

Module C

Treating Diabetes

2 - Nephropathy

Learning aims

To appreciate that all those with diabetes are at risk of developing urinary infections and chronic kidney disease (CKD)

To be aware that a person's kidney function is monitored by measuring the eGFR (estimated glomerular filtration rate) and ACR (albumin to creatinine ratio)

To have knowledge that CKD is divided into 5 stages of disease according to the patient's eGFR, with stage 5 being end stage renal disease

To understand that the treatment options for each person depend on their stage of CKD

To acknowledge that all people with diabetes need regular monitoring of kidney function (eGFR and ACR)

Nephropathy - 1

- ⊙ Diabetes affects the kidneys and causes kidney damage called nephropathy.
- ⊙ The causes of diabetic nephropathy are complex.
- ⊙ About 40% of those with type 1 diabetes will develop some degree of nephropathy
- ⊙ About 25% of those with type 2 diabetes will develop some form of kidney damage



Nephropathy - 2

- ◎ Repeated urinary infections can cause kidney damage in diabetes
- ◎ Diabetes is the leading cause of CKD in Western countries: *about 40% of all those requiring dialysis for CKD will have diabetes.*
- ◎ CKD is also associated with cardiovascular disease and increased mortality



Urinary tract infections

Predisposing factors in diabetes

- ⊙ Continuous glycosuria particularly in poor diabetes control
- ⊙ Treatment with SGLT-2 inhibitors
- ⊙ Poor immune function in diabetes
- ⊙ Poor neutrophil dysfunction
- ⊙ Vaginal candidiasis
- ⊙ Severe bladder disease (cystopathy)

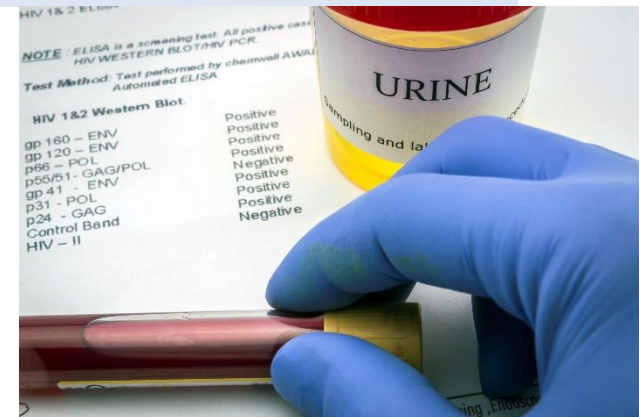
Diagnosis

- ⊙ Diagnosis is aided by: the clinical picture, urine analysis for culture and sensitivity of any bacteria present, a plain abdominal Xray, an ultrasound or even CT scan/MRI
- ⊙ Important to determine if infection is upper or lower urinary tract

- ⊙ Care staff should have a low threshold for considering a urinary tract infection (UTI) in a resident with diabetes
- ⊙ UTI in a resident with diabetes may initially present with a fall, a new confusional state or marked anxiety or agitation
- ⊙ A UTI may present as lower abdominal pain, back pain, pain or burning on passing urine (dysuria), passing urine frequently, passing blood in the urine (haematuria), a pyrexia, feeling nauseated, or even asymptotically!
- ⊙ Treatment with either oral or IV antibiotics may be required (the latter better treated in hospital):
- ⊙ Commonest cause is E.coli infection.

Screening for Kidney Disease

- ⊙ Kidney function should be monitored by regular blood and urine tests. NICE (National Institute for Health and Care Excellence) recommends annual measurements of ACR and eGFR.
- ⊙ You can obtain advice on what samples and measurements are required from the doctor (GP) or diabetes specialist nurse
- ⊙ The eGFR can be determined from a blood sample and requires information about blood creatinine, age of resident, gender and race.
- ⊙ An albumin to creatinine ratio (ACR) >3 mg/mmol indicates that the kidneys may not be working properly and requires referring the resident for further review by the doctor (GP) who will want to check the resident's blood pressure, glucose control, and what medication the resident is on.
- ⊙ Over a third of people with diabetes aged 65 years and over have evidence of chronic kidney disease



CKD stages

- ① CKD is divided into 5 stages of disease according to the person's GFR, with stage 5 being the most advanced stage of impairment (see table on upcoming slide).
- ① Treatment options for each patient will depend on the stage of CKD as several drugs are contraindicated in later stages of CKD.



Management - 1

- ⊙ Although not so straightforward in care home residents since targets and goals may vary, those with CKD should receive optimal treatment for:
 - Blood sugar levels; blood pressure; blood cholesterol
 - Heart disease risk factors and dietary treatment
- ⊙ Targets for blood pressure in a resident with diabetes should be between systolic 140-50, and <90 diastolic (mmHg); targets for glycaemia should be 53 – 64 mmol/mol (7-8%) but all targets require agreement with the resident and the care staff/doctor (GP), and will be influenced by functional status, life expectancy and so on.



Management - 2


- ① Treatment medications should prioritise ACE-inhibitors and ARBs (angiotensin-converting enzyme inhibitors and angiotensin-receptor blockers)
- ① If your resident with diabetes and kidney disease has evidence of stage 3 CKD or above, please ensure that the question of referral to a kidney specialist has been discussed with the resident and his diabetes care team.




Stages of CKD according to GFR and ACR measurements

Classification of chronic kidney disease using GFR and ACR categories

GFR and ACR categories and risk of adverse outcomes			ACR categories (mg/mmol), description and range		
			<3 Normal to mildly increased	3–30 Moderately increased	>30 Severely increased
			A1	A2	A3
GFR categories (ml/min/1.73 m ²), description and range	≥90 Normal and high	G1	No CKD in the absence of markers of kidney damage		
	60–89 Mild reduction related to normal range for a young adult	G2			
	45–59 Mild–moderate reduction	G3a ¹			
	30–44 Moderate–severe reduction	G3b			
	15–29 Severe reduction	G4			
	<15 Kidney failure	G5			



 Increasing risk



 Increasing risk

Key messages

KM

Residents with diabetes need as a minimum, an annual ACR and eGFR measurement.

KM

The eGFR result and CKD stage are part of the key medical information in any resident.

KM

Every effort should be made to make recent renal function test results available when medication is prescribed or when the resident is seen by a health care professional.

KM

All residents with diabetes and kidney disease should have agreed blood pressure and glycaemic targets.

KM

Do not overmedicate residents with diabetes and kidney disease.

Questions

Q1. Nephropathy is a complication of diabetes that affects the:

- A. Nervous system
- B. Kidneys
- C. Feet
- D. Brain

Questions

Q1. Nephropathy is a complication of diabetes that affects the:

- A. Nervous system
- B. Kidneys**
- C. Feet
- D. Brain

Questions

Q2. Kidney function can be monitored by performing regular:

- A. Blood tests
- B. Urine tests
- C. Abdominal Xray
- D. A and B

Questions

Q2. Kidney function can be monitored by performing regular:

- A. Blood tests
- B. Urine tests
- C. Abdominal Xray
- D. A and B**

Questions

Q3. Chronic kidney disease is divided into how many stages?

A. 3

B. 5

C. 6

D. 4

Questions

Q3. Chronic kidney disease is divided into how many stages?

A. 3

B. 5

C. 6

D. 4

Questions

Q4. Referral to a kidney specialist is generally considered at CKD stage 3 – at this stage patients have:

- A. Mildly reduced function
- B. Moderately reduced function
- C. Severely reduced function
- D. Established renal failure

Questions

Q4. Referral to a kidney specialist is generally considered at CKD stage 3 – at this stage patients have:

- A. Mildly reduced function
- B. Moderately reduced function**
- C. Severely reduced function
- D. Established renal failure

Questions

Q5. Estimated glomerular filtration rate (eGFR) is a measure of kidney function. Albumin to creatinine ratio (ACR) is:

- A. A measure of albumin (protein) in the urine
- B. An indicator of kidney disease
- C. A and B

Questions

Q5. Estimated glomerular filtration rate (eGFR) is a measure of kidney function. Albumin creatinine ratio (ACR) is:

- A. A measure of albumin (protein) in the urine
- B. An indicator of kidney disease
- C. A and B**

Further reading

- © NICE (National Institute of Health and Care Excellence). Chronic kidney disease in adults: assessment and management. Clinical Guideline (CG)182. January 2015. Available at: <https://www.nice.org.uk/guidance/cg182>
- © NICE (National Institute of Health and Care Excellence). Type 2 diabetes in adults: management. August 2019. Clinical Guideline 28 (CG 28). Available at: <https://www.nice.org.uk/guidance/ng28/ifp/chapter/kidney-disease>

Learning completed