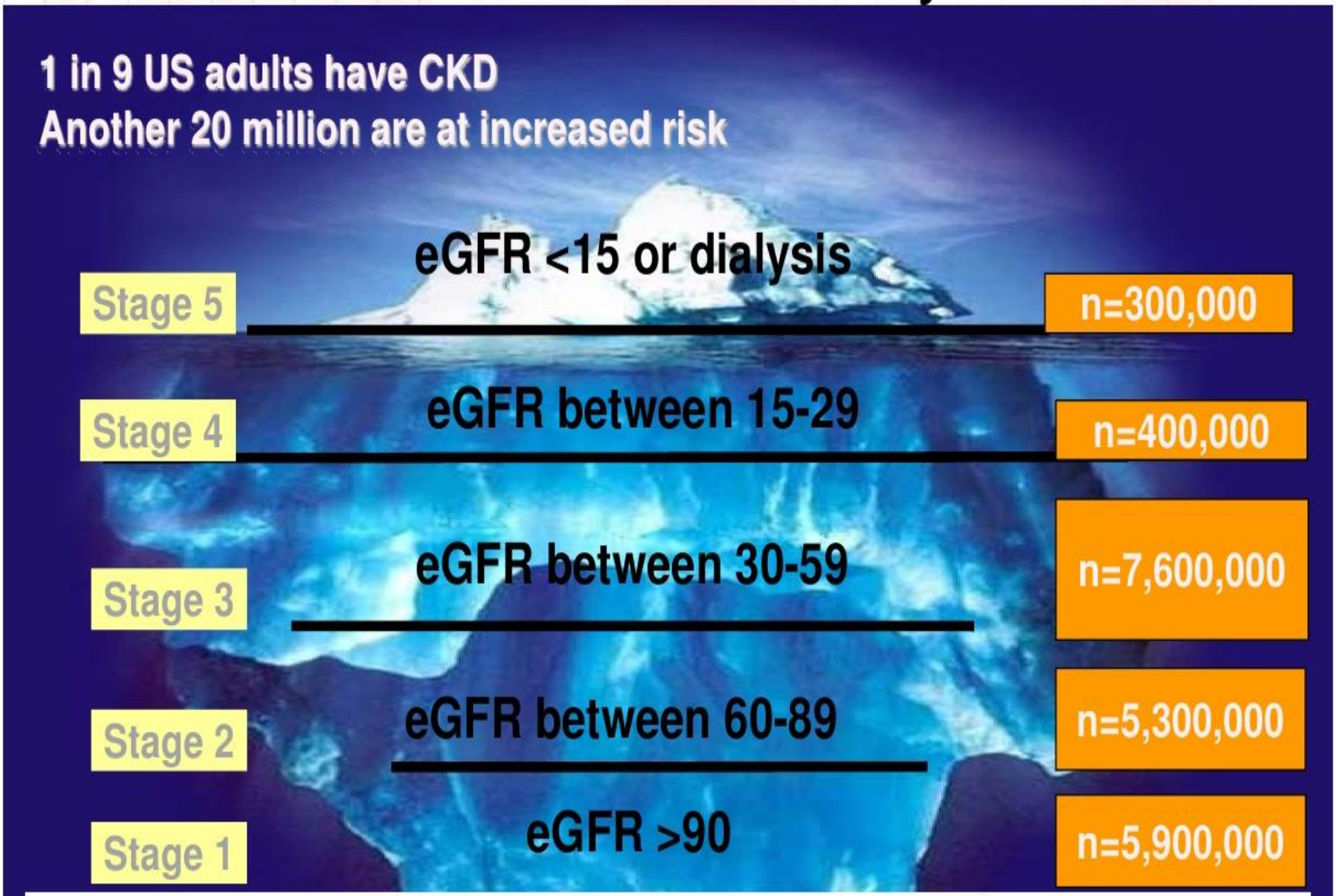
Prevalence of Chronic Kidney Disease



Chronic kidney disease is defined as either kidney damage or GFR <60 mL/min/1.73 m^2 for ≥3 months. Kidney damage is defined as pathologic abnormalities or markers of damage, including abnormalities in blood or urine tests or imaging studies.

CKD: The Epidemic

- Prevalence data for chronic kidney disease suggest that across the globe rates range from 7 – 12%
- Estimates for Barbados at 20 000 persons
- 0.01% of population on dialysis
- Increasingly large proportion of the health budget being spent on tertiary care (> BDS 15 million /yr)

Outline

- Goals of The Renal team
- Services available at the QEH
- What we want you to know

Goals: Primary Care

- Support primary care efforts with education of patients and communities regarding CKD and its risk factors

- Support education of healthcare workers regarding care of patients with CKD (protocols, updates)

Goals: Primary/Secondary Care

- Identifying patients at risk for or diagnosed with a CNCD (DM, HTN, CVD)
- Early identification of CKD by appropriate screening
- Appropriate management of these individuals to reduce CKD progression
- Encourage the identification of those for referral to the specialist

Goals: Tertiary care

- Identifying/confirming and staging of CKD
- Investigating the aetiology of CKD and instituting appropriate therapy
- Instituting management to reduce progression of CKD
- Identifying and managing complications of CKD
- Preparation for and managing replacement therapies

Nephrology services at the QEH

Nephrology services

- General nephrology services
- Acute care service
- Dialysis
  - Hemodialysis
  - Peritoneal dialysis
- Renal transplantation

General Nephrology

General Nephrology:

- Weekly clinics (5 – 6hrs), satellite clinic at SWSPC
- Population size (no database, >800 patients)
- 45 patients weekly
- Referrals average 6 patients/week
- Discharge 1 patient/week
- Deaths (unknown)
- Transition to dialysis

General Nephrology:

- **Chronic kidney disease:**
  - Reduced eGFR, persistent proteinuria
- **Hematuria:**
  - Microscopic hematuria, macroscopic hematuria
- **Difficult to control hypertension**

Acute care

Acute care:

- **Admissions from AKU:**
  - Access issues: catheter malfunction, clotted fistulas
  - CLABSI (catheter infection)
  - Cardiovascular complications
- **In hospital referrals:** average ~8 per week
  - AKI/Acute on chronic kidney disease
  - Nephrotic syndrome

Acute care:

- Consultations and clinical management
- Temporary and permanent vascular catheters for dialysis
- Kidney biopsies

Hemodialysis

Nephrology services: Hemodialysis

- The late Professor George Nicholson established and developed the first Renal clinic at The Queen Elizabeth Hospital in 1979

- At that time there were only three patients on the then Hemodialysis Unit/Artificial Kidney Unit

Hemodialysis

YEAR	NUMBER OF PATIENTS	Admissions/ Deaths
1979	3	
1990	131	
2009	145	65/43
2016	227	105/69

Artificial Kidney Unit

- New unit opened in April 2007, a charitable donation by The Rotary Club of Barbados West. Dialysis machines and chairs were donated by The Barbados Canada Ball

- Capacity: 22 dialysis chairs (132 patients)

- On December 6th 2016, it was renamed The Professor George Nicholson Unit

The Renal Dialysis Unit was constructed by the

The funds for this project were raised from the
2006 Rotary West Diamonds International
Sandy Lane Golf Classic
The Renal Dialysis Unit was officially opened by
Doctor the Honourable Jerome Walcott,
Minister of Health,
on April 14th, 2007

Hemodialysis:

- 1 charge nurse
- Nursing staff
  - 11 registered nurses
  - 6 nursing assistants
- 2 aides

Artificial Kidney Unit

- **Hemodialysis:**
  - 186 patients at QEH (oversubscribed)
    - 150 x twice weekly
    - 36 x thrice weekly
  - 52 patients outsourced
  - private (unknown)

Peritoneal Dialysis

Peritoneal dialysis:

- Acute PD previously used for AKI, mainly in the ICU setting
- Chronic PD started ? 2000 (cycler therapy was introduced at QEH)
- Formal program with dedicated nurses commenced on Jan 14th 2013

Peritoneal dialysis:

- Separate unit from hemodialysis
- Mostly nurse managed (4 RNs)
  - Daily teaching, trouble shooting
  - Clinics
  - On call service
- Twice weekly clinics
- Home visit program

Peritoneal dialysis:

Year	Number of patients
2000	??
2007	6
2014	14
2015	46
2017	75

The Team

The Unit

The Equipment

The Equipment

Renal Transplantation

Renal Transplantation:

- Started at the QEH in 1989
- Restarted in 2005
- Currently partnered with Transplant Links Charity from Birmingham
  - Nov 2016 – 2
  - May 2017 – 1
  - Feb 2018 - ? 3

Renal Transplantation

Year	Number of patients
1989–1996	9
2005 –2008	3
2016–2017	3
2018	?

Staffing

Staffing

	RECOMMENDED	ACTUAL
Number of nephrologists per 100 000 population	1	0.66
Number of nephrologists per 100 patients on dialysis	1	0.8
Ratio of nurses to patients on hemodialysis	1:4	1:5-6
Ratio of nurses to patients on PD	1:20	1:18

What we want you to know

What we want you to know

- **Prevention is key**
- **Screen, screen, screen**
- **Recognise CKD**
- **Slow progression**
- **Refer early**
- **Drug safety**

1. Prevention

2. Screen

Screen, screen, screen

- Many patients with DM, HTN and urological issues continue to be seen with CKD who have had no prior screening

- Other at risk patients:
  - CVD disease
  - Recurrent kidney disease
  - SLE
  - Sickle cell disease
  - Chronic pain syndromes

Screening

- **Blood:**
  - urea and electrolytes

- **Urine:**
  - Microscopy
  - Protein to creatinine ratio
  - MACR (esp. in DM)

3. Recognise CKD

Recognise CKD

- Some labs report eGFR (CKD < 60mls/mins; need more than one result)

Calculating formulas (mobile apps)

- MDRD
- Cockcroft-Gault
- CKD-EPI

Estimating GFR: MDRD and Cockcroft-Gault

- **Abbreviated MDRD Equation**

$$\text{GFR (mL/min/1.73 m}^2\text{)} = 186 \times (\text{SCr})^{-1.154} \times (\text{age})^{-0.203} \times (0.742 \text{ if female}) \times (1.210 \text{ if African American})$$

- **Cockcroft-Gault Equation**

$$C_{Cr}\ \text{(mL/min)} = \frac{(140 - \text{age [y]} \times \text{weight [kg]})}{72 \times \text{SCr (mg/dL)}} \times 0.85 \text{ if patient is female}$$

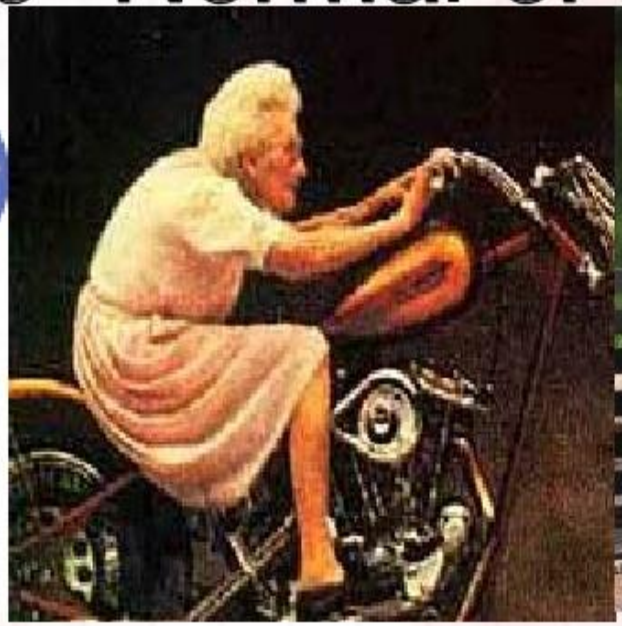
C_{Cr} = creatinine clearance; MDRD = Modification of Diet in Renal Disease.

Levey AS, et al. *Ann Intern Med*. 2003;139:137-147.

Serum Creatinine 1.3- Normal or Abnor

Abnormal

Normal



Abnormal

Normal

Why use eGFR instead of sCr?

Age	Sex	Race	SCr (umol/l)	eGFR (mL/min/1.73 m^2)	CKD Stage
20	M	B	**114**	91	**1**
20	M	W	**114**	75	**2**
55	M	W	**114**	61	**2**
20	F	W	**114**	56	**3**
55	F	B	**114**	55	**3**
50	F	W	**114**	46	**3**

Recognise CKD

- **Check urine:**
  - Dipstick +/- microscopy
  - Proteinuria
    - > 300mg/day
    - Pr/cr > 0.3
    - Refer if > 1g/day
  - MACR

Okay, one last time: This is not a urinal.

Get caught tossing a bottle of urine and you'll pay $95.
Fines for littering range from $95 to $1,000. Remember, Washington State Patrol has eyes out for violators. (Not to mention their noses).

Litter and it will hurt.

REPORT VIOLATORS
866-LITTER-1

Recognise CKD

- Moderately increased albuminuria:
  - 30-300mg/day (0.03mg/mg)
  - Reflects vascular damage (endotheial dysfunction)
  - Accepted as a risk factor for CVD and earlier cardiovascular mortality
  - Established risk factor for renal disease progression in type 1 DM
  - Prevented by aggressive BP control (ACE-I)

Equivalents in urine protein measures

	Urine ACR (mg/mmol)	24h urine albumin (mg/day)	Urine PCR (mg/mmol)	24h urine protein (mg/day)
Microalbuminuria	Male: 2.5-25 Female: 3.5-35	30-300	Male: 4-40 Female: 6-60	50-500
Macroalbuminuria	Male: > 25 Female: > 35	> 300	Male: > 40 Female: > 60	> 500

Repeat urine ACR

↑ ACR in conditions other than CKD:

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)

4. Slow progression

Treatment target for people with CKD

Parameter	Target	Treatment
Blood Pressure	≤ 140/90 mmHg or ≤ 130/80 mmHg if albuminuria is present (ACR > 2.5 mg/mmol males; >3.5 mg/mmol females)	Lifestyle modification ACE inhibitor or ARB
Albuminuria	>50% reduction of baseline value	ACE inhibitor or ARB
Cholesterol	Total < 4.0 mmol/L LDL < 2.5 mmol/L	Dietary advice statins
Blood glucose (for people with diabetes)	HbA1c <7.0% / 53 mmol/mol	Lifestyle modification Oral hypoglycaemic Insulin

5. Drug safety

Minimizing adverse events

- Minimize pill burden as possible
  - 8- 10 tablets per patient
- Review medications carefully for
  - Dose
  - Potential interactions
- Educate patient on:
  - Avoiding NSAIDs
  - Potential drug adverse effects

NSAIDs

- Injure kidneys directly
  - Induce acute kidney injury (AKI) from “pre-renal” or ATN
  - Interstitial nephritis
  - Nephrotic syndrome
- Decrease kidney potassium excretion → hyperkalemia
- Decrease sodium excretion → HTN, edema

NSAIDs

- Avoid in patients with:
  - CKD
  - Conditions that could lead to "pre-renal physiology"
    - CHF
    - Cirrhosis
    - Renal artery stenosis
    - RAAS-blockade

Metformin

- eGFR 45 to 60 mL/min/1.73m²
  - Continue metformin use and ↑ monitoring of eGFR to every 3 - 6 months
- eGFR 30 to 45 mL/min/1.73m²
  - Use metformin with caution with lower dose (50% maximal)
- eGFR < 30 mL/min/1.73m²
  - Stop metformin

Drug Safety

- Antacid drugs may contain magnesium or aluminium and should be avoided in CKD

- Bowel preparations containing phosphorus should be used with caution

Drug safety

- Do not adjust, add or discontinue medications in any patient with a renal transplant patient without discussion with a specialist

7. Early referral

Referral to specialist

- Unclear cause of CKD
- Active urine sediment
- Uncontrolled HTN (on appropriate meds)
- Stage 4 CKD
- Rapid decline in renal function
- Protein > 1g/day (unless known DM nephropathy)
- Difficult to control complications
- Young patients
- Hereditary disease

Thank you