

MANAGEMENT OF CKD AT PRIMARY LEVEL

HTAR KYI SWE

PROFESSOR

Renal Medical Unit

Mandalay General Hospital

Global Prevalence of Chronic Kidney Disease – A Systematic Review and Meta-Analysis

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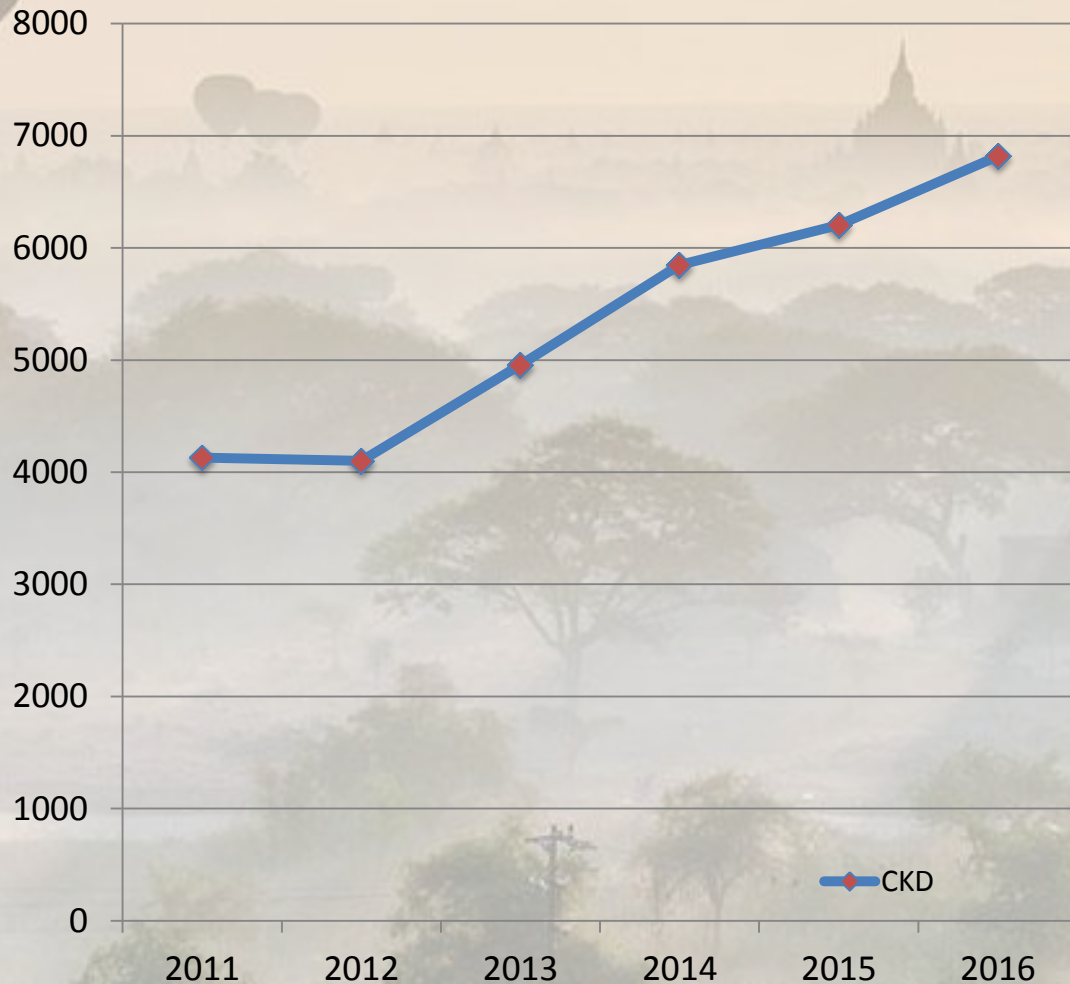
CKD prevalence Stages 1 to 5 was 13.4% and 10.6% in stages 3 to 5.

These estimates indicate that CKD may be more common than diabetes, which has an estimated prevalence of 8.2%.

PLOS ONE | DOI:10.1371/journal.pone.0158765 July 6,
2016

Incidence of CKD in Myanmar (2011-2016 Data)

Year	Total
2011	4,129
2012	4,102
2013	4,958
2014	5,848
2015	6,204
2016	6,817



Current Situation of Kidney Disease in MGH

Mandalay General Hospital

	2013	2014	2015	2016
Total Inpatients	884	1082	1012	1316
CKD	67	349	670	753
HD	81	99	258	230

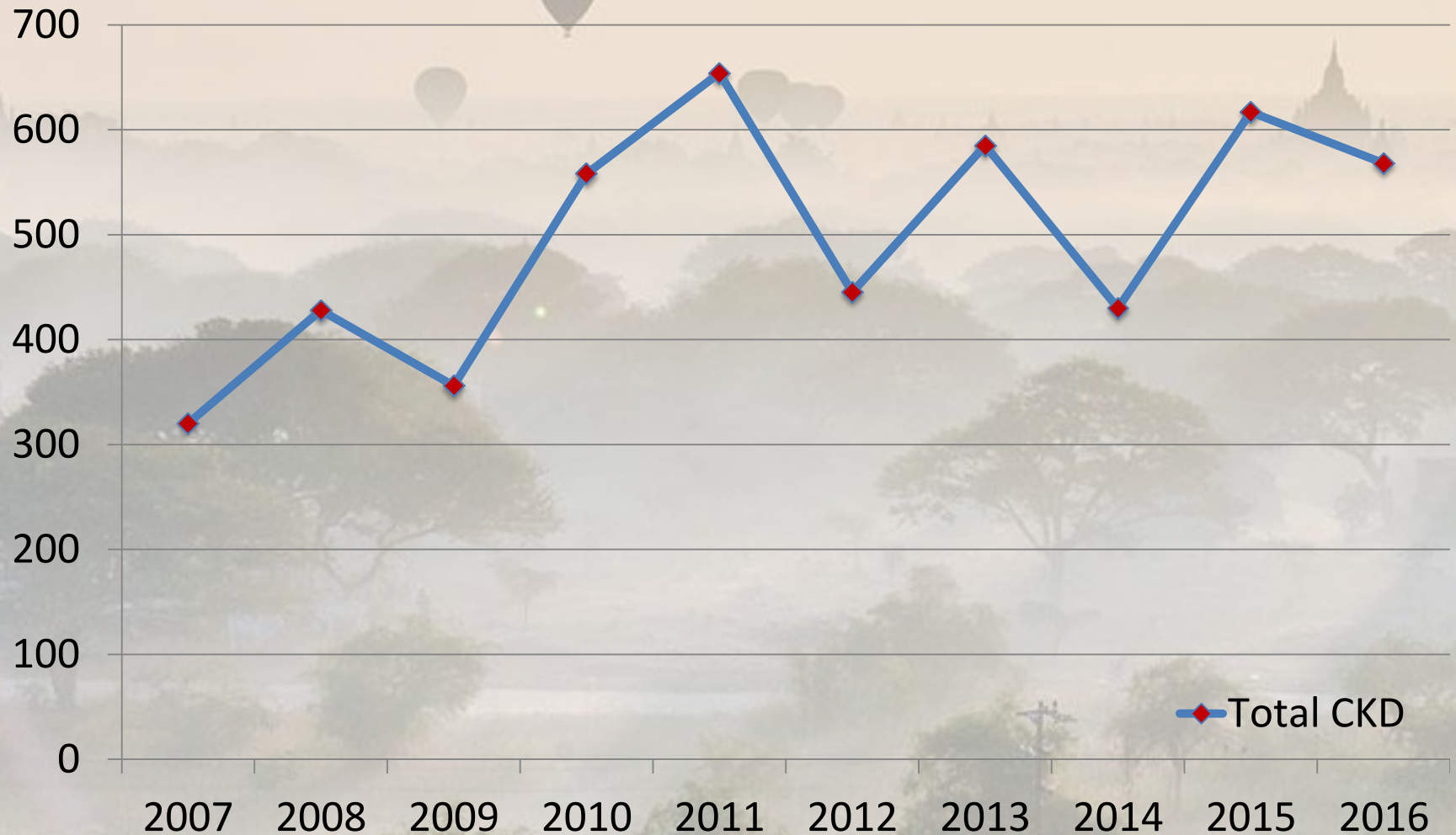
HD machine : 20 MGH

HD Hospital numbers :

2 Government Hosp & 9 Private Hosp:



Number of CKD in RMD, YGH & YSH (2007-2016)



CKD is common



What is CKD?

- Chronic kidney disease (CKD) is defined as kidney damage or glomerular filtration rate (GFR) below 60 ml/min per 1.73 m² for 3 months or more irrespective of the cause.

People at increased risk of CKD

Major risk factors for CKD

Diabetes

High blood pressure

Age over 60 years

Smoking

Obesity

Family history of kidney disease

Established cardiovascular disease

Renal and Urological diseases

Nephrotoxic drugs

International Recommendations for Targeted Screening for Chronic Kidney Disease (CKD)

Targeted Group	Guidelines			
	KDOQI	NICE	CARI	CSN
Elderly	•			
Hypertension	•	•	•	•
Diabetes mellitus	•	•	•	•
Atherosclerotic		•	•	•
Cardiovascular disease, heart failure		•		•
Urologic disease, stone disease, recurrent urinary infections	•	•		
Systemic autoimmune conditions	•	•		•
Nephrotoxic drugs	•	•		•
High-risk ethnic groups	•		•	•
Family history of CKD	•	•		
Other high-risk groups may include smokers and patients with metabolic syndrome, obesity, low birth weight, systemic infections, reduced renal mass, and previous acute kidney injury.				

Table 79-2 International recommendations for targeted screening for CKD. *KDOQI*, Kidney Disease Outcomes Quality Initiative; *NICE*, U.K. National Institute for Health and Care Excellence; *CARI*, Caring for Australasians with Renal Impairment; *CSN*, Canadian Society of Nephrology.

KDIGO Classification and Prognosis of Chronic Kidney Disease 2012

Prognosis of CKD by GFR and albuminuria category

Prognosis of CKD by GFR
and albuminuria categories:
KDIGO 2012

				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
GFR categories (mL/min/1.73 m ²) description and range	G1	Normal or high	≥90			
	G2	Mildly decreased	60–89			
	G3a	Mildly to moderately decreased	45–59			
	G3b	Moderately to severely decreased	30–44			
	G4	Severely decreased	15–29			
	G5	Kidney failure	<15			

Green: low risk (if no other markers of kidney disease, no CKD); yellow: moderately increased risk;
orange: high risk; red: very high risk.

Cost for ESRD

- **Haemodialysis**

- 40,000-60,000MMK/one section
- 400,000-720,000MMK/mth

- ***Charity Groups***

20,000-30,000 MMK/one section

- **CAPD**

- 400,000-600,000/mth

- **Kidney Transplant**

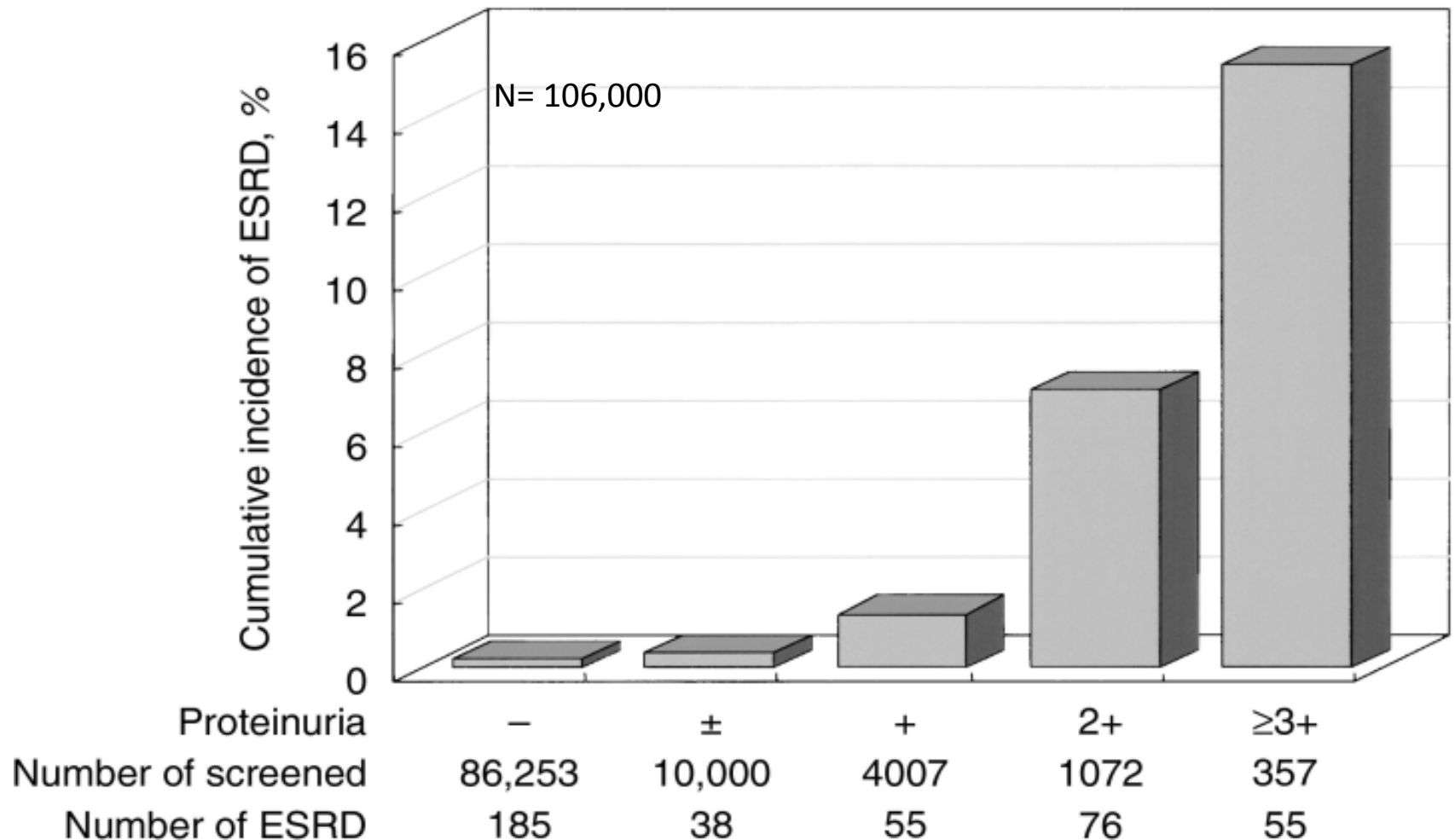
- 15,000,000-20,000,000MMK within 2 weeks (Mandalay)
- 500,000-700,000MMK/mth x first 3 mths
- 300,000-500,000MMK later months
- India (45,000,000MMK) average

How do we assess CKD?

Recommendation for detection/ assessment of CKD

Test Kidney Function	Blood test for eGFR (creatinine)
Test for Albuminuria	Urine test for albumin / creatinine ratio (ACR)
Test for Hypertension	Check patient's blood pressure

Risk of ESKD related to baseline proteinuria (dipstick) over 18 year period



Case study – U MA

is a new patient to your practice

Past medical history

- Overweight (BMI 29)
- Mild intermittent asthma
- Chronic low back pain
- Mild hypertension
- Smoker 25 pack year history

63 years old

Retired Lawyer

History of mild asthma

Family history

- Maternal grandmother died of a heart attack in her 60's but also had a history of 'kidney problems'
- Mother has type 2 diabetes
- Father has angina and hypertension

UMA risks

- Obesity
- HT
- Smoking
- Family history of kidney disease

Case study - Question

Q1.Does he has risk of CKD?

Q2.What is UMA's CKD Stage?

Case study – UMA, 63d yrs old

UMA Kidney Health Check Results

Creatinine	118 $\mu\text{mol/L}$
eGFR	55 mL/min/1.73m ² With QxCalculated
Urine ACR	5.7 mg/mmol
Blood Pressure	155 / 95 mmHg

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UMA result

Green: low risk (if no other markers of kidney disease, no CKD); yellow: moderately increased risk;
orange: high risk; red: very high risk.

Case study - Question

UMA comes back to see you three months later and you repeat his urine ACR, eGFR and blood pressure...

Test	1 st Visit	This Visit
eGFR	55 mL/min/1.73m ²	52 mL/min/1.73m ²
Urine ACR	5.7 mg/mmol	8.4 mg/mmol
BP	155/95 mmHg	160/95 mmHg

Q3. What is your next step?

Case study - UMA

Orange Clinical Action Plan

eGFR 30-59 mL/min/1.73m² with microalbuminuria or eGFR 30-44 with normoalbuminuria

Goals of Management

- Investigations to exclude treatable disease
- Reduce progression of disease
- Reduce cardiovascular risk
- Early detection & management of complications
- Avoidance of nephrotoxic medications or volume depletion
- Adjustment of medication doses to levels appropriate for kidney function
- Appropriate referral to a Nephrologist

Case study - UMA

Orange Clinical Action Plan

eGFR 30-59 mL/min/1.73m² with microalbuminuria or eGFR 30-44 with normoalbuminuria

Monitoring

- ✓ 3-6 monthly clinical review

Clinical assessment	<ul style="list-style-type: none">✓ Blood pressure✓ Weight
Laboratory assessment	<ul style="list-style-type: none">✓ Urine ACR✓ Biochemical profile including urea, creatinine, electrolytes✓ eGFR✓ HbA1c (for people with diabetes)✓ Fasting lipids✓ Full blood count✓ Calcium and phosphate✓ Parathyroid hormone (6-12 monthly if eGFR <45 mL/min/1.73m²)

FU per year of CKD patients

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

				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
GFR categories (ml/min/1.73 m ²) Description and range	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+

Case study - UMA

Orange Clinical Action Plan

eGFR 30-59 mL/min/1.73m² with microalbuminuria or eGFR 30-44 with normoalbuminuria

It is also important to consider...

- Absolute Cardiovascular Risk assessment
- Lifestyle modification
- Blood pressure reduction
- Lipid lowering treatments
- Glycaemic control

Case study - Question

Q4. As UMA's general practitioner, how do you reduce his risks of cardiovascular disease?

Cardiovascular risk reduction

- Individuals with CKD have a 2-3 fold greater risk of cardiac death than individuals without CKD
- People with CKD are at least 20 times more likely to die from cardiovascular disease than survive to need dialysis or transplant
- CKD is one of the most potent known risk factors for cardiovascular disease
- It is important to calculate UMA's cardiovascular risk using the cardiovascular risk tool at **<http://www.cvriskcalculator.com>**

Blood pressure reduction

- CKD can cause and aggravate hypertension and hypertension can contribute to the progression of CKD
- Reducing blood pressure to below target levels is one of the most important goals of CKD management
- ACE inhibitor or ARB is recommended first line therapy
- Combined therapy of ACE & ARB is not recommended
- Maximal tolerated doses of ACE inhibitor or ARB is recommended
- Hypertension may be difficult to control and multiple (3-4) medications are frequently required

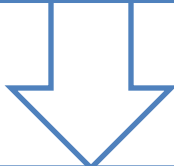
UMA has stage 3a CKD with microalbuminuria so his blood pressure needs to be maintained consistently below 130/80 mmHg

Renal Response to ACE-i

Serum creatinine concentration may increase up to 30% after an ACE inhibitor is started.



This rise in creatinine is associated with long-term renoprotection



ACE inhibitor should not necessarily be stopped in these patients

Effects of Intensive Blood-Pressure Control in Type 2 Diabetes Mellitus

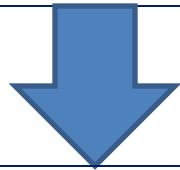
The ACCORD Study Group*

Table 2. Serious Adverse Events and Clinical Measures after Randomization.*

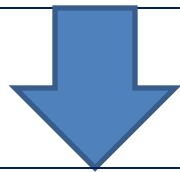
Variable	Intensive Therapy (N=2362)	Standard Therapy (N=2371)	P Value
Serious adverse events — no. (%)†			
Event attributed to blood-pressure medications	77 (3.3)	30 (1.27)	<0.001
Hypotension	17 (0.7)	1 (0.04)	<0.001
Syncope	12 (0.5)	5 (0.21)	0.10
Bradycardia or arrhythmia	12 (0.5)	3 (0.13)	0.02
Hyperkalemia	9 (0.4)	1 (0.04)	0.01
Angioedema	6 (0.3)	4 (0.17)	0.55
Renal failure	5 (0.2)	1 (0.04)	0.12
End-stage renal disease or need for dialysis	59 (2.5)	58 (2.4)	0.93
Symptoms affecting quality of life — no./total no. (%)‡			
Hives or swelling	44/501 (8.8)	41/468 (8.8)	1.00
Dizziness when standing	217/501 (44.3)	188/467 (40.3)	0.36
Adverse laboratory measures — no. (%)			
Potassium <3.2 mmol/liter	49 (2.1)	27 (1.1)	0.01
Potassium >5.9 mmol/liter	73 (3.1)	72 (3.0)	0.93
Elevation in serum creatinine			
>1.5 mg/dl in men	304 (12.9)	199 (8.4)	<0.001
>1.3 mg/dl in women	257 (10.9)	168 (7.1)	<0.001
Estimated GFR <30 ml/min/1.73 m ²	99 (4.2)	52 (2.2)	<0.001
Clinical measures§			
Glycated hemoglobin — %	7.6±1.3	7.5±1.2	0.13
Fasting plasma glucose — mg/dl	147.1±56.6	148.1±57.5	0.58

Diabetic Nephropathy & Drugs

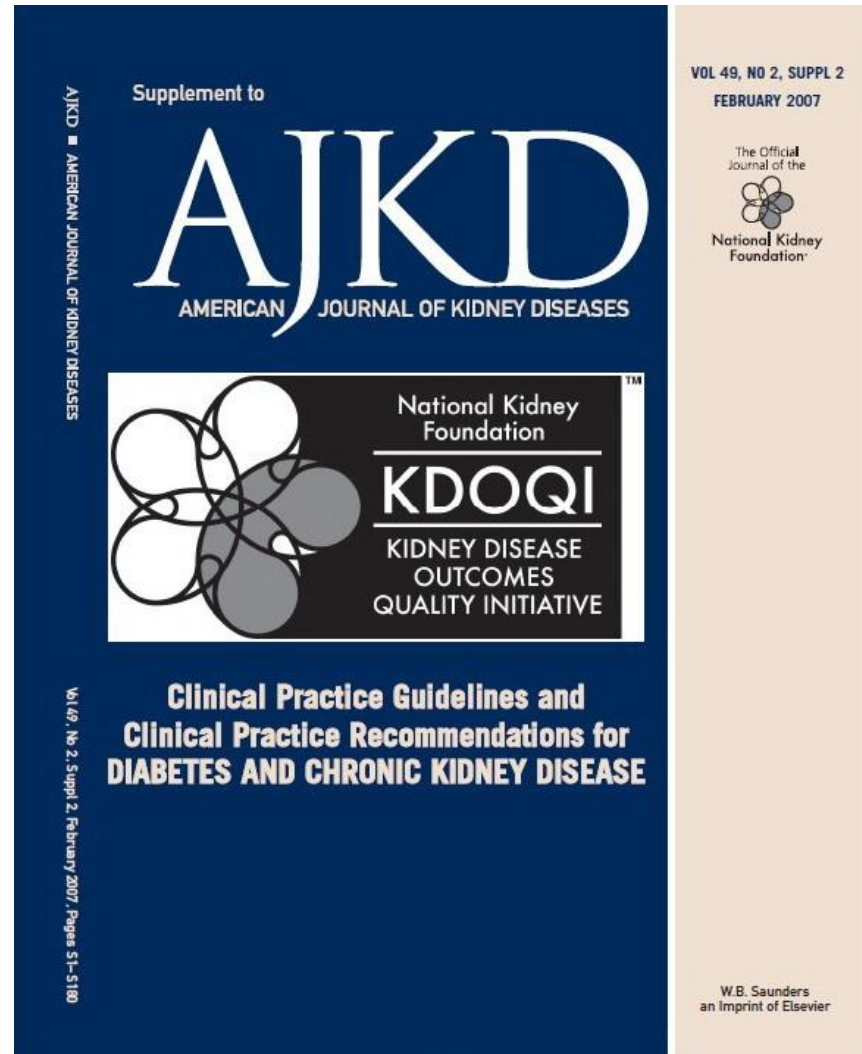
ACEi & ARBs



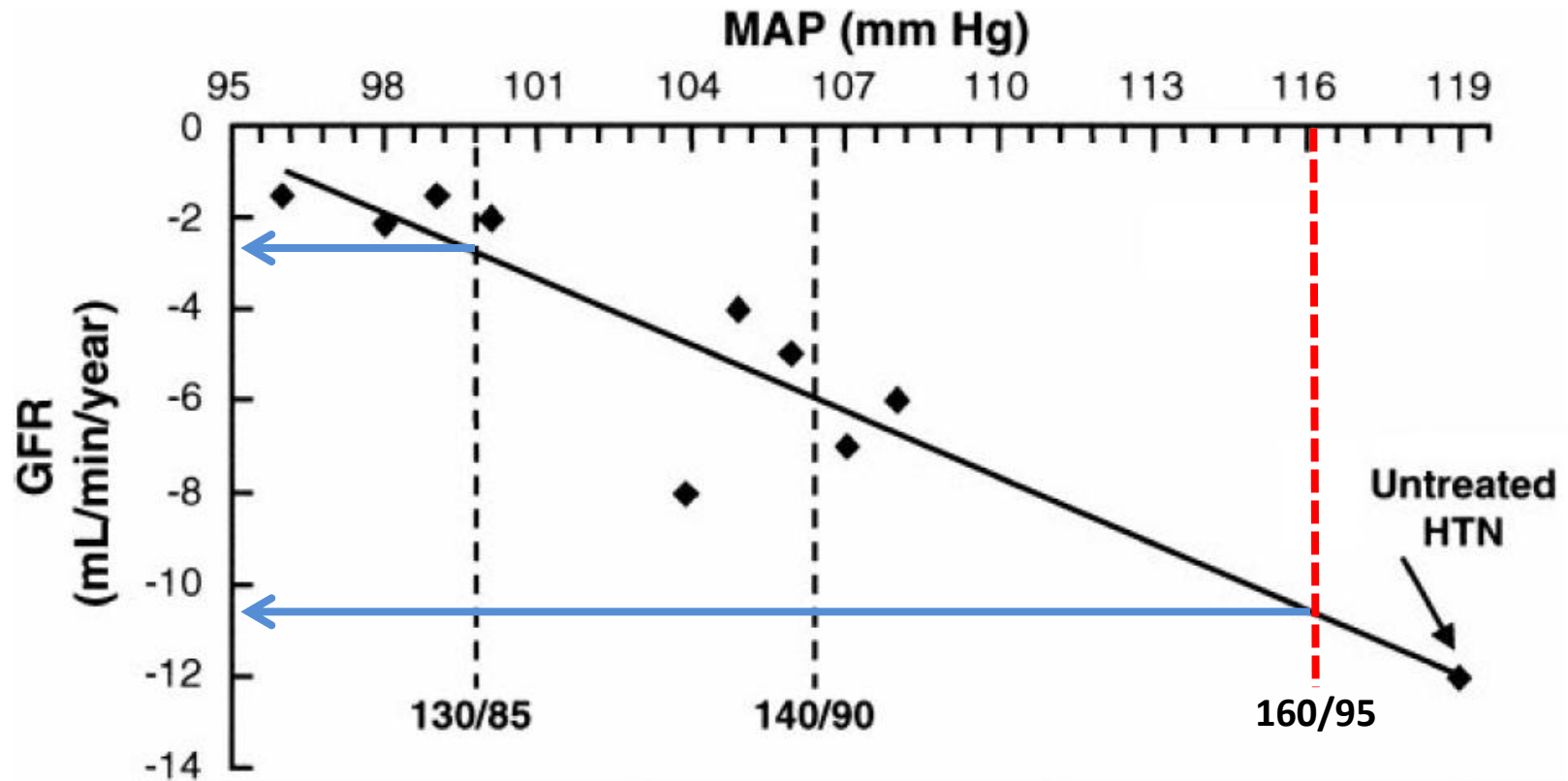
> 30% reduction in GFR
within 2-3 months after
initiation



Suspect renovascular
disease



Adequate BP management delays the progression of CKD



If UMA's blood pressure was consistently below target, the GFR loss per year would be reduced by 80%

Lifestyle modification



Lifestyle approaches are essential in reducing the overall cardiovascular risk - the key elements are:

‘SNAP’ (smoking, nutrition, alcohol, physical activity)

- ✓ Stop smoking
- ✓ A low calorie diet to reduce BMI
- ✓ A low salt diet
- ✓ Weight reduction
- ✓ A reduction in alcohol intake
- ✓ Physical activity

Lifestyle modification effects on BP

Modification	Recommendation	Approx SBP reduction
Weight reduction	BMI 18-24.9 kg/m ²	5-20 mmHg / 10kg lost
Dietary salt restriction	<100 mmol/day	2-8 mmHg
DASH* diet	Fruit, vegies, low saturated and total fat	8-14 mmHg
Physical activity	Aerobic activity for 30mins most days	4-9 mmHg
Moderate alcohol consumption only	1-2 standard drinks/day	2-4 mmHg

* Dietary Approaches to Stop Hypertension

Lipid lowering & glycaemic control



Lipids

- lipids should be assessed
- Lipid-lowering treatment should be considered for CVD risk reduction

Glycaemic control

- Glycaemia control should be assessed
- For people with diabetes, blood glucose control significantly reduces the risk of developing CKD, and in those with CKD reduces the rate of progression

Case study - Question

Q5. Should UMA be referred to a Nephrologist?

Referral to a Nephrologist is recommended if:

- eGFR $<30\text{mL/min/1.73m}^2$
- Persistent significant albuminuria (urine ACR $\geq 30\text{mg/mmol}$)
- Rapidly declining eGFR from a baseline of $<60\text{ mL/min/1.73m}^2$ (a decline of $>5\text{mL/min/1.73m}^2$ over a six-month period which is confirmed on at least three separate readings)
- CKD and hypertension that is hard to get to target despite at least three anti-hypertensive agents
- glomerular haematuria with macroalbuminuria



Anyone with an acute presentation and signs of acute nephritis (oliguria, haematuria, acute hypertension, and oedema) should be regarded as a medical emergency and referred without delay

Clinical tip

When referring to a Nephrologist ensure patient has had a recent urine ACR, current blood chemistry and haematology and a urinary tract ultrasound.

Referral is NOT usually necessary if:

- Stable eGFR ≥ 30 mL/min/1.73m²
- Urine ACR < 30mg/mmol (with no haematuria)
- Controlled blood pressure



The decision to refer or not must always be individualised and particularly in younger patients the indications for referral may be less stringent.

Useful Tips

- ✓ Pay attention to CVD risk reduction
- ✓ Consider discussing management issues with a Nephrologist in cases where uncertainty regarding referral exists.
- ✗ Don't refer to Nephrologist if targets of therapy are achieved
- ✗ Spiral CT angiogram for hypertension is not recommended without specialty advice

Case study – Action plan

Orange Clinical Action Plan

eGFR 30-59 mL/min/1.73m² with microalbuminuria or eGFR 30-44 with normoalbuminuria

- Cardiovascular risk reduction
- Blood Pressure should be consistently below 130/80 mmHg – use of ACE or ARB as appropriate
- Lifestyle modification
- Avoid nephrotoxic medications
- Adjust dose of other medications to levels appropriate for his kidney function
- **No need for Nephrology referral at this stage**
- **Continue to monitor 3-6 monthly**

Treatment target for people with CKD

Parameter	Target	Treatment
Blood Pressure	< 130/80 mmHg	Lifestyle modification ACE inhibitor or ARB
Albuminuria	>50% reduction of baseline value	ACE inhibitor or ARB
Cholesterol	LDL< 100mg/dl or < 70mg/dl depend on risks	Dietary advice Statin/Statin+ezetimibe
Blood glucose (for people with diabetes)	HbA1c ~ 7.0%	Lifestyle modification Oral hypoglycaemic Insulin

Case study - Question

Q6. What difference does a CKD diagnosis make if I already manage my patients well?

CKD diagnosis, management & patient outcomes

The diagnosis of CKD brings with it the need to identify risk reduction measures both for kidney and cardiovascular diseases

- Treatment targets and choices of therapy may differ with a CKD diagnosis
- Early detection and management of CKD complications
- Greater consideration of any prescribing - avoidance of nephrotoxic medications and ensuring dosages of other prescribed drugs are appropriate for the level of kidney function
- Timely referral of CKD patients to a Nephrologist for more severe CKD or complications

Summary...

- CKD is common, harmful and treatable
- Early detection and regular assessment is beneficial
- Perform a Kidney Health Check (urine ACR, eGFR, blood pressure) on at risk/ CKD patients
- Repeat the eGFR if $<60\text{mL/min/1.73m}^2$
- Maintain blood pressure consistently below the relevant threshold
- Refer to the CKD staging table and clinical action plans
- GPs play a vital role in the management of CKD
- Most CKD patients can be managed in general practice

Remember...

Kidney Health Check

**Blood
Test**

Urine Test

BP Check

CKD screening should be undertaken as a part of a systematic chronic disease assessment

Thank you

What is GFR?

GFR = Glomerular Filtration Rate

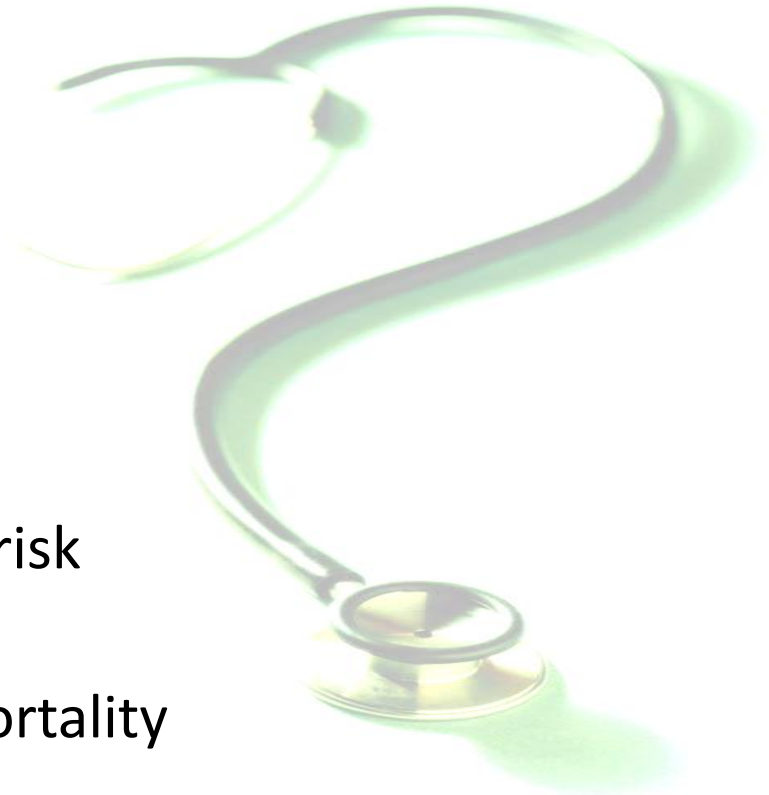
- **GFR is accepted as the best measure of kidney function**
- May fall substantially before serum creatinine is outside the normal range
- **Normal GFR** in healthy adults is **>90mL/min/1.73m²** and declines with age
- A GFR consistently **<60mL/min/1.73m²** indicates CKD
- A GFR of **60-90mL/min/1.73m²** should not be considered abnormal unless there is evidence of kidney damage.
- A fall in GFR always precedes kidney failure
- There is no direct way of measuring GFR
- **GFR can be estimated from serum creatinine using prediction equations**

How will eGFR help me and my patients?

Early detection & management of CKD:

- slows progression
- prevents complications
- reduces cardiovascular risk
- reduces morbidity & mortality

Early detection and treatment may reduce the rate of progression of kidney failure and cardiovascular risk by 20 – 50%



Albuminuria

- There is an association between albuminuria and progressive kidney disease in population studies
- The severity of albuminuria is predictive of outcome
- Therapeutic intervention can delay progression of disease and is most effective where there is significant albuminuria
- Microalbuminuria is predictive of progressive renal disease in people with diabetes.
- Urine ACR accurately predicts renal and cardiovascular risks in population studies and reduction in urine ACR predicts renoprotective benefit in intervention trials

Repeating the urine ACR

Factors other than CKD know to increase urine albumin excretion...

- ✓ Urinary Tract Infection
- ✓ High dietary protein intake
- ✓ Congestive cardiac failure
- ✓ Acute febrile illness
- ✓ Heavy exercise within 24 hours
- ✓ Menstruation or vaginal discharge
- ✓ Drugs (especially NSAIDs)

Approximate equivalents between urine ACR & other measure of albumin & protein

	U ACR (mg/mmol)	U ACR (mg/g)	24h U alb (mg/day)	U PCR (mg/mmol)	24h U prot (mg/day)
Microalb	Male: 2.5-25 Female: 3.5-35	30-300	30-300	Male: 4-40 Female: 6-60	50-500
Macroalb	Male:> 25 Female: > 35	>300	>300	Male:> 40 Female:> 60	> 500

8.3.1. Follow-Up After Initiating Antihypertensive Drug Therapy

Recommendation for Follow-Up After Initiating Antihypertensive Drug Therapy		
References that support the recommendation are summarized in Online Data Supplement 28.		
COR	LOE	Recommendation
I	B-R	1. Adults initiating a new or adjusted drug regimen for hypertension should have a follow-up evaluation of adherence and response to treatment at monthly intervals until control is achieved (1-3).

Recommendation-Specific Supportive Text

1. Components of the follow-up evaluation should include assessment of BP control, as well as evaluation for orthostatic hypotension, adverse effects from medication therapy, adherence to medication and lifestyle therapy, need for adjustment of medication dosage, laboratory testing (including electrolyte and renal function status), and other assessments of target organ damage (1-3).

You can now diagnose UMA as having CKD stage 3a with microalbuminuria

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	G5	Kidney failure	<15			

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Who should be tested for kidney disease?

Risk Factor	Recommended Tests	Frequency
Smoker	Urine ACR eGFR Blood Pressure	Every 1-2 years*
Diabetes		
Hypertension		
Obesity		
Established cardiovascular disease		
Family history of CKD		
Others		

*yearly for people with diabetes or hypertension

If an individual has multiple risk factors, follow the more frequent regime