GFR categories (ml/min/ 1.73 m2) Description and range				Persistent albuminuria categories Description and range		
				A1	A2	A3
				Normal to mildly increased	Moderately increased	Severely increased
				<30 mg/g <3 mg/mmol	30–300 mg/g 3–30 mg/mmol	>300 mg/g >30 mg/mmol
	G1	Normal or high	≥90		Monitor	Refer*
	G2	Mildly decreased	60–89		Monitor	Refer*
	G3a	Mildly to moderately decreased	45 –59	Monitor	Monitor	Refer
	G3b	Moderately to severely decreased	30–44	Monitor	Monitor	Refer
	G4	Severely decreased	15–29	Refer*	Refer*	Refer
	G5	Kidney failure	<15	Refer	Refer	Refer

Referral decision making by GFR and albuminuria. *Referring clinicians may wish to discuss with their nephrology service depending on local arrangements regarding monitoring or referring.

5.2: CARE OF THE PATIENT WITH PROGRESSIVE CKD

5.2.1: We suggest that people with progressive CKD should be managed in a multidisciplinary care setting. (2B)
5.2.2: The multidisciplinary team should include or have access to dietary counseling, education and counseling about different RRT modalities, transplant options, vascular access surgery, and ethical, psychological, and social care. (Not Graded)

5.3: TIMING THE INITIATION OF RRT

5.3.1: We suggest that dialysis be initiated when one or more of the following are present: symptoms or signs attributable to kidney failure (serositis, acid-base or electrolyte abnormalities, pruritus); inability to control volume status or blood pressure; a progressive deterioration in nutritional status refractory to dietary intervention; or cognitive impairment. This often but not invariably occurs in the GFR range between 5 and 10ml/min/1.73 m2. (2B)
5.3.2: Living donor preemptive renal transplantation in adults should be considered when the GFR is o20ml/min/ 1.73 m2, and there is evidence of progressive and irreversible CKD over the preceding 6–12 months. (Not Graded)

5.4: STRUCTURE AND PROCESS OF COMPREHENSIVE CONSERVATIVE MANAGEMENT

5.4.1: Conservative management should be an option in people who choose not to pursue RRT and this should be supported by a comprehensive management program. (Not Graded)
5.4.2: All CKD programs and care providers should be able to deliver advance care planning for people with a recognized need for end-of-life care, including those people undergoing conservative kidney care. (Not Graded)
5.4.3: Coordinated end-of-life care should be available to people and families through either primary care or specialist care as local circumstances dictate. (Not Graded)
5.4.4: The comprehensive conservative management program should include protocols for symptom and pain management, psychological care, spiritual care, and culturally sensitive care for the dying patient and their family (whether at home, in a hospice or a hospital setting), followed by the provision of culturally appropriate bereavement support. (Not Graded)

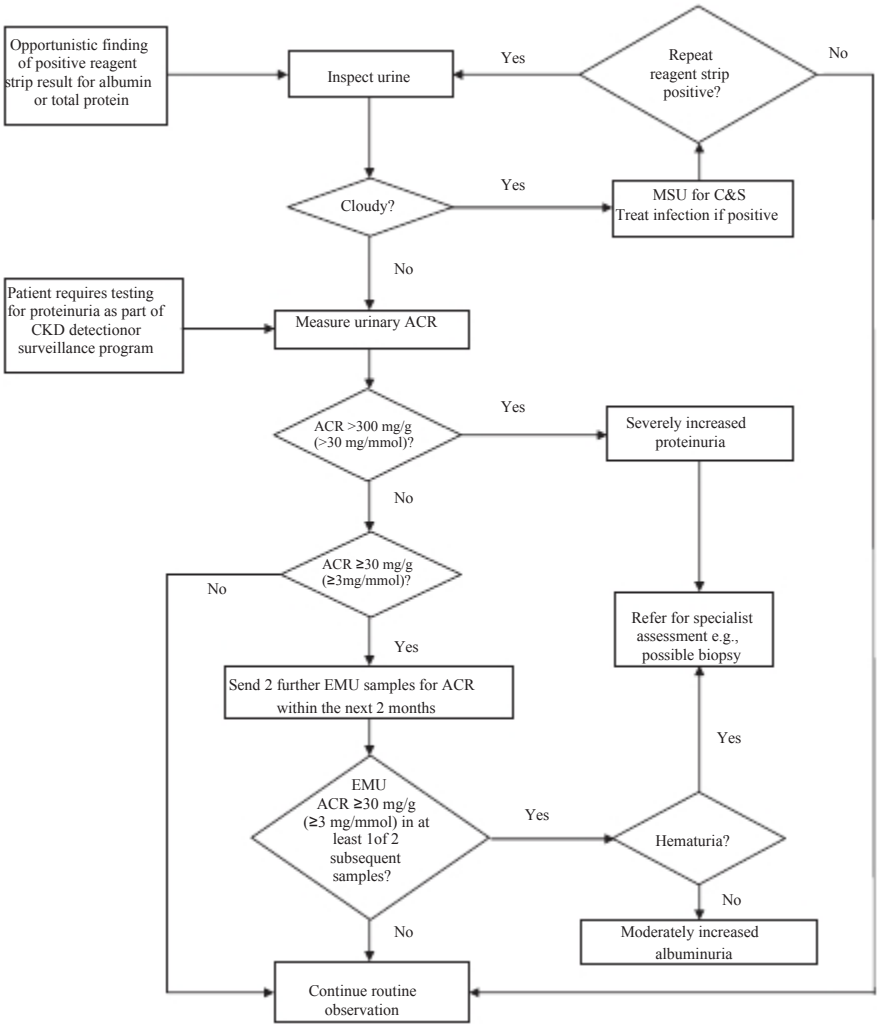

Figure 16|Suggested protocol for the further investigation of an individual demonstrating a positive reagent strip test for albuminuria/proteinuria or quantitative albuminuria/proteinuria test. Reagent strip device results should be confirmed using laboratory testing of the ACR on at least two further occasions. Patients with two or more positive (Z30mg/g or Z3mg/mmol) tests on early morning samples 1-2 weeks apart should be diagnosed as having persistent albuminuria. The possibility of postural proteinuria should be excluded by the examination of an EMU. PCR measurement can be substituted for the ACR but is insensitive in the detection of moderately increased albuminuria/proteinuria. Approximate PCR equivalent to an ACR of 30mg/mmol is 50mg/mmol. ACR, albumin-to-creatinine ratio; C&S, culture and sensitivity; CKD, chronic kidney disease; EMU, early morning urine; MSU, mid-stream urine; PCR, protein-to-creatinine ratio. [a]Consider other causes of increased ACR (e.g., menstrual contamination, uncontrolled hypertension, symptomatic urinary tract infection, heart failure, other transitory illnesses, and strenuous exercise), especially in the case of type 1 diabetes present for less than 5 years. The presence of hematuria may indicate non-diabetic renal disease. This figure was published and adapted from Lamb EJ, Price CP.[122] Kidney function tests, in Tietz Textbook of Clinical Chemistry and Molecular Diagnostics, eds Burtis CA, Ashwood E, Bruns DE, 5th edition, pp 669-708, 2012. Copyright Elsevier.

be clinical reasons for a specialist to use PCR instead of ACR to quantify and monitor significant levels of proteinuria (e.g., in patients with monoclonal gammopathies).

Commonly used reagent strip devices measuring total protein are insufficiently sensitive for the reliable detection of proteinuria, do not adjust for urinary concentration, and are only semi-quantitative. Furthermore, there is no standardization between manufacturers. The use of such strips should be discouraged in favor of quantitative laboratory measurements of albuminuria or proteinuria. When used, reagent strip results should be confirmed by laboratory testing (Figure 16).

The combination of reagent strips with automated reader devices can improve inter-operator variability. More recently launched reagent strip devices capable of producing albumin or total protein results as a ratio to urinary creatinine require further evaluation to provide evidence that they have equivalent sensitivity and specificity to laboratory tests and are economically advantageous.

Although the reference point remains the accurately timed 24-hour specimen, it is widely accepted that this is a difficult procedure to control effectively and that inaccuracies in urinary collection may contribute to errors in estimation of protein losses. In practice, untimed urine samples are a reasonable first test for ascertainment of albuminuria. An EMU (‘first pass’) sample is preferred since it correlates well with 24-hour protein excretion, has relatively low

Chapter 2: Definition, identification, and prediction of CKD progression

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2.1: DEFINITION AND IDENTIFICATION OF CKD PROGRESSION

2.1.1: Assess GFR and albuminuria at least annually in people with CKD. Assess GFR and albuminuria more often for individuals at higher risk of progression, and/ or where measurement will impact therapeutic decisions (Figure 17). (Not Graded)

RATIONALE

The statement is worded this way to remind the practitioner to use both GFR and albuminuria in order to assess progression and is consistent with the definition offered in Chapter 1 regarding definitions of CKD which include both parameters. There is increasing evidence which supports that both parameters are valuable. Lower GFR and greater albuminuria are both associated with an increased rate of progression and are synergistic.

More frequent measures of eGFR and albuminuria should be considered in patients with a lower GFR and greater albuminuria as these people are more likely to progress. Frequency of measurement should also be individualized based on the patient history and underlying cause of kidney disease.

In specific conditions (e.g., GN or increased levels of albuminuria), frequent (every 1–3 months) assessment may guide therapeutic decisions. Regular monitoring of stable patients may include more frequent monitoring than annually, but will be dictated by underlying cause, history, and estimates of GFR and ACR values obtained previously.

Evidence Base

There is variability in the presence of or rate of decline of kidney function in those with CKD. The rate at which

Guide to Frequency of Monitoring (number of times per year) by GFR and Albuminuria Category

GFR categories (ml/min/1.73 m2) Description and range				Persistent albuminuria categories Description and range		
				A1	A2	A3
				Normal to mildly increased	Moderately increased	Severely increased
				<30 mg/g <3 mg/mmol	30–300 mg/g 3–30 mg/mmol	>300 mg/g >30mg/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+

Figure 17|GFR and albuminuria grid to reflect the risk of progression by intensity of coloring (green, yellow, orange, red, deep red). The numbers in the boxes are a guide to the frequency of monitoring (number of times per year). Green reflects stable disease, with follow-up measurements annually if CKD is present; yellow requires caution and measurements at least once per year; orange requires measurements twice per year; red requires measurements at 3 times per year while deep red may require closest monitoring approximately 4 times or more per year (at least every 1–-3 months). These are general parameters only based on expert opinion and must take into account underlying comorbid conditions and disease state, as well as the likelihood of impacting a change in management for any individual patient. CKD, chronic kidney disease; GFR, glomerular filtration rate. Modified with permission from Macmillan Publishers Ltd: Kidney International. Levey AS, de Jong PE, Coresh J, et al.[30] The definition, classification, and prognosis of chronic kidney disease: a KDIGO controversies conference report. Kidney Int 2011; 80: 17–28; accessed http://www.nature.com/ki/journal/v80/n1/full/ki2010483a.html