
Overview of CKD & Proteinuria Management in Primary Care

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Faculty/Presenter Disclosure

- **Faculty:** Dr. Jay Hingwala
- **Relationships with commercial interests:**
 - **Advisory Board:** Otsuka and Janssen

Mitigating Potential Bias

- All information presented will be supported by national and provincial guidelines
 - No specific medications or trade names will be used
- 

Objectives

At the conclusion of this educational activity, participants should be able to:

- 1) Appreciate the growing rate of CKD and ESRD in Manitoba and North America
 - 2) Learn how early detection can lead to improved outcomes and when a patient is high risk
 - 3) Learn how to appropriately screen patients and when to refer to nephrology
-



Case

- 45 yo Male, PMH of newly diagnosed diabetes with recent A1C 9.5%, obesity, and is a smoker. His labs show a GFR 30, Urine ACR 300.
- 80 yo Male, PMH of DM2 for 20 years with good control, obesity, and is a smoker. His labs show GFR 30, ACR 10.
 - Do they have CKD?
 - Are they at high risk for ESRD?
 - Should they see a nephrologist?



DEFINITIONS

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graph TD; A[DEFINITIONS] --> B[CKD:]; A --> C[Kidney Failure (ESRD):];
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CKD:

Abnormal structure or function
>3 months

- Proteinuria, Hematuria
- Markers of kidney damage*
- eGFR <60 ml/min/m²

Kidney Failure (ESRD):

Requiring kidney replacement
therapy >3 months

- Facility Hemodialysis
- Home PD or HD
- Kidney Transplantation

*nephrotic syndrome, nephritic syndrome, tubular syndromes, urinary tract symptoms, asymptomatic urinalysis abnormalities, asymptomatic radiologic abnormalities, hypertension due to kidney disease

Case

- 45 yo Male, PMH of newly diagnosed diabetes, obesity, and is a smoker. His labs show a GFR 30, Urine ACR 300.

Do they have CKD?

- 80 yo Male, PMH of DM2 for 20 years with good control, obesity, and is a smoker. His labs show GFR 30, ACR 10.

Do they have CKD?

FACING THE FACTS ABOUT KIDNEY DISEASE

WHAT YOU NEED TO KNOW



1 IN 10
HAS CHRONIC
KIDNEY DISEASE
4 MILLION CANADIANS¹



THE NUMBER OF CANADIANS
LIVING WITH **END-STAGE**
KIDNEY DISEASE **HAS GROWN**

↑ 35%
SINCE 2008*



46% OF **NEW PATIENTS**
ARE UNDER THE
AGE OF 65*



NEARLY
49,000
CANADIANS
ARE BEING TREATED
FOR KIDNEY FAILURE

57.5%
ARE ON DIALYSIS

42.5%
HAVE A FUNCTIONING
TRANSPLANT



THE **LEADING CAUSES**
OF KIDNEY FAILURE*

39%

DIABETES

13%

RENAL VASCULAR DISEASE
(Including High Blood Pressure)



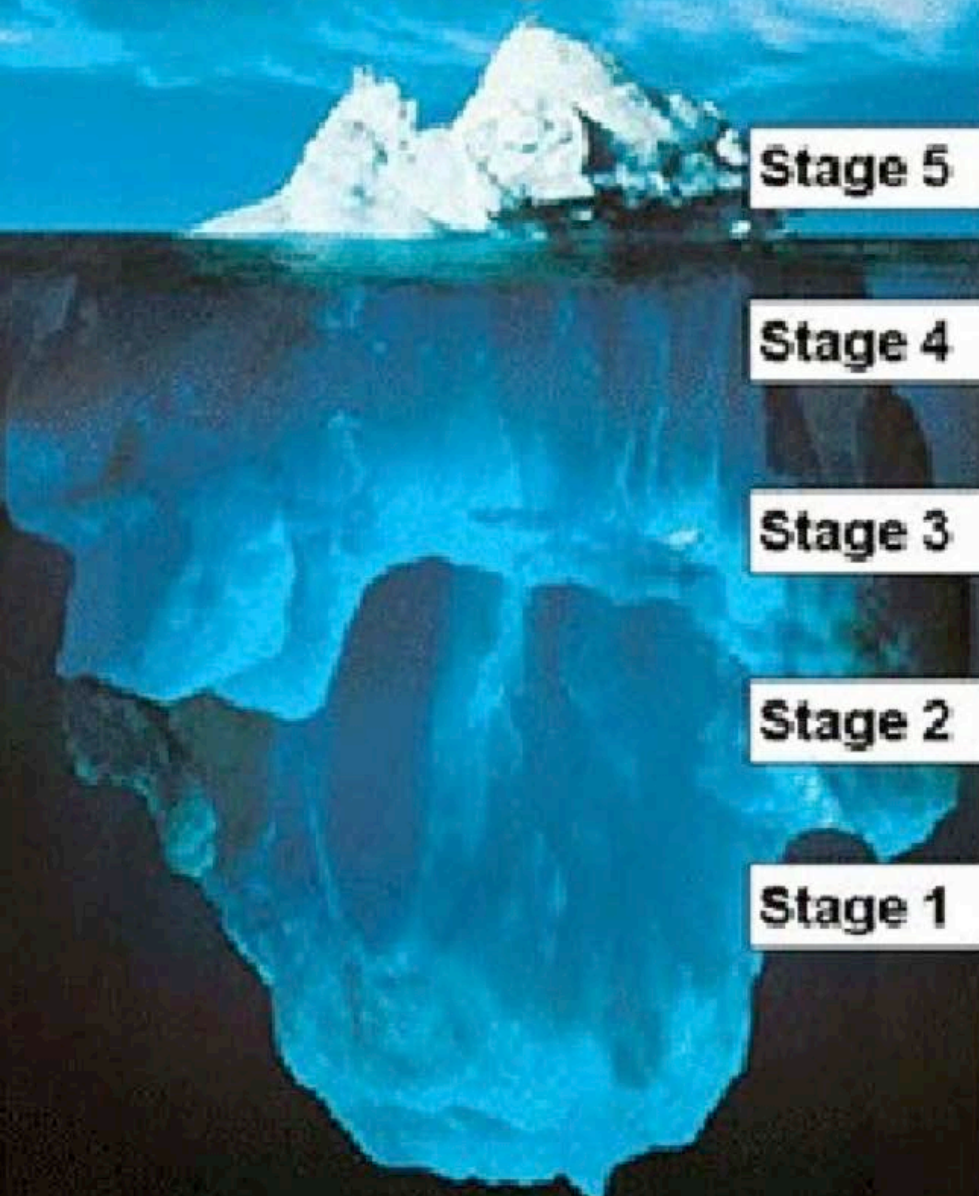
OUT-OF-POCKET COSTS
ASSOCIATED WITH DIALYSIS
CAN AMOUNT TO

12.5% OF SOME
PATIENTS'
INCOME²



Kidney.ca

Kidney Failure is the Tip of the Iceberg...



Stage 5

Prevalence of Chronic Kidney Disease (CKD):

Kidney Failure/End-stage kidney disease (GFR <15): 400,000 2%

Stage 4

GFR 15–29:
300,000 1%

Stage 3

GFR 30–59: 39%
7,400,000

Stage 2

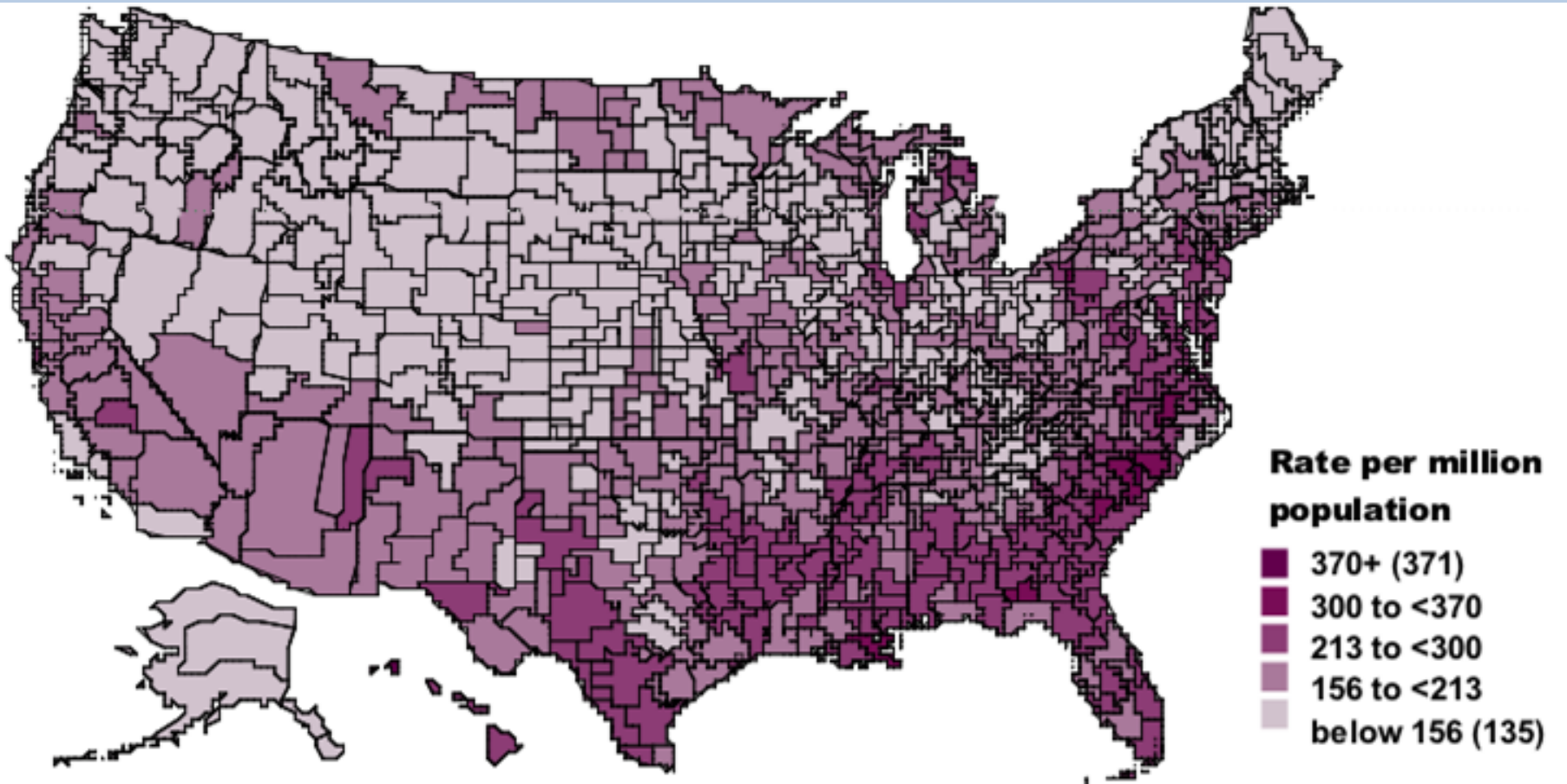
Kidney damage & GFR 60–89:
5,700,000 30%

Stage 1

Kidney damage & GFR >90:
5,600,000 30%

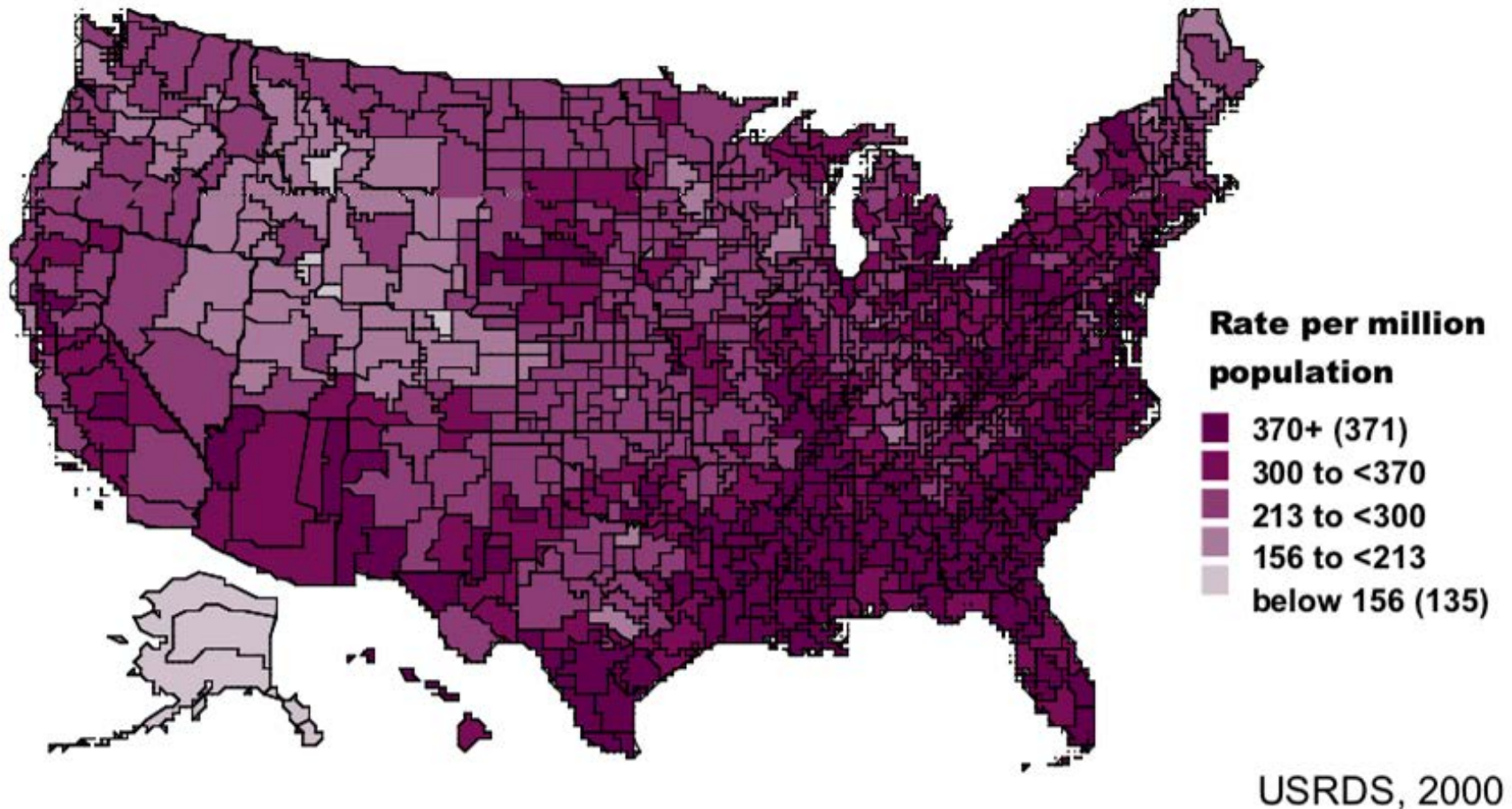
19 million Americans with CKD
8 million Americans with GFR<60

Incidence of Kidney Failure (per million population, 1990, from HSA)

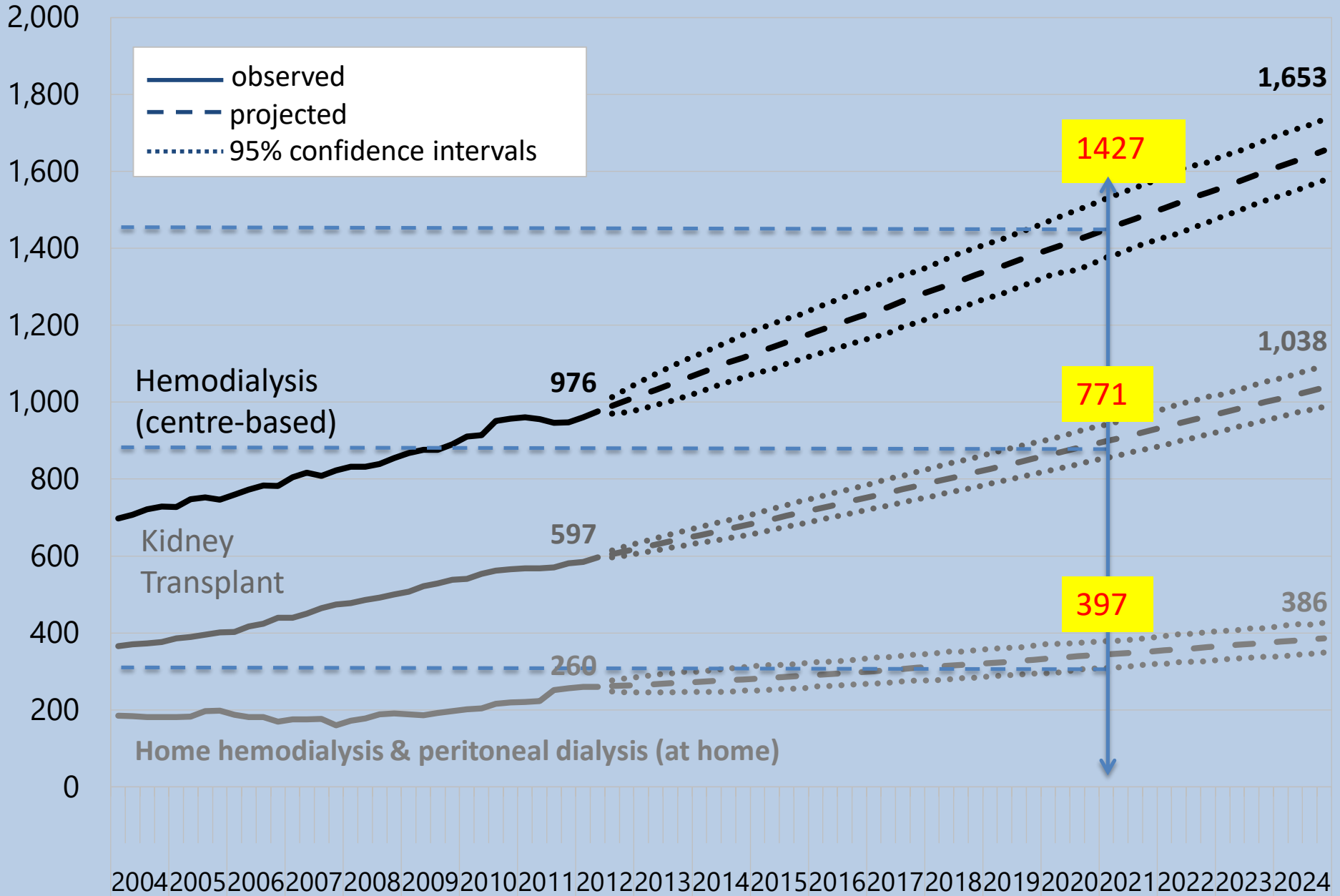


USRDS, 2000

Incidence of Kidney Failure (per million population, 2000, by HSA)



Projected Number of Manitobans with ESKD to 2024



CKD as a Public Health Issue

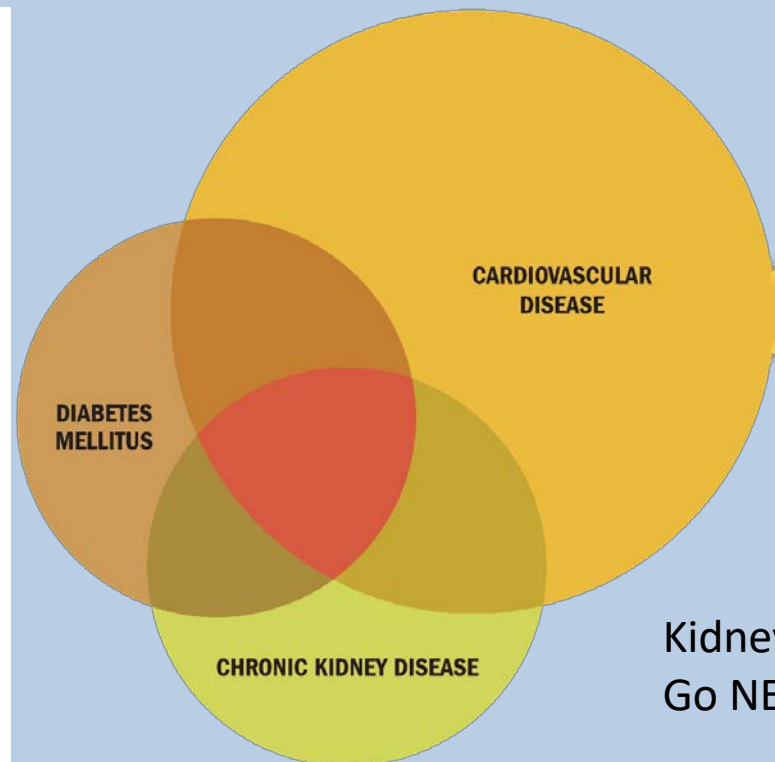
- Mortality, CV Events, Hospitalizations strongly related to eGFR
- 6 fold increase in mortality rate with DM + CKD (ie. multipliers)
- Disproportionately affects African Americans and Hispanics and Indigenous Peoples

Table 2. Adjusted Hazard Ratio for Death from Any Cause, Cardiovascular Events, and Hospitalization among 1,120,295 Ambulatory Adults, According to the Estimated GFR.*

Estimated GFR	Death from Any Cause	Any Cardiovascular Event	Any Hospitalization
	<i>adjusted hazard ratio (95 percent confidence interval)</i>		
≥60 ml/min/1.73 m ² †	1.00	1.00	1.00
45–59 ml/min/1.73 m ²	1.2 (1.1–1.2)	1.4 (1.4–1.5)	1.1 (1.1–1.1)
30–44 ml/min/1.73 m ²	1.8 (1.7–1.9)	2.0 (1.9–2.1)	1.5 (1.5–1.5)
15–29 ml/min/1.73 m ²	3.2 (3.1–3.4)	2.8 (2.6–2.9)	2.1 (2.0–2.2)
<15 ml/min/1.73 m ²	5.9 (5.4–6.5)	3.4 (3.1–3.8)	3.1 (3.0–3.3)

* The analyses were adjusted for age, sex, income, education, use or nonuse of dialysis, and the presence or absence of prior coronary heart disease, prior chronic heart failure, prior ischemic stroke or transient ischemic attack, prior peripheral arterial disease, diabetes mellitus, hypertension, dyslipidemia, cancer, a serum albumin level of 3.5 g per deciliter or less, dementia, cirrhosis or chronic liver disease, chronic lung disease, documented proteinuria, and prior hospitalizations.

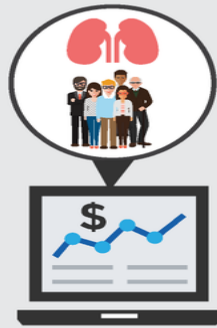
† This group served as the reference group.



Kidney.org
Go NEJM 2004

What does it cost to care for someone with kidney disease in Canada?

Alberta administrative health data from 219,641 adults* with kidney disease not on dialysis or transplanted

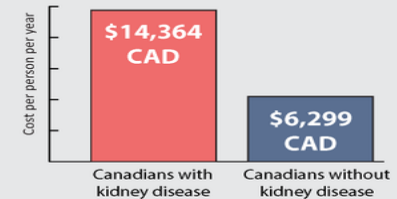


* Early and more advanced kidney disease

Study looked at estimated one-year direct medical costs



Health care costs for patients with kidney disease are more than twice that of other Canadians



Cost of care was higher for people with more co-morbidities and more severe kidney disease

The cost of care for Canadians with kidney disease (not on dialysis) is high, estimated to be \$32 billion per year. Further investment in effective programs and treatments to slow progression of kidney disease is recommended.

Manns et al. 2019, CJKHD



2019 - \$264 billion spent (12% budget)

Steps	Cost
Identification of high risk and early disease	\$
Prevention of progression	\$\$
Transplant	\$\$\$
Dialysis	\$\$\$\$

The CURRENT CKD Journey



FIND

- Primary care screening

DECIDE

- Risk of progression
- Refer or not refer
- When to prepare for dialysis/transplant
- When to start dialysis

TREAT

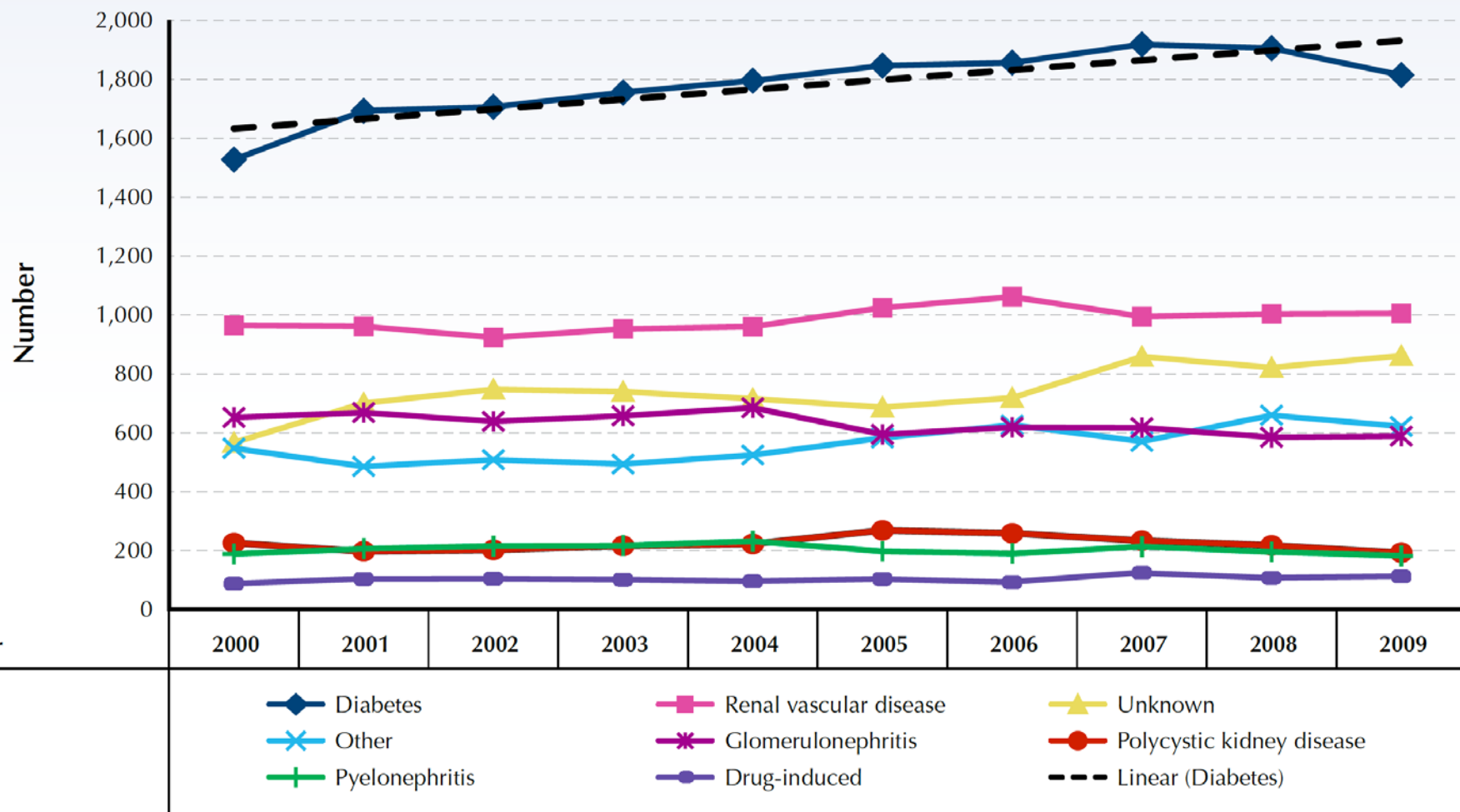
- Blood pressure
- Glucose management
- Multidisciplinary Care
- Dialysis/Transplant

Risk Factors

Modifiable	Non Modifiable
Diabetes	Family History
Hypertension	Age > 60
AKI	Race
NSAIDs	
CV Disease	

Diabetes is #1 Cause of New Cases of ESRD

Figure 2-3. Number of incident cases of end-stage renal disease, by primary diagnosis, Canada, 2000 to 2009

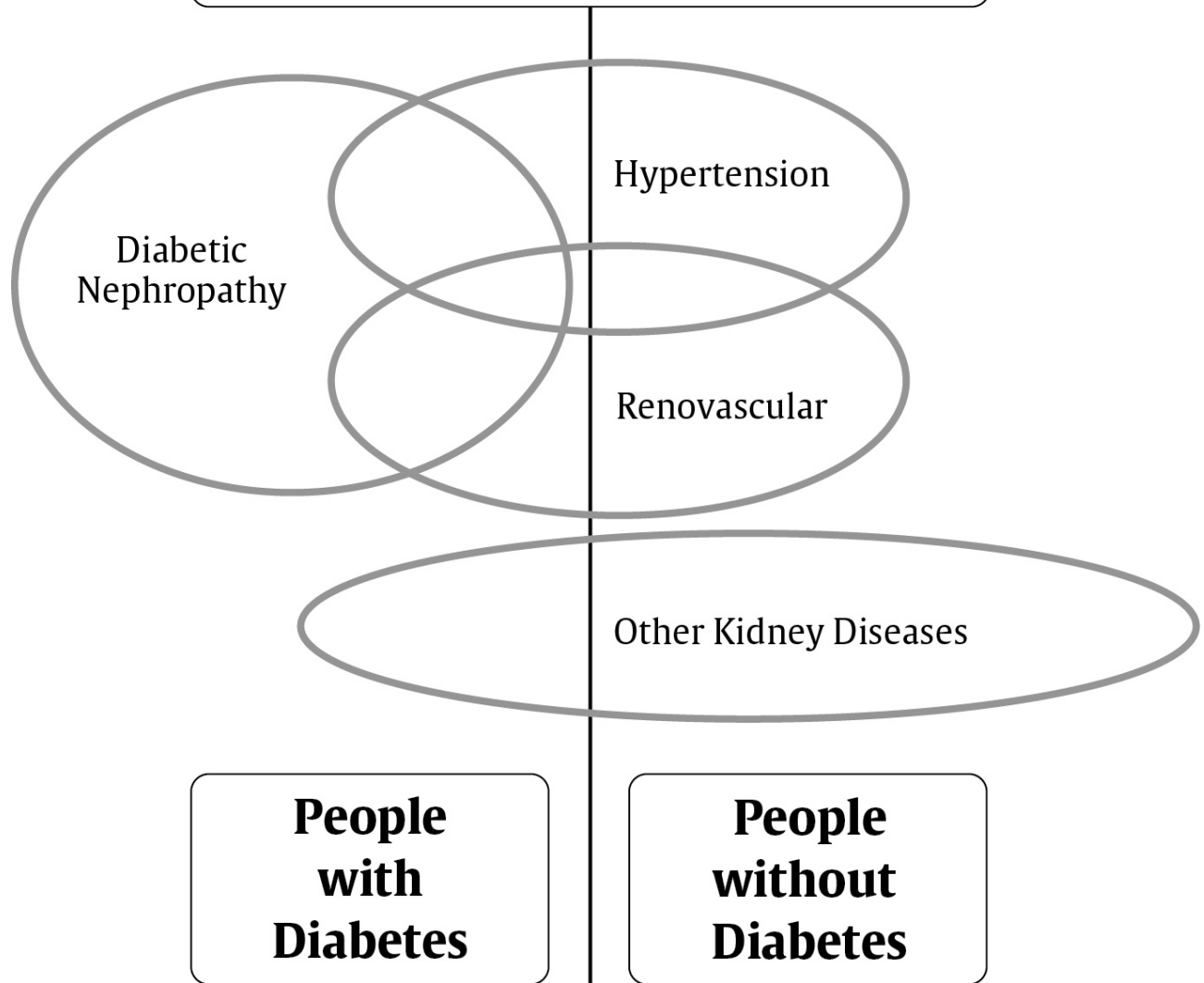


Source: Public Health Agency of Canada (2011); adapted from Canadian Institute for Health Information. Canadian Organ Replacement Register Annual Report: Treatment of End-Stage Organ Failure in Canada, 2000 to 2009. 2011. Ottawa.

Public Health Agency of Canada (August 2011); using 2008/09 data from the Canadian Chronic Disease Surveillance System (Public Health Agency of Canada).

Causes of CKD in people with and without diabetes

Beware
of Other
Causes
of CKD



Screening

$f(u) = \int f(x) e^{-\alpha x} dx$

$\rho\left(\frac{\partial^2 V}{\partial t^2} + \nu \frac{\partial V}{\partial t}\right) = \nu \rho + \sigma T \cdot d$

$H = -\sum \rho(x) \log \rho(x)$

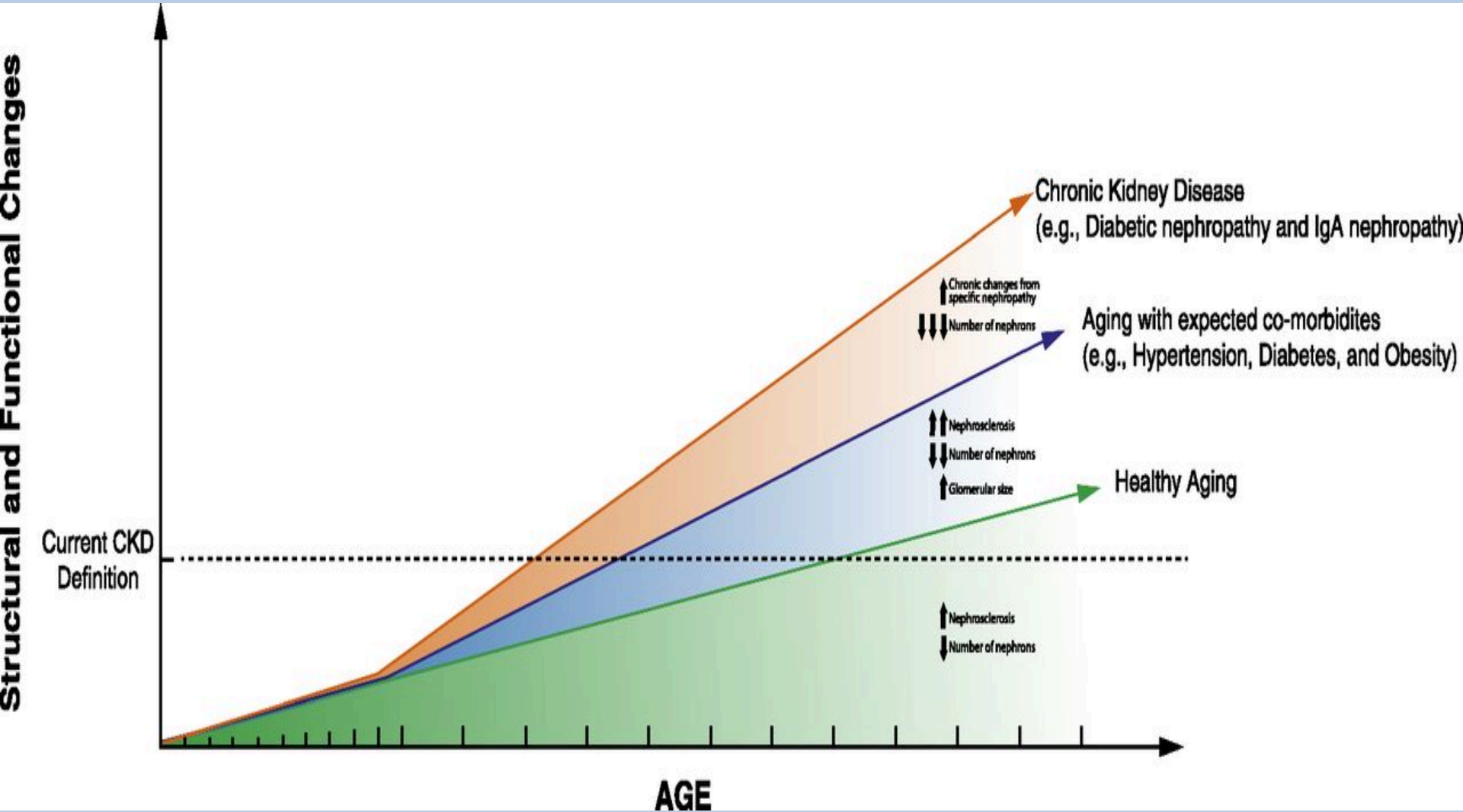
$\frac{1}{2} \sigma^2 S^2 \frac{\partial^2 V}{\partial S^2} + \nu S \frac{\partial V}{\partial S} + \frac{\partial V}{\partial t} - \nu V = 0$

$TC(Q, q, m) = \sum_{i=1}^n \left[\frac{D_i}{m q} S_i + c_i D_i + \frac{q_i H_i}{q} \left(\alpha \left(1 - \frac{D_i}{q}\right) - 1 + 2 \frac{D_i}{q} \right) \right]$

$\frac{d \Delta p(s, \phi)}{d \phi} = \begin{bmatrix} \alpha & -\beta \\ -\beta & 0 \end{bmatrix} \begin{bmatrix} \Delta p(s, \phi) \\ \Delta H(s, \phi) \end{bmatrix}$

$\int_0^{\infty} (\log m x) dx = \int_0^{\infty} (\log c x) dx = \frac{q}{\alpha} \left\{ \frac{\alpha}{\alpha} + (\log c)^2 \right\}$

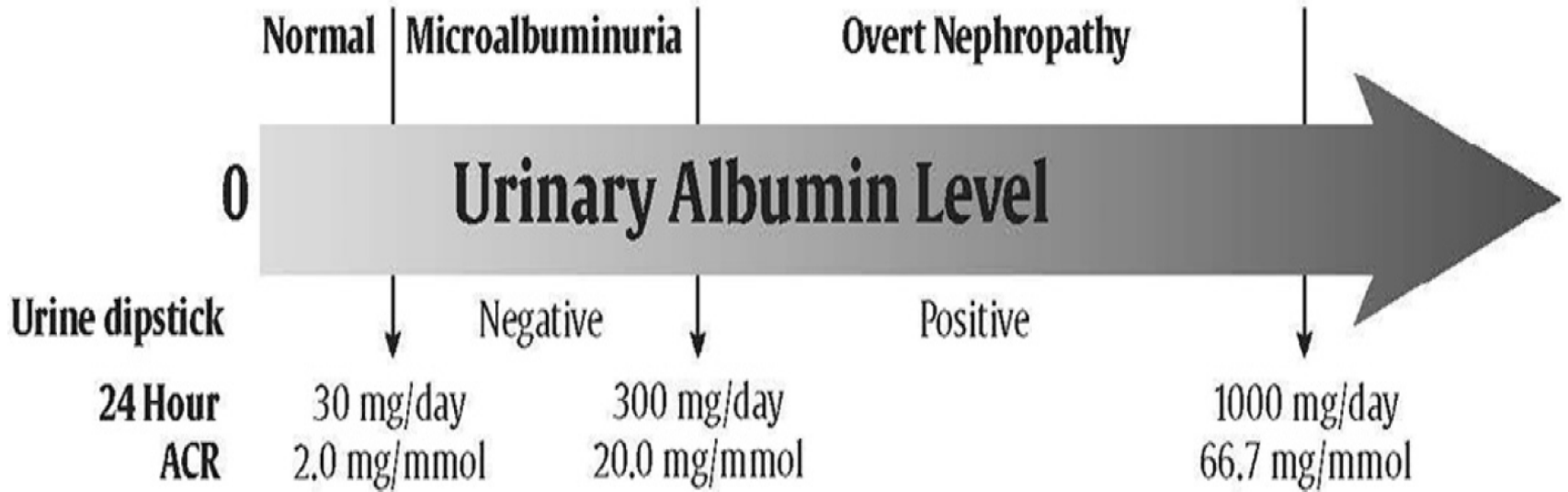
Healthy aging and eGFR



Gaps in CKD Screening

Indicator	Total	Events	%	CIF ^a (%)	
Screening/recognition of CKD					
1	% of patients with an initial eGFR <60 mL/min/1.73 m ² who received a repeat SCr test in the following 6 months	218 309	107 483	49	50
2	% of patients with an initial eGFR <60 mL/min/1.73 m ² who received a urine albumin-to-creatinine test in the following 6 months (including the day of the initial eGFR)	218 309	120 876	55	65
3	% of patients with an initial ACR >3 mg/mmol who received a repeat urine albumin-to-creatinine test in the following 6 months	131 178	55 583	42	42

Stage of Nephropathy



TESTING AND READING TIME Rev. 08/2010

	Neg.	Trace	Small	Moderate	Large	units	
Leukocytes 120s	Neg.	Trace	Small	Moderate	Large	cells/ μ l	
Nitrite 60s	Neg.	Positive (Any degree of uniform pink color)					
Urobilinogen 60s	3.2	16	32	64	128	μ mol/l	
Protein 60s	Neg.	Trace	Small	Moderate	Large	g/l	
pH 60s	5.0	6.0	6.5	7.0	7.5	8.0	8.5
Blood 60s	Neg.	Not identified	10 Trace	25 Small	60 Moderate	200 Large	cells/ μ l
Specific Gravity 45s	1.000	1.005	1.010	1.015	1.020	1.025	1.030
Ascorbate 40s	0	0.6	1.4	2.8	5.0	mmol/l	
Ketone 40s	Neg.	Trace	Small	Moderate	Large	mmol/l	
Bilirubin 30s	Neg.	Trace	Small	Moderate	Large	μ mol/l	
Glucose 30s	Neg.	5	15	30	60	110	mmol/l

Screening – who, when, how often

Risk Factors

- Diabetes Mellitus
- Cardiovascular Disease
- Urinary tract abnormalities including reduced renal mass
- Known systemic auto immune disorders such as SLE
- Excessive use of known toxins such as analgesics (NSAIDs), lithium and others
- Hypertension
- Family history of kidney disease
- High risk ethnic groups e.g. Indigenous

Screening for at risk individuals (annual):

- History and physical examination with blood pressure assessment
- eGFR from serum creatinine (ml/min/1.73m²)
- Urinalysis, and spot urine for albumin/creatinine (ACR)

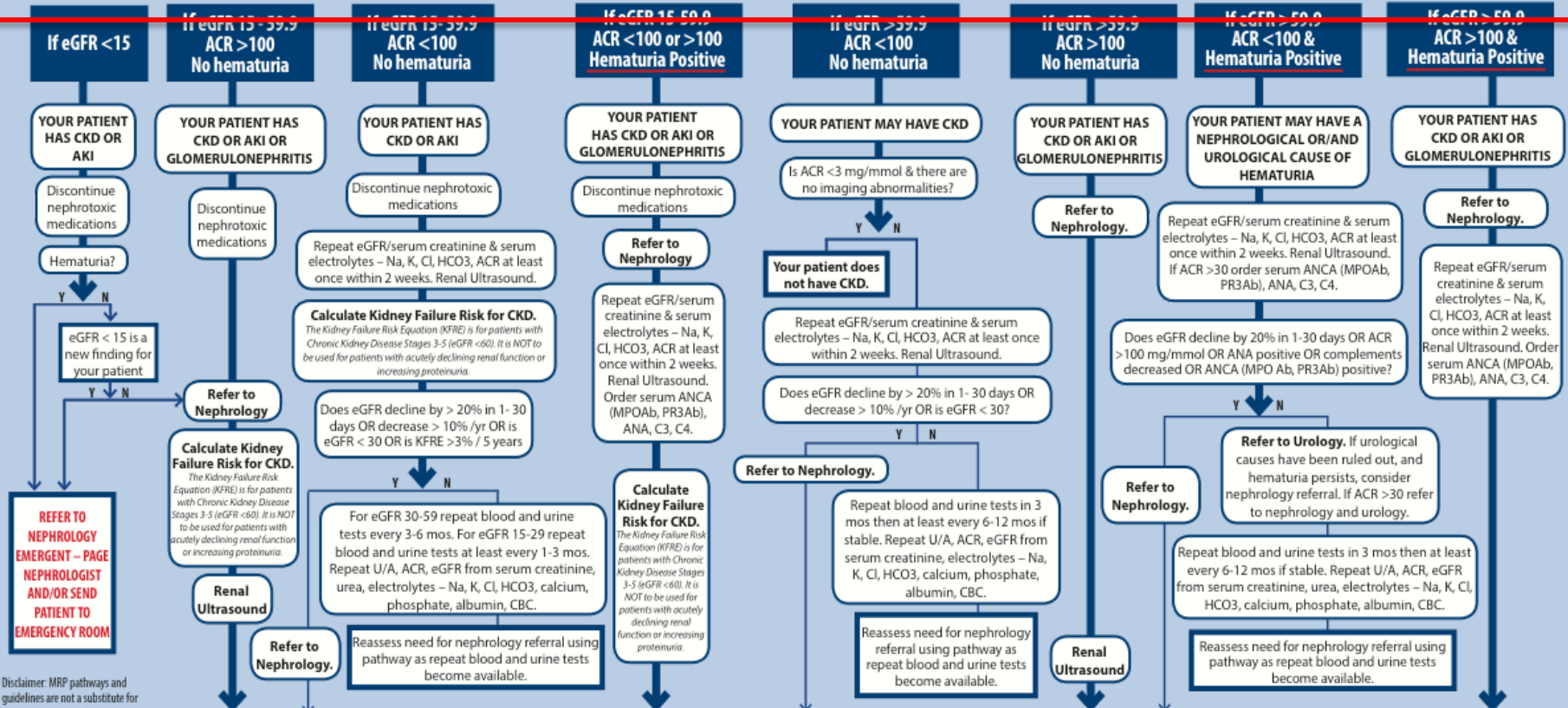
If abnormal eGFR or Albumin/Creatinine Ratio (ACR) or hematuria, order Renal Ultrasound and CBC, serum urea, electrolytes – Na, K, Cl, HCO₃, calcium, phosphorus, glucose, albumin. If over 40 y/o obtain serum and urine protein electrophoresis.

ALSO

If diabetic see: **Diabetic Nephropathy Management Guidelines**

If non-diabetic see: **Non-Diabetic CKD Management Guidelines**

ACR - Albumin/Creatinine Ratio GFR units - ml/min/1.73m²



Repeat eGFR/serum creatinine & serum electrolytes at least Q 1-4 weeks until seen by nephrology. Forward all blood and urine test results to nephrology. Page on call nephrologist if:

1. Acute kidney injury or acute glomerulonephritis is suspected or you are not sure.
2. Evidence of worsening renal function.

Disclaimer: MRP pathways and guidelines are not a substitute for the healthcare provider's clinical judgement in providing the most appropriate care to meet the unique needs of his/her patient.

Risk Factors

Diabetes
CV Disease
Urinary Tract Abnormalities
Reduced Renal Mass
AI disease (ex. SLE)
NSAIDS, Lithium Use
Hypertension
Family History of kidney disease
High Risk Ethnic Groups ex.
Indigenous

Annual
screening for at
risk Individuals

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graph TD; A[Risk Factors] --> B[Annual screening for at risk Individuals]; B --> C[Hx and Px (with BP)  
eGFR  
U/A and Urine ACR]; C --> D[If AbN order a renal U/S, CBC, serum Ur, Na, K, Cl, HCO3, Ca, PO4, Glucose, Alb. If age>40 get SPEP and SFLC]; C --> E[If Diabetes, see Diabetic Nephropathy Management Guidelines. If Non Diabetic see Non-Diabetic CKD Management Guidelines];
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Hx and Px (with BP)
eGFR
U/A and Urine ACR

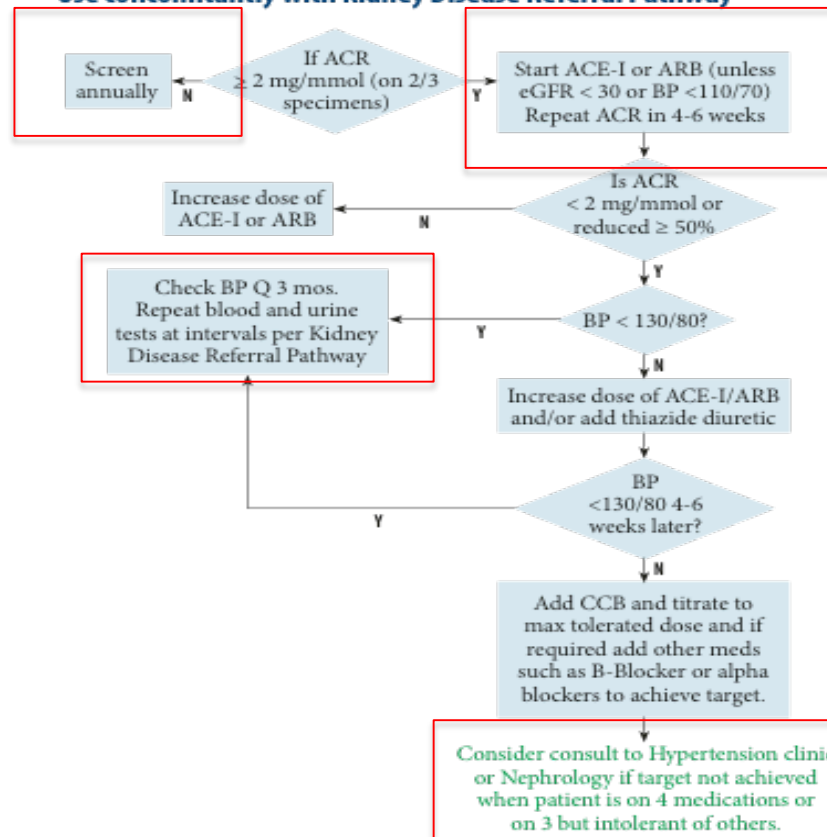
If AbN order a renal U/S, CBC, serum Ur, Na, K, Cl, HCO₃, Ca, PO₄, Glucose, Alb. If age>40 get SPEP and SFLC

If Diabetes, see Diabetic Nephropathy Management Guidelines. If Non Diabetic see Non-Diabetic CKD Management Guidelines

Kidney Failure Risk Tools & Referral Pathways

Diabetic Nephropathy Management Guidelines

Use concomitantly with Kidney Disease Referral Pathway



Guidelines for using ACE-I and ARB:

- ACE-I/ARB are absolutely contraindicated in pregnancy. Any pre-menopausal woman on and ACE-I/ARB should be on an appropriate contraceptive method.
- **Always check eGFR and serum K prior to and in 1-2 weeks of initiation or increasing dose of ACE-I/ARB.**
- Expect up to a 15% decrease in eGFR. If eGFR decreases repeat again in 1-2 weeks and if eGFR decrease is stable continue ACE-I/ARB; if not, repeat eGFR again in 1-2 weeks. If eGFR continues to decrease, STOP ACE-I/ARB.
- If serum K > 5 advise dietary K restriction.
- If serum K > 6 advise dietary K restriction +/- prescribe diuretic if tolerated, +/- prescribe K resin binder. If unsuccessful in lowering serum K to < 5.5, DECREASE OR STOP ACE-I/ARB,
- HOLD ACE-I/ARB if patient has severe vomiting/ diarrhea, or volume depletion

Interventions and Targets for Diabetic Nephropathy:

- Regular exercise program
- Weight loss if obesity
- Cessation of smoking
- Low Sodium Diet (Advise check food labels)
- Avoid NSAIDs & other nephrotoxins
- Target BP < 130/80
- Target HgbA1C < 7% (check Q 3 mos)
- Consider statin treatment
- Assess medications for potential contraindication in CKD
- Adjust medication dosing for level of eGFR
- Discontinue metformin for eGFR < 30. Use with caution or discontinue for eGFR < 60.
- Monitor glucose closely and consider stopping long acting sulfonylurea (eg glyburide) in patients with declining eGFR.

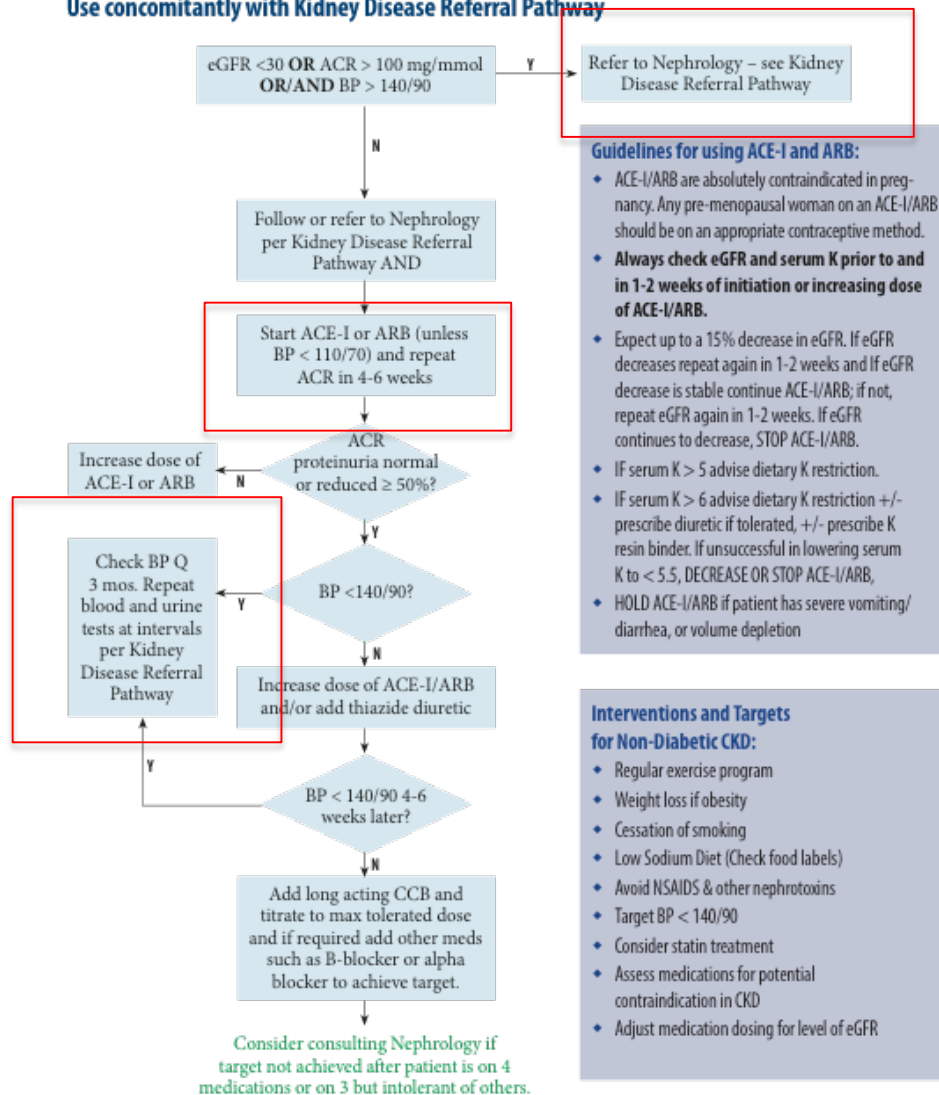
N.B. See 'Proteinuria Conversion Table'

Disclaimer: NRP pathways and guidelines are not a substitute for the healthcare provider's clinical judgement in providing the most appropriate care to meet the unique needs of his/her patient.

Kidney Failure Risk Tools & Referral Pathways

Non-Diabetic CKD Management Guidelines

Use concomitantly with Kidney Disease Referral Pathway



Guidelines for using ACE-I and ARB:

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- HOLD ACE-I/ARB if patient has severe vomiting/diarrhea, or volume depletion

Interventions and Targets for Non-Diabetic CKD:

- Regular exercise program
- Weight loss if obesity
- Cessation of smoking
- Low Sodium Diet (Check food labels)
- Avoid NSAIDS & other nephrotoxins
- Target BP < 140/90
- Consider statin treatment
- Assess medications for potential contraindication in CKD
- Adjust medication dosing for level of eGFR

Disclaimer: MRP pathways and guidelines are not a substitute for the healthcare provider's clinical judgement in providing the most appropriate care to meet the unique needs of his/her patient.

N.B. See 'Proteinuria Conversion Table'

The CURRENT CKD Journey



FIND

- Primary care screening

DECIDE

- Risk of progression
- Refer or not refer
- When to prepare for dialysis/transplant
- When to start dialysis

TREAT

- Blood pressure
- Glucose management
- Multidisciplinary Care
- Dialysis/Transplant

Estimating Risk



Heat Map of Classification of CKD

Prognosis of CKD by GFR and Albuminuria Categories				Albuminuria categories		
				Description and range		
				A1	A2	A3
				Normal to mildly increased	Moderately increased	Severely increased
				<30 mg/g <3 mg/mmol	30-299 mg/g 3-29 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	60-90			
	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.
KDIGO 2012

The Prevalence of CKD in Rural Canadian Indigenous Peoples: Results From the First Nations Community Based Screening to Improve Kidney Health and Prevent Dialysis (FINISHED) Screen, Triage, and Treat Program

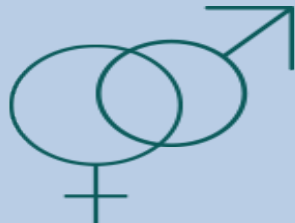
Paul Komenda, MD, MHA,¹ Barry Lavallee, MD,^{1,2} Thomas W. Ferguson, MSc,¹
 Navdeep Tangri, MD,¹ Caroline Chartrand, RN,² Lorraine McLeod, RN,²
 Audrey Gordon, MBA,³ Allison Dart, MD,⁴ and Claudio Rigatto, MD¹

			Albuminuria (mg/g)			
			A1		A2	A3
			Optimal to high-normal		High	Very high to nephrotic
			<10	10-<30	30-<300	≥ 300
eGFR (mL/ min/ 1.73 m ²)	G1a	≥105	26.4% (24.0%-28.7%)	18.6% (16.6%-20.7%)	10% (8.4%-11.6%)	1.9% (1.1%-2.6%)
	G1b	90-104	10.2% (8.6%-11.8%)	8.2% (6.8%-9.7%)	4.8% (3.6%-5.9%)	0.7% (0.2%-1.1%)
	G2a	75-89	5.3% (4.1%-6.6%)	3.2% (2.3%-4.1%)	2.6% (1.8%-3.5%)	1% (0.5%-1.6%)
	G2b	60-74	1.6% (0.9%-2.2%)	1.0% (0.4%-1.5%)	0.9% (0.4%-1.4%)	0.3% (0%-0.6%)
	G3a	45-59	0.4% (0.1%-0.8%)	0.8% (0.3%-1.3%)	0.3% (0%-0.6%)	0.2% (0%-0.5%)
	G3b	30-44	0.1% (0%-0.2%)	0.2% (0%-0.5%)	0.4% (0%-0.7%)	0.4% (0.1%-0.8%)
	G4	15-29	0% (0%-0%)	0% (0%-0%)	0% (0%-0%)	0.3% (0%-0.6%)
	G5	<15	0% (0%-0%)	0% (0%-0%)	0% (0%-0%)	0.1% (0%-0.4%)
Totals:			74.5% (72.2%-76.8%)	19.5% (17.4%-21.7%)	4.5% (3.4%-5.6%)	1.5% (0.8%-2.1%)



URINE

+



SEX

+



AGE

+

GFR

GLOMERULAR
FILTRATION RATE

=

THE PROJECTED RISK OF KIDNEY FAILURE

JAMA[®]

The Journal of the
American Medical
Association

Tangri et al. 2011

Case

45 yo Male, PMH of newly diagnosed diabetes, obesity, and is a smoker. His labs show a GFR 30, Urine ACR 300.

Are they at high risk?

80 yo Male, PMH of DM2 for 20 years with good control, obesity, and is a smoker. His labs show GFR 30, ACR 10.

Are they at high risk?

45 yo Male, PMH of newly diagnosed diabetes, obesity, and is a smoker. His labs show a GFR 30, Urine ACR 300.

Moderately to severely decreased function



Patient risk of progression to kidney failure requiring dialysis or transplant:

AT 2 YEARS

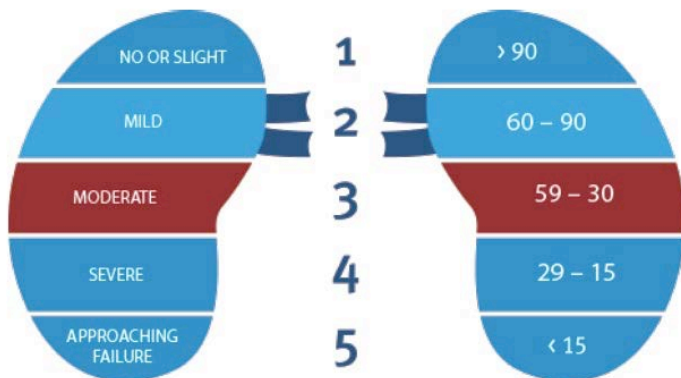
28.51%

AT 5 YEARS

64.93%

80 yo Male, PMH of DM2 for 20 years with good control, obesity, and is a smoker. His labs show GFR 30, ACR 10.

Mildly to moderately decreased function



Patient risk of progression to kidney failure requiring dialysis or transplant:

AT 2 YEARS

0.63%

AT 5 YEARS

1.95%

No Current Risk 0%

Low Risk (<3%/5 yr risk of kidney failure)

Intermediate Risk (3-10%/5 yr risk of kidney failure)

High Risk (>10%/ 5 yr risk of kidney failure)

Kidney Failure Risk Tools & Referral Pathways

Outpatient Nephrology Referral Form

Detailed 2016 Nephrology Referral Pathways are available at: www.kidneyhealth.ca/pathways

Referring MD: _____ Ph. _____ Fax. _____

Patient Name: _____ Phone: _____

PHIN: _____ Address: _____

Please complete and append results of:

- ♦ Past medical history
- ♦ Medications list
- ♦ eGFR (also serum urea, creatinine) at least two values
- ♦ CBC
- ♦ Urinalysis
- ♦ Spot urine for ACR

Consider ordering and send reports when available:

- ♦ Serum and Urine Protein Electrophoresis (> 40 years of age)
- ♦ Kidney Ultrasound

REFERRAL SITE PREFERENCE (check one)

- St. Boniface Hospital • Fax to (204) 233-2770
- Health Sciences Centre • Fax to (204) 787-7366
- Seven Oaks Hospital • Fax to (204) 697-4204
- Brandon Regional Health Centre
Fax to (204) 726-8797
- Dr. _____

EMERGENT REFERRAL (< 24 HOURS)

DO NOT FAX REFERRAL

eGFR <15 mL/min with indications (see referral pathway) for emergent dialysis

PAGE NEPHROLOGIST ON CALL AT:

Health Sciences Centre
(204) 787-2071

St. Boniface Hospital
(204) 237-2053

Brandon
(204) 578-4000 or
(204) 571-7139

NON-EMERGENT

Reason for Urgency (check all that apply)

- eGFR <30 mL/min
- KFRE >3% / 5 year
- eGFR decline by >20% in 1-30 days (acute kidney injury)
- Proteinuria (ACR >100 mg/mmol)
- Hematuria, suspected GN (eGFR or proteinuria criteria below, or ANA>1:80, or decreased complements, or ANCA positive or normal urological evaluation)
- Other (REASON) _____

Signature: _____ Date: _____

1 – ACR = Albumin to Creatinine Ratio. 2 – eGFR = estimated Glomerular Filtration Rate automatically calculated from serum Creatinine by MDRD Formula.

N.B. The noted appointment wait times are target benchmarks, but each patient will be triaged at time of referral. Appointment times may vary. Until your patient is assessed by a nephrologist, you (referring physician) are responsible for monitoring (and forwarding) your patient's blood and urine tests at regular intervals as suggested in the MRP Kidney Disease Referral Pathway. You should contact the nephrologist with any new concerns.

Case

45 yo Male, PMH of newly diagnosed diabetes, obesity, and is a smoker. His labs show a GFR 30, Urine ACR 300.

Should they see a nephrologist?

80 yo Male, PMH of DM2 for 20 years with good control, obesity, and is a smoker. His labs show GFR 30, ACR 10.

Should they see a nephrologist?

Indications for Referral to Specialist Kidney Care Services for People with CKD (KFRE is just a tool!)

eGFR < 30 ml/min

eGFR rapid decline > 10%/year or 20% in a shorter interval

K⁺ >6, other electrolyte abnormalities

Nephrotic Range Proteinuria +/- eGFR

Refractory Hypertension

Hematuria/Suspected GN

Structural Disease/Polycystic Kidney Disease

Pregnancy

CALL FOR URGENT CONSULTS!!!!

The CURRENT CKD Journey



FIND

- Primary care screening

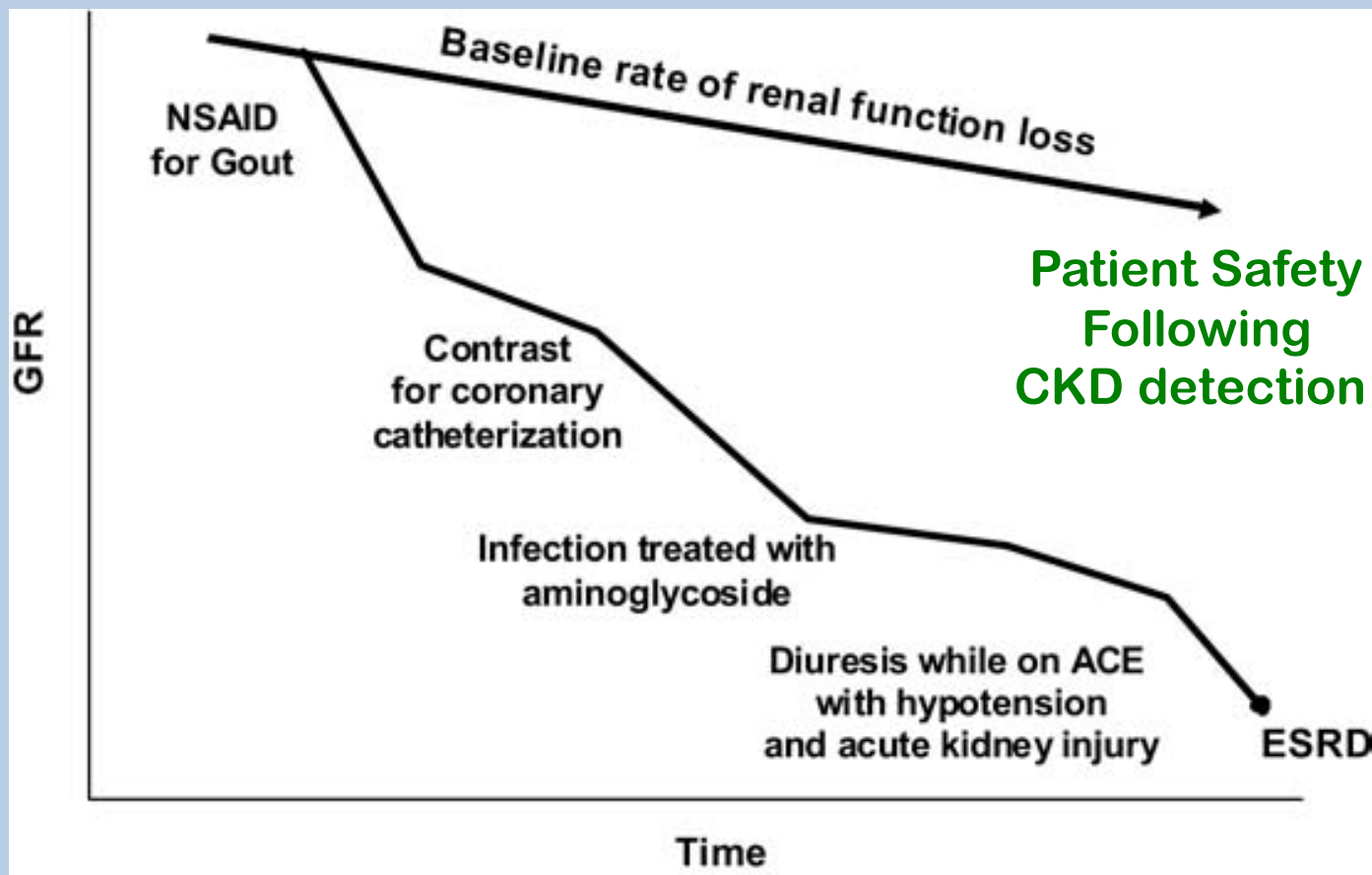
DECIDE

- Risk of progression
- Refer or not refer
- When to prepare for dialysis/transplant
- When to start dialysis

TREAT

- Blood pressure
- Glucose management
- CV Risk
- Multidisciplinary Care
- Dialysis/Transplant

Impact of primary care CKD detection with a patient safety approach



Improved diagnosis creates opportunity for strategic preservation of kidney function

Risk-Based Teams Approach

Low Risk Patients

Team:

- Primary care provider

Focus:

- Lifestyle
- blood pressure

Medium Risk Patients

Team:

- Primary Care providers
- Kidney specialist

Focus:

- Diagnosis
- Lifestyle
- Blood pressure
- Protein leak reduction

High Risk Patients

Team: Multidisciplinary Kidney Health Clinic

- Primary care provider*
- Kidney specialist
- Kidney Nurse
- Kidney Dietitian
- Kidney Pharmacist
- Kidney Social worker

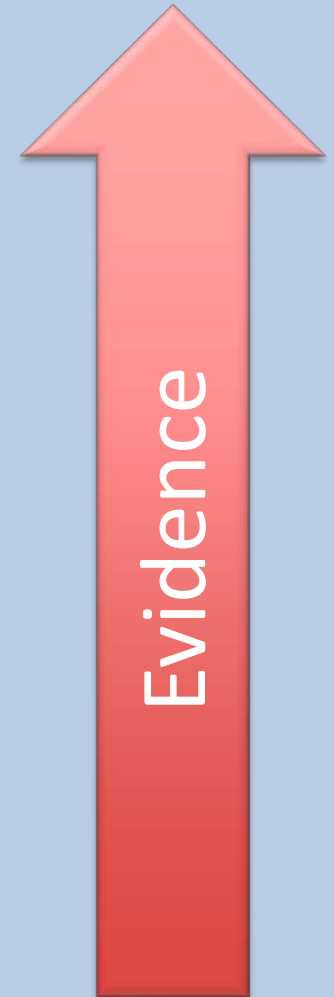
Focus:

- Healthy Lifestyle
- Reduction of blood pressure
- Reduction of protein leak in the urine
- Treat consequences of low kidney function
- Treat related heart and diabetic diseases

Resource allocation aligned with
RISK

Evidence Based Treatments for CKD

- Sodium-Glucose Transporter 2 Inhibitors (SGLT-2i)
- Blood Pressure <130/80
- Renin-Angiotensin Inhibitors (ACE/ARB)
- Target optimal blood glucose (HgbA1c – 7%)
- Cardiovascular risk factor control
- Acid-Base Control



The earlier we catch it, the longer time to needing dialysis

Medication adjustments

- Declining kidney function may necessitate changes to > 30% renally-cleared drugs
- Stop NSAIDs
- Minimize polypharmacy
- Many commonly used meds need dose adjustment based on CrCl or GFR
 - Allopurinol
 - Gabapentin
 - Narcotics
 - BB
 - Digoxin
 - Antibiotics
 - MTX
 - Enoxaparin/anticoagulants
 - Diabetic meds

S	Sulfonylureas
A	ACEi
D	Diuretics
M	Metformin
A	ARB
N	NSAIDs
S	SGLT2 inhibitors

Thank you!

