Patients with CKD are at greater risk of ASCVD than their age- and sex-matched contemporaries.
- The GFR and ACR staging categories are used to indicate risk of adverse outcomes, such as [1]:
  - The progression of CKD.
  - AKI.
  - All-cause mortality.
  - Cardiovascular events.
- In predicting risk for outcome of CKD, identify the following variables [2,3]:
  - Cause of CKD.
  - GFR category.
  - Albuminuria category.
  - Other risk factors and comorbid conditions.
  - Estimated risk of concurrent complications and future outcomes should be used to guide decisions for testing and treatment for CKD complications.
### Prognosis of CKD by GFR and Albuminuria Categories: KDIGO 2012

<table>
<thead>
<tr>
<th>Persistent albuminuria categories Description and range</th>
<th>A1</th>
<th>A2</th>
<th>A3</th>
</tr>
</thead>
<tbody>
<tr>
<td>Normal to mildly increased</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Moderately increased</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Severely increased</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>&lt;3 mg/mmol</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3-30 mg/mmol</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>&gt;30 mg/mmol</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>GFR categories (ml/min/1.73 m²)</th>
<th>G1</th>
<th>G2</th>
<th>G3a</th>
<th>G3b</th>
<th>G4</th>
<th>G5</th>
</tr>
</thead>
<tbody>
<tr>
<td>Description and Range</td>
<td>Normal or high</td>
<td>60-89</td>
<td>Mildly to moderately decreased</td>
<td>45-59</td>
<td>15-29</td>
<td>Kidney failure</td>
</tr>
<tr>
<td>Range</td>
<td>≥90</td>
<td>60-89</td>
<td>45-59</td>
<td>30-44</td>
<td>15-29</td>
<td>&lt;15</td>
</tr>
<tr>
<td>Green: Low risk (if no other markers of kidney disease, no CKD); Yellow: Moderately increased risk; Orange: High risk; Red: Very high risk.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Table 4.4:** Prognosis of CKD by GFR and albuminuria categories from KDIGO 2012 Guideline [2,3] ('Risk' relates to the risk of poor prognosis and outcomes).

### 4.5 Higher risk groups
Risk factors for developing CKD include [1,3]:
- Diabetes mellitus.
- Hypertension.
- ASCVD.
- Obesity with metabolic syndrome.
- History of AKI.
- Use of nephrotoxic medication.
- Recurrent renal calculi.
- Structural renal tract disease, including untreated urinary outflow tract obstruction and prostatic hypertrophy.
- A family history of ESRD or hereditary kidney disease.
- Multisystem diseases with potential kidney involvement – e.g., systemic lupus erythematosus.

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5 Presentation

CKD is usually:
- Asymptomatic in earlier stages [1,2].
- Detected as a consequence of screening or monitoring of high-risk patients, e.g. patients with [1]:
  - Diabetes mellitus.
  - Hypertension.
  - Opportunistic detection of haematuria or proteinuria.

Symptoms are usually due to complications of decreased kidney function [2] but may also be due to co-morbid conditions [9].

A presentation with specific symptoms associated with CKD is rare. Where this occurs, the manifestations can include [1]:
- Oedema secondary to salt and fluid retention.
- Lethargy and fatigue, often exacerbated by anaemia.
- Nausea and vomiting can occur with advanced CKD – Stage 5.
- Overt uraemia, e.g. encephalopathy, neuropathy, or pericarditis, in a patient not known to have CKD is very rare.

6 Investigations

6.1 Initial tests for CKD

Offer testing for CKD using eGFR and ACR to patients with any of the following risk factors [1,2][L2, RGA2]:
- Diabetes mellitus.
- Hypertension.
- History of AKI.
- ASCVD – includes those with ischaemic heart disease, chronic heart failure, peripheral vascular disease, or cerebral vascular disease.
- Structural renal disease.
- Recurrent renal calculi.
- Prostatic hypertrophy.
- Multisystem diseases that may affect kidneys – e.g. SLE.
- Family history of ESRD or hereditary kidney disease.
- Nephrotoxic drugs.
- Incidental detection of haematuria.

It is not recommended to use age, gender, or ethnicity as risk markers to test patients for CKD. It is not recommended to use obesity alone as a risk marker to test patients for CKD in the absence of a metabolic syndrome, diabetes mellitus, or hypertension [1][L2, RGA2].

6.1.1 Estimated glomerular filtration rate (eGFR)

Serum creatinine is usually used to calculate eGFR [1][L2, RGA1]:
- Use the CKD Disease Epidemiology Collaboration (CKD-EPI) creatinine equation to estimate GFR.

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Always compare creatinine and eGFR with baseline measures, where available [8].

The reliability of eGFR may be reduced and results should be interpreted with caution in patients with the following [1]:

- AKI
- Pregnancy.
- Oedematous states.
- Extremes of muscle mass, e.g.:
  - In bodybuilders.
  - In patients with muscle wasting disorders or amputation.
  - NB: Reduced muscle mass will lead to overestimation, and increased muscle mass to underestimation, of the GFR.
- Malnourishment.
- Certain ethnic groups:
  - eGFR has not been well validated in certain ethnic groups, e.g. in people of South Asian family origin.
  - Multiply the eGFR by 1.159 if a patient is of African-Caribbean or of African ethnicity when using the CKD-EPI creatinine equation [1].

### 6.1.1.1 Cautions in interpretation of eGFR

Consider the following factors, which may influence interpretation of eGFR [1][L2, RGA2]:

- Interpret reported values of eGFR of ≥ 60 mL/min/1.73m² with caution – because:
  - As the true GFR increases, eGFR becomes less accurate.
- If the eGFR is > 90 mL/min/1.73m², an increase in serum creatinine concentration of > 20% indicates a significant reduction in kidney function.
- When interpreting changes in the eGFR, allow for a +/-5% variability of serum creatinine.
- If eGFR is < 60 mL/min/1.73m² in a patient not previously tested and AKI is not suspected, repeat the eGFR within 2 weeks to exclude analytical and biological causes of variation.
  - Timing of repeat testing depends on clinical judgement and more urgent action may be required if AKI is suspected [1,2].

NB: If there is doubt about whether a patient has worsening CKD or acute-onset CKD, it should be considered acute and managed appropriately [R-GDG].

### 6.1.1.2 CystatinC-based eGFR

CystatinC-based estimate of glomerular filtration rate (eGFRcys)[1]:

- Is an alternative and more accurate marker for CKD than creatinine-based eGFR (eGFRcreat).
- Consider using eGFRcys at the initial diagnosis to confirm or exclude CKD in patients with [1,2][L2, RGA2]:
  - An eGFRcreat of 45-59 mL/min/1.73m² sustained for at least 90 days; and
  - No proteinuria (i.e. an ACR < 3 mg/mmol), or any other marker of kidney disease.
- Interpret eGFRcys with caution in patients with uncontrolled thyroid disease [1]:
  - Hypothyroidism may lead to falsely elevated values, and levels may be reduced in patients with hyperthyroidism.
- A diagnosis of CKD is not confirmed in patients with the following [1][L2, RGA2]:
  - An eGFRcreat of 45-59 mL/min/1.73m²; and
  - An eGFRcys of > 60 mL/min/1.73m²; and
  - No other marker of kidney disease.
6.1.2 Assess for proteinuria
Measure urinary ACR (or urinary protein loss) in the following groups of patients [1]:
- Patients with diabetes mellitus.
- If there is a strong suspicion of CKD in the following patients:
  - Patients with an eGFR of $< 60$ mL/min/1.73m$^2$.
  - Patients with an eGFR of $\geq 60$ mL/min/1.73m$^2$.

If the urinary ACR is [1]:
- $3$-$70$ mg/mmol:
  - Confirm with a subsequent early morning sample to determine if the abnormality is persistent.
- $\geq 70$ mg/mmol:
  - There is no need to repeat the test, as this is considered to be significant proteinuria and requires referral to a nephrologist.
- NB: Regard a confirmed ACR of $\geq 3$ mg/mmol as clinically important.

Use the urinary ACR in preference to the protein:creatinine ratio (PCR) [1,2][L2, RGB]:
- It has a greater sensitivity for low levels of proteinuria.
- For quantification and monitoring of high levels of proteinuria (i.e. an ACR of $\geq 70$ mg/mmol), PCR can be used as an alternative to ACR.
- ACR is the recommended method for patients with diabetes mellitus.

NB: Reagent strips are not recommended for use as an initial test, as they are unreliable for identifying small amounts of proteinuria and are unable to reliably quantify the degree of proteinuria [1][L2].

6.1.2.1 Cautions in interpretation of ACR
The following conditions can cause variability in measured ACR levels without changes in the level of kidney damage [3]:
- Transient elevation in albuminuria:
  - Menstrual blood contamination.
  - Symptomatic UTI.
  - Exercise.
  - Upright posture (orthostatic proteinuria).
  - Other conditions increasing vascular permeability (e.g. septicaemia).
- Non-renal causes of variability in creatinine excretion:
  - Age (lower in children and older people).
  - Race (lower in Caucasian than black people).
  - Muscle mass (e.g. lower in people with amputations, paraplegia, muscular dystrophy).
  - Gender (lower in women).
- Changes in creatinine excretion:
  - Non-steady state for creatinine (e.g. AKI).
- Other causes of variability:
  - Degradation of albumin before analysis.
  - Intrinsic biological variability.
  - Genetic variability.

6.1.3 Assessing for haematuria
When testing for haematuria [1]:

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• Reagent strips should be used rather than urine microscopy.
• Further evaluation is recommended if there is a result of 1+ or more – use:
  o Urine microscopy and culture.
  o Imaging of the urinary tract.

When assessing haematuria in the absence of proteinuria, persistent haematuria is considered to be present if 2 of 3 dipstick tests show ≥ 1+ of blood [1].

If a patient is found to have isolated microscopic haematuria [1,10,11]:
• Evaluate for UTI.
• Evaluate for urinary tract malignancy in appropriate age groups.
• Repeat testing annually for haematuria, proteinuria, eGFR, and of blood pressure (BP) for as long as the haematuria persists.

6.2 Consider further investigations
Other blood tests may be considered when monitoring for complications, such as [1]:
• Calcium.
• Phosphate.
• Vitamin D.
• Parathyroid hormone.
• Haemoglobin.

Renal ultrasound [12]:
• Is the first imaging study for evaluating previously undiagnosed CKD if clinically indicated.
• Ultrasound differentiates between obstruction and intrinsic parenchymal disease.
• Helps separate chronic ESRD from potentially reversible kidney injury by defining:
  o Renal size.
  o Echogenicity.
  o The presence or absence of hydronephrosis.
  o The presence of cystic renal disease.

Renal ultrasound is recommended for all patients with CKD who also have [1]:
• Accelerated progression of CKD:
  o A sustained fall in eGFR of ≥ 25% and a change in GFR category within 12 months; or
  o A sustained decrease in eGFR of ≥ 15 mL/min/1.73m² per year.
• Frank or persistent microscopic haematuria.
• Urinary tract obstructive symptoms.
• A family history of polycystic kidney disease and the patient is ≥ 20 years old.
• The need for a renal biopsy as determined by a nephrologist.

NB: Patients with a family history of inherited kidney disease should be advised about the implications of an abnormal ultrasound scan result before it is arranged [1].

Further investigation, as directed by a nephrologist, may include [12]:
• Further imaging of the renal tract.
• Renal scintigraphy.
• Percutaneous renal biopsy.

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7 Management

The principles of management of CKD are [1,2]:
- Patient support and education.
- Managing BP and/or proteinuria.
- Managing diabetes mellitus and proteinuria.
- Primary and secondary prevention of ASCVD.
- Monitoring for progression and conditions associated with CKD, such as anaemia.
- Recognising and managing deterioration.
- Managing causes and risk factors for progression.
- Immunisation where appropriate.
- Specialist referral when appropriate.
- Preparing for and managing renal replacement therapy when appropriate.

NB: Do not determine the management of CKD solely on the basis of the patient’s age [1][L1, RGA1].

7.1 Patient support and education

Patient education should consist of information on severity, cause, complications, and prognosis of CKD [13]:
- Psychological aspects such as coping with CKD must be considered. Support groups, counselling, or a specialist nurse are examples of appropriate support.
  - This may include support with:
    - Personal needs.
    - Family.
    - Financial needs.
    - Employment.
    - Social needs.

Lifestyle advice – encourage patients with CKD to [1]:
- Exercise.
- Achieve a healthy weight.
- Stop smoking.

Dietary interventions [1][L1]:
- Offer dietary advice – appropriate to the severity of CKD – about intake of:
  - Potassium.
  - Phosphate.
  - Calories.
  - Salt.
  - Protein.
- Dietary intervention should ensure that malnutrition is prevented by including education, detailed dietary assessment, and supervision.

Self-management:
- Patients with CKD should be informed of their diagnosis and be able to share in decision making about their care [1][L2, RGA2].
- Help and encourage self-management by giving patients access to their medical data, including diagnosis, co-morbidities, test results, treatments, and correspondence [1][L3, RGA2].
- Advise anyone with CKD about the increased risk of AKI if they become acutely ill [R-GDG].

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• Advise patients not to use herbal remedies [2][L2, RGA2]:
  o There is a lack of evidence to support alternative or complementary medicines and these may have nephrotoxic effects.

Consider referral to [10]:
• A physiotherapist if there is a reduction in exercise capacity that impacts the patient's daily life.
• An occupational therapist if there are problems with activities of daily living.
• A dietician for specialist dietary advice, in all patients with an eGFR of <60ml/min/1.73m².

7.2 Management of blood pressure and proteinuria
A reduction in BP reduces the progression of CKD and ASCVD risk [1,2][L1]:
• In patients with CKD, with or without diabetes mellitus, and an ACR of < 3 mg/mmol, aim to keep the BP at the following levels [2]:
  o Systolic BP ≤ 140 mmHg; and Diastolic BP ≤ 90 mmHg.
• In patients with CKD, with or without diabetes mellitus, and an ACR of ≥ 3 mg/mmol, aim to keep the BP at the following levels [2]:
  o Systolic BP ≤ 130 mmHg; and Diastolic BP ≤ 80 mmHg.

Pharmacological management:
Treatment with a renin-angiotensin antagonist is indicated in the following patients with CKD [2]:
• Patients with diabetes mellitus with a urinary ACR of ≥ 3 mg/mmol.
• Non-diabetic hypertensive patients and a urinary ACR of ≥ 3 mg/mmol.
• Hypertensive patients with or without diabetes mellitus and a urinary ACR of < 3 mg/mmol should be managed according the MOPH National Guideline for Hypertension.

Renin-angiotensin system antagonist prescribing considerations [1,2]:
• A combination of renin-angiotensin system antagonists should not be routinely offered to patients with CKD.
• Before commencing treatment, measure the eGFR and serum potassium [1][L1]:
  o Repeat after 1-2 weeks of treatment and after each dose increase.
• If pre-treatment serum potassium is > 5.0 mmol/L [1][L1]:
  o Do not routinely start ACE inhibitors or ARBs.
  o Exclude and treat other factors that promote hyperkalaemia, and re-check serum potassium.
• ACE inhibitors should only be initiated under specialist supervision in the following groups of patients – if in doubt, discuss with a nephrologist [11]:
  o Receiving multiple or high-dose diuretic therapy (e.g. ≥ 80 mg of furosemide daily or its equivalent).
  o Receiving concomitant angiotensin-II receptor antagonist or aliskiren.
  o With a plasma sodium concentration < 130 mmol/L.
  o With severe or unstable heart failure.
  o Known renovascular disease.
• If the patient is taking medication that promotes hyperkalaemia, more frequent monitoring may be required [1].
• If serum potassium rises to ≥ 6.0 mmol/L and hyperkalaemia-promoting medications have been stopped – discontinue renin-angiotensin system antagonists [1].
• If there is a decrease in eGFR of < 25% or there is a serum creatinine increase of < 30% following introduction or dose increase of renin-angiotensin system antagonists [1][L1]:

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- Do not modify the dose.
- Repeat tests in 1-2 weeks.

- If the eGFR decrease is > 25% from baseline or the plasma creatinine increase is > 30% [1]:
  - Investigate alternative causes of renal function deterioration, e.g. volume depletion or other medication.
  - If there is no other cause:
    - Stop the renin-angiotensin system antagonist, or reduce to a previously tolerated dose; and
    - Add alternative antihypertensive medication if needed.

7.3 Manage atherosclerotic cardiovascular risk
ASCVD risk is increased in people with CKD [1,2]:
- Vascular comorbidities that are more common in patients with CKD include:
  - Hypertension.
  - Peripheral vascular disease.
  - Heart failure.
- Cardiovascular events, e.g. myocardial infarction and strokes, are also more common.

7.3.1 Assess cardiovascular risk
Assess ASCVD risk:
- Record the patient’s history of and risk factors for ASCVD [15][L1, RGA1].
- Baseline blood tests to assess ASCVD risk include [16]:
  - Lipid profile.
  - HbA1c.
  - Liver function tests.
  - Thyroid-stimulating hormone.

7.3.2 Lipid-lowering therapy
Dyslipidaemia is suggested as a risk factor for CKD [1].
- Increased levels of cholesterol and triglyceride can cause kidney function to rapidly decline.
- Lipid-lowering may slow disease progression.

Initiate statin therapy in the following patients [17,18]:
- All patients with established ASCVD.
- All patients aged ≥ 50 years with an eGFR < 60 mL/min/1.73m² but not treated with dialysis or kidney transplantation.
- All patients aged ≥ 50 years with an eGFR ≥ 60 mL/min/1.73m² but who have albuminuria or other manifestations of CKD (e.g. polycystic kidney disease).
- All patients aged < 50 years with CKD and a 10-year ASCVD risk of > 7.5% (assessed using ACC/AHA Pooled Cohort Equations).
- All patients aged > 18 years with CKD and diabetes mellitus.
- All renal transplant recipient, especially aged ≥ 30 years.

Statin or statin/ezetimibe combination therapy need not to be initiated in dialysis patients; however, these agents can be continued during dialysis in patients who are receiving them at the time of dialysis initiation [17].
Recommended statin doses in patients at GFR categories G3a-G5, selected for lipid-lowering therapy [17]:

- Atorvastatin 20 mg
- Rosuvastatin 10 mg
- Simvastatin/ezetimibe 20 mg/10 mg
- Pravastatin 40 mg
- Simvastatin 40 mg

Patients at GFR categories G1-G2 should be initiated at doses as recommended in the MOPH National Guidelines for Dyslipidaemia.

Before initiating treatment with a statin [16]:
- Transaminase levels should be measured to establish a baseline level.
- In the event of chronic, generalised, and unexplained muscle pain, measure creatine kinase regardless of use of statin therapy.
- Discuss the risks and benefits with the patients, including:
  - Advantages of lifestyle modifications.
  - Patient personal preference.
  - Comorbidities.
  - Effect of polypharmacy.
  - General frailty condition.
  - Life expectancy while on statin therapy.

Monitoring treatment:

In patients initiated on a statin, further monitoring of lipid levels is not required, except to support adherence to treatment [17].

7.3.3 Antiplatelet therapy

Impaired renal function is associated with a bleeding risk that increases with severity of CKD [1].

Antiplatelet therapy is indicated in the following patients [2,18]:
- All patients with established ASCVD.
- All patients with CKD who at risk of ASCVD, unless there is an increased bleeding risk that needs to be balanced against the possible cardiovascular benefits.

7.4 Medication management

Considerations when prescribing for patients with CKD [2]:
- Many drugs are renally-excreted and their dosage may need to be reduced to avoid toxicity.
- Advise patients to seek advice before using over-the-counter preparations.
- Advise patients not to use herbal remedies.
- All patients taking nephrotoxic agents should have their eGFR, electrolytes, and drug levels regularly monitored.
- If a patient becomes acutely unwell:
  - Review medication [13][L1, RGA1].
  - Temporarily discontinue potentially nephrotoxic and renally excreted drugs in patients with an eGFR of < 60 mL/min/1.73m² who have a serious intercurrent illness that increases the risk of AKI [2][L2, RGA2].
7.5 Immunisation
CKD is associated with major infectious complications [2]:
- Infection is the second leading cause of death following ASCVD [2].

The MOPH Public Health Department recommends the following immunisations in patients with established CKD, unless contraindicated [19]:
- Hepatitis B vaccination course.
- Pneumococcal conjugate vaccine (PCV13) once.
- Pneumococcal polysaccharide vaccine (PPSV23), repeated once after 5 years to a maximum of 3 times.
- Annual influenza vaccination.

7.6 Monitoring

7.6.1 Frequency of monitoring
The frequency of monitoring of patients is determined by the stage of CKD. The table below outlines the recommended frequency of follow-up in number of reviews per year [2].

| Frequency of monitoring in CKD by GFR and Albuminuria Categories: KDIGO 2012 | Persistent albuminuria categories |
| --- | --- | --- |
| Description and Range | Normal to mildly increased | Moderately increased | Severely increased |
| GFR categories (mL/min/1.73 m²); | < 3 mg/mmol | 3-30 mg/mmol | > 30 mg/mmol |
| G1 | Normal or high | ≥ 90 | 1 if CKD | 1 | 2 |
| G2 | Mildly decreased | 60-89 | 1 if CKD | 1 | 2 |
| G3a | Mildly to moderately decreased | 45-59 | 1 | 2 | 3 |
| G3b | Moderately to severely decreased | 30-44 | 2 | 3 | 3 |
| G4 | Severely decreased | 15-29 | 3 | 3 | 4+ |
| G5 | Kidney failure | < 15 | 4+ | 4+ | 4+ |

Table 7.6.1: Recommended frequency of review in number of times per year [2].
7.6.2 **Assessment for and management of progression**

Progression of CKD [2]:

- Progression of CKD is defined as a sustained fall in eGFR accompanied by a ≥ 25% decline from baseline eGFR.
- Rapid progression is defined by a sustained decline in eGFR of > 5 mL/min/1.73 m² within one year.

NB: Small fluctuations in eGFR are common and not necessarily indicative of progression. Obtain a minimum of 3 eGFR measurements over a period of not less than 90 days [1,2].

In those patients with CKD progression [2][L2]:

- Review current management.
- Examine for reversible causes of progression.

7.7 **Monitor and treat for other complications**

Complications of CKD include [2,12,20]:

- Anaemia.
- Hypertension.
- Acidosis.
- Hyperphosphataemia.
- Hypoalbuminaemia.
- Hyperparathyroidism.
- Vitamin D deficiency.
- Malnutrition.
- Acquired cystic renal disease:
  - A complication of acquired cystic renal disease is renal cell carcinoma (RCC).

7.7.1 **Renal anaemia**

As CKD progresses, the kidney produces less erythropoietin, and patients can become anaemic [10].

Measure haemoglobin concentrations in the following patients [2]:

- When clinically indicated, in people with an eGFR of ≥ 60 mL/min/1.73 m².
- At least annually in people with eGFR of 30-59 mL/min/1.73 m².
- At least twice per year in people with eGFR of < 30 mL/min/1.73 m².

NB: If the eGFR is ≥ 30 mL/min/1.73 m², it is more likely that the anaemia is related to another underlying cause than renal failure [R-GDG].

7.7.2 **Monitor nutritional status**

Undernutrition [1,20]:

- Is a frequent finding in established renal failure – present in 30-40% of patients.
- Is sometimes due to poor appetite secondary to uraemia.
- Can increase vulnerability to disease and infection.
- Is associated with reduced patient survival.

Screening for undernutrition [20]:

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• Screen all patients with stage 4-5 CKD for the following indicators of undernutrition [20][L2, RGA2]:
  o Actual body weight is < 85% of ideal body weight.
  o Reduction in oedema-free body weight of ≥ 5% in 3 months or ≥ 10% in 6 months.
  o Body mass index (BMI) < 20 kg/m².
• Other measures to help further assess nutritional state include [20][L2, RGB]:
  o Anthropometry.
  o Handgrip strength.
  o NB: Low serum albumin is a strong predictor of adverse outcomes but generally is unrelated to nutritional status.

7.7.3 Bone metabolism and osteoporosis
Alterations in calcium and phosphate homeostasis occur early in the course of CKD and progress as kidney function decreases, which may result in [1]:
• Abnormalities of metabolism of:
  o Calcium.
  o Phosphate.
  o Parathyroid hormone.
  o Vitamin D.
• Abnormalities of bone turnover, growth, and strength.
• Vascular or soft tissue calcification.

The below table outlines the frequency of testing for markers of bone metabolism by stage of CKD [21].

<table>
<thead>
<tr>
<th>CKD Stage</th>
<th>GFR Range</th>
<th>Measurement of PTH</th>
<th>Measurement of Calcium/Phosphorus</th>
</tr>
</thead>
<tbody>
<tr>
<td>3</td>
<td>30-59</td>
<td>Every 12 months</td>
<td>Every 6-12 months</td>
</tr>
<tr>
<td>4</td>
<td>15-29</td>
<td>Every 6-12 months</td>
<td>Every 3-6 months</td>
</tr>
<tr>
<td>5</td>
<td>&lt; 15 or dialysis</td>
<td>Every 3-6 months</td>
<td>Every 1-3 months</td>
</tr>
</tbody>
</table>

Table 7.7.3: Frequency of testing bone metabolism in CKD Stage 3-5 [21,22].

Vitamin D supplements:
• In the absence of deficiency, do not routinely offer supplements of vitamin D to manage or prevent CKD-mineral and bone disorders [2][L1, RGB].

Osteoporosis:
• Do not routinely perform tests for bone mineral density in patients with an eGFR of < 45 mL/min/1.73m², as information may be misleading or unhelpful [2].
• Bisphosphonates should not be offered routinely to patients with a eGFR of < 30 mL/min/1.73m² without a strong clinical rationale [2].
7.8 Referral to nephrology

7.8.1 Consider referral to a nephrologist
Referral to a nephrologist for specialist assessment and management is normally required for patients with CKD, and [1-3,23]:

- AKI or abrupt sustained fall in eGFR.
- A sustained eGFR of < 60 mL/min/1.73m².
- A decline in GFR category accompanied by a ≥ 25% drop in eGFR from baseline.
- A sustained decline in eGFR of > 5 mL/min/1.73 m² within one year.
- A consistent finding of significant albuminuria (ACR of ≥ 30 mg/mmol or AER of ≥ 300 mg/24 hours; approximately equivalent to PCR of ≥ 50 mg/mmol or a PER of ≥ 500 mg/24 hours):
  - Despite appropriate treatment; or
  - Associated with haematuria and other risks factors, such as ASCVD or declining eGFR.
- Persistent abnormalities of serum potassium.
- Recurrent or extensive nephrolithiasis.
- Urinary red cell casts with red blood cell count (RBC) > 20 per high power field, which is sustained and not readily explained.
- Patients with hypertension who remain poorly controlled despite the use of at least 4 antihypertensive drugs at therapeutic doses.
- Hereditary kidney disease.

7.8.2 Indications for urgent or immediate referral
Consider immediate referral to hospital or discussion with a specialist if [1,23]:

- The eGFR is < 20 mL/min/1.73m².
- The patient has AKI.
- Urgent medical intervention is required, such as for treatment of:
  - Hyperkalaemia.
  - Severe uraemia.
  - Acidosis.
  - Fluid overload.

Refer to a urologist [1]:

- If the patient has evidence of urinary tract obstruction.
- For investigation of urinary tract malignancy for patients in appropriate age groups with persistent haematuria, regardless of the presence of proteinuria.
8 Specialist management

8.1 Renal replacement therapy
For patients with progressive CKD, who are most likely to require renal replacement therapy (RRT) within one year, it is advisable to manage care within a multidisciplinary care setting, which includes [2,3):

- Dietary counselling
- Education and counselling about different RRT modalities
- Transplant options
- Vascular access surgery
- Ethical, psychological, and social care.

8.1.1 Preparation for renal replacement therapy
Most patients with an eGFR of < 20 mL/min/1.73m² should be provided with timely and personalised information regarding renal failure and RRT [2]. Patients with ESRD who are likely to need RRT within 6 months should be referred urgently to receive education and information and to prepare for RRT [R-GDG].

Preparation for RRT includes [24-26]:

- Education aimed at improving the patient’s knowledge and understanding of their condition, and to help them choose among the options for treatment.
- Counselling with regard to modality choices, including conservative care, offering descriptions of and including information on:
  - Efficacy.
  - Risks.
  - The potential benefit, based on the patient's prognosis.
  - The potential side effects and their severity.
  - Changing the modality of dialysis and the possible consequences.
- Transplant assessment and potential pre-emptive listing
- Physical preparation for the chosen modality/modalities, e.g. definitive vascular access.
- Discussion of social and psychological issues, including:
  - The patient’s and/or carer’s ability to perform and adjust the treatment.
  - Integration with daily activities such as work, school, hobbies, family commitments, and travel for work or leisure.
  - Opportunities to maintain social interaction.
  - The impact on body image.
  - How the dialysis access point on the body may restrict physical activity.
  - If their home will need to be modified.
  - Distance and time spent travelling for treatment.
  - Flexibility of treatment regimen.
  - Any additional support or services that might be needed from others.
- Education on forearm vein preservation.
- In order to preserve site, avoid unnecessary venepuncture in the upper limb intended for creation of vascular access.

Planning for renal transplant:
- The advantages of pre-emptive transplantation should be discussed with all suitable individuals [24][L2].

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• Efforts should be made to identify a potential donor to allow pre-emptive transplantation before the need for RRT [24][L2].

Where pre-emptive transplantation is not possible, a timely referral for either definitive vascular access formation or peritoneal dialysis catheter placement should be made [24].

The exact timing of vascular access placement should be determined by [26][L1, RGA2]:
• The rate of renal function decline.
• Co-morbidities.
• The surgical pathway.

Pre-operative assessment:
• Clinical assessment and, when appropriate, imaging of both arteries and veins of upper arms should be performed to assess vessel suitability for access creation [26][L1, RGA2].
• Imaging to exclude central vein stenosis may be considered in all patients with previous central venous cannulation [26][L2, RGA2].

8.1.2 Initiation of renal replacement therapy
There is no good evidence for the superiority of one RRT option over another [24,25]:
• Decisions on which intervention to use will depend upon patient preferences, availability, and clinical contraindications.
• A patient’s priorities will not necessarily be the same as the healthcare professional’s clinical priorities.

Consider initiation of dialysis when one or more of the following are present. This often but doesn’t always occur when the eGFR is between 5-10 ml/min/1.73m² [2][L2, RGA2]:
• Symptoms or signs of renal failure are present, such as:
  o Acid base or electrolytes abnormalities.
  o Inability to control volume status or BP.
  o Deterioration in nutritional status, unresponsive to dietary interventions.
  o Cognitive impairment.

8.1.3 Renal transplant
Renal transplantation should be the RRT of choice for patients with ESRD who are fit for renal transplant [27][L2, RGA2]. Consideration for renal transplant should be addressed on an individualised basis [R-GDG].

8.1.4 Peritoneal dialysis
Peritoneal dialysis [28]:
• May be delivered safely and effectively at home or another location of the patient’s choice.
• Treatment modalities include:
  o Assisted automated peritoneal dialysis (aAPD).
  o Automated peritoneal dialysis (APD).
  o Continuous ambulatory peritoneal dialysis (CAPD).
• Offer all patients a choice, if appropriate, between the different treatment modalities.
8.1.5 Haemodialysis

Haemodialysis [28]:

- Treatment may take place:
  - In a dialysis centre.
  - In a hospital setting.
  - At the patient’s home.

8.2 Conservative management

Conservative management [2,24]:

- Conservative kidney management should be provided to patients with advanced CKD who opt not to have dialysis.
- Conservative management focuses on:
  - Slowing the decline in renal function.
  - Actively managing symptoms.
  - Advance care planning.
  - Provision of palliative care.

8.3 Consider palliative care at the appropriate stage

Recognising need for end of life care [24][L2, RGA2]:

- Recognise patients struggling to cope on long term dialysis due to a deterioration of underlying clinical problems or a sudden catastrophic clinical event. Either may indicate an imminent or immediate need of end of life care.
- Offer the opportunity to create an Advance Care Plan with patients who are:
  - Deteriorating despite dialysis; or
  - Undergoing conservative management.

Dialysis withdrawal [24][L2, RGA2]:

- Decisions to discontinue dialysis should be made jointly by the patients and their consultant and should involve relatives and carers and other members of the team.
- Carry out an assessment of competence.
- Exclude depression.

Principles of care in the last days of life include [24]:

- Symptom relief.
- Psychological, spiritual, and cultural support.
- Good communication with the patient and their family.
- Care wherever possible in their preferred place of care.
- Bereavement support.
9 References


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