**Clinical presentation**

**RED FLAG!** - Refer immediately or discuss with specialist

Refer urgently to appropriate specialist

Initial tests for CKD

**eGFR**

Assess for proteinuria

Assess for haematuria

Consider further investigations

Management

Medication management

Management of blood pressure and proteinuria

Manage atherosclerotic cardiovascular risk

Patient support and education

Immunisation

**Go to CKD - monitoring and complications**

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1 Background information

Quick info:

Objective and purpose of the care map
The purpose of this care map 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 care map will be used primarily by physicians in primary/generalist care and secondary/specialist care settings.

Scope of the care map
Aspects of care included within the scope of the care map are:

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

Aspects of care not included in this care map are:

- Screening for chronic kidney disease.
- Chronic kidney disease in pregnancy.
- 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.

Definition

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 (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).

Epidemiology

Incidence and prevalence in Qatar [4,5]:

- Diabetes mellitus, hypertension, and CKD are major emerging epidemics.
- The incidence of 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.

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. Please see here for GFR and ACR categories.

**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.

- Nephrototoxic drugs, e.g.:
  - NSAIDs.
  - Lithium.

- Multi-system diseases that may involve the kidney:
  - SLE.
  - Vasculitis.
  - Autosomal dominant polycystic kidney disease.
  - Alop 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 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.

Please see here for Prognosis of CKD by GFR and Albuminuria Categories.

**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.

References:
Please see the care map's Provenance.

2 Updates to this care map

Quick info:
Date of publication: 19-Mar-2017
Please see the care map's Provenance for additional information on references, contributors, and the editorial approach.

3 Key recommendations of this care map

Quick info:
The key recommendations of this care map 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 are 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 'Chronic kidney disease - monitoring and complications' 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 the to 'Consider referral to nephrologist' care point for criteria for routine and urgent referral to nephrology.

Specialist management [2,3]:
• Patients with progressive CKD should be managed in a multidisciplinary care setting with a multidisciplinary team.

RRT:
• 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].
• 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 [28]:
• May be delivered safely and effectively at home or another location of the patient's choice.
• Treatment modalities include:
  • aAPD.
  • APD.
  • CAPD.

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

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].

References:
Please see the care map's Provenance.

4 Abbreviations used in this care map

Quick info:
The abbreviations used in this care map are as follows:
aAPD
Assisted automated peritoneal dialysis
ACC / AHA
American College of Cardiology / American Heart Association
ACR
Albumin:creatinine ratio
AKI
Acute kidney injury
APD
Automated peritoneal dialysis
ASCVD
Atherosclerotic cardiovascular disease
BMI
Body mass index
BP
Blood pressure
CAPD
Continuous ambulatory peritoneal dialysis
CKD
5 Clinical presentation

Quick info:
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.

References:
Please see the care map's Provenance.
6 RED FLAG! - Refer immediately or discuss with specialist

Quick info:
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.

References:
Please see the care map's Provenance.

8 Consider referral to nephrologist

Quick info:
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 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.

References:
Please see the care map's Provenance.

9 Consider referral to urologist

Quick info:
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.

References:
Please see the care map's Provenance.

10 Initial tests for CKD

Quick info:
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].

References:
Please see the care map's Provenance.

11 eGFR

Quick info:
Serum creatinine is usually used to calculate eGFR [1][L2, RGA1]:

- Use the CKD-EPI creatinine equation to estimate GFR.
- 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].

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].

**CystatinC-based eGFR**

eGFR\(_{cys}\)[1]:

- Is an alternative and more accurate marker for CKD than eGFR\(_{creat}\).
- Consider using eGFR\(_{cys}\) at the initial diagnosis to confirm or exclude CKD in patients with [1,2][L2, RGA2]:
  - An eGFR\(_{creat}\) of 45-59 mL/min/1.73m\(^2\) sustained for at least 90 days; and
  - No proteinuria (i.e. an ACR < 3mg/mmol), or any other marker of kidney disease.
- Interpret eGFR\(_{cys}\) 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 eGFR\(_{creat}\) of 45-59 mL/min/1.73m\(^2\); and
  - An eGFR\(_{cys}\) of > 60 mL/min/1.73m\(^2\); and
  - No other marker of kidney disease.

References:
Please see the care map's Provenance.

### 12 Assess for proteinuria

**Quick info:**

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 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].

**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.

References:
Please see the care map's Provenance.

13 Assess for haematuria

Quick info:
When testing for haematuria [1]:
• Reagent strips should be used rather than urine microscopy.
• Further evaluation is recommended if there is a result of 1+ or more – use:
  • Urine microscopy and culture.
  • 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 BP for as long as the haematuria persists.

References:
Please see the care map's Provenance.

14 Consider further investigations

Quick info:
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:
  • Renal size.
  • Echogenicity.
  • The presence or absence of hydronephrosis.
  • The presence of cystic renal disease.

Renal ultrasound is recommended for all patients with CKD who also have [1]:
• Accelerated progression of CKD.
Chronic kidney disease - diagnosis and management

15 Management

Quick info:
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].

References:
Please see the care map's Provenance.

16 Medication management

Quick info:
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].

References:
Please see the care map's Provenance.
17 Management of blood pressure and proteinuria

Quick info:
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]:
  • 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.

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 'Hypertension' care map.

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]:
  • Repeat after 1-2 weeks of treatment and after each dose increase.
• If pre-treatment serum potassium is > 5.0 mmol/L [1][L1]:
  • Do not routinely start ACE inhibitors or ARBs.
  • 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]:
  • Receiving multiple or high-dose diuretic therapy (e.g. ≥ 80 mg of furosemide daily or its equivalent).
  • Receiving concomitant angiotensin-II receptor antagonist or aliskiren.
  • With a plasma sodium concentration < 130 mmol/L.
  • With severe or unstable heart failure.
  • 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]:
  • 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.

References:
Please see the care map's Provenance.

18 Manage atherosclerotic cardiovascular risk

Quick info:
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.

References:
Please see the care map's Provenance.

19 Patient support and education

Quick info:
Patient education should consist of information on severity, cause, complications, and prognosis of CKD [13]:
• Psychological aspects such as of 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].
• Advise patients not to use herbal remedies [2][L2, RGA2]:
  • There is a lack of evidence to support alternative or complementary medicines and these may have nephrotoxic effects.

References:
Please see the care map's Provenance.

20 Immunisation

Quick info:
CKD is associated with major infectious complications [2]:


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• 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.
• PCV13 once.
• PPSV23, repeated once after 5 years to a maximum of 3 times.
• Annual influenza vaccination.
References:
Please see the care map's Provenance.

21 Consider referral
Quick info:
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 < 60 mL/min/1.73m².
References:
Please see the care map's Provenance.

22 Assess cardiovascular risk
Quick info:
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.
References:
Please see the care map's Provenance.

23 Lipid-lowering therapy
Quick info:
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 'Dyslipidaemia' care map.

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].

**References:**

Please see the care map's Provenance.

### 24 Antiplatelet therapy

**Quick info:**

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.

**References:**

Please see the care map's Provenance.
Assessment and management of chronic kidney disease in adults

Provenance Certificate

Overview

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.

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

This care map was approved on 19 Mar 2017.

For information on changes in the last update, see the information point entitled 'Updates to this care map' on each page of the care map.

Editorial approach

This care map 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 care map 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 care map, 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 care map by patient groups was not undertaken.

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

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.
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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.

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 (RGA1):** Evidence demonstrates at least moderate certainty of at least moderate net benefit.
- **Recommendation Grade A2 (RGA2):** 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 (RGB):** Evidence is insufficient, conflicting, or poor and demonstrates an incomplete assessment of net benefit vs harm; additional research is recommended.
- **Recommendation Grade C1 (RGC1):** Evidence demonstrates a lack of net benefit; additional research is recommended.
- **Recommendation Grade C2 (RGC2):** Evidence demonstrates potential harm that outweighs benefit; additional research is recommended.
- **Recommendation of the GDG (R-GDG):** Recommended best practice on the basis of the clinical experience of the Guideline Development Group members.
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References


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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.

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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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Responsibilities of healthcare professionals

This care map 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.

Acknowledgements

The following individuals are recognised for their contribution to the successful implementation of the National Guidelines project.

Healthcare Quality Management and Patient Safety Department of the MOPH:

- Ms Huda Amer Al-Katheeri, Acting Director & Project Executive.
- Dr Alanoud Saleh Alfehaidi, Guideline & Standardisation Specialist.
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