CSI for CKD
Unravelling the myths surrounding chronic kidney disease

Practical Evidence for Informed Practice
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University of Alberta

Faculty/Presenter Disclosure

- Presenter: Scott Klarenbach

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Learning Objectives

- Identification of CKD
  - Who to test?
  - What does it mean?
  - Who to refer?
- Treatment of CKD
  - ACEi and ARB
  - Other interventions (CV risk, nephrotoxins)

ckdpathway.ca

Background

- The majority of patients with CKD in Alberta are cared for by primary care providers:

All patients should be screened for CKD?

Who to test?

Targeted for individuals of increased risk of CKD:

- Hypertension
- Diabetes Mellitus
- Family hx of Stage 5 CKD or hereditary kidney dz
- Vascular disease (CVD, stroke/TIA or PVD)
- Multisystem disease with potential kidney involvement (SLE)
A 24 hour urine test is needed to assess for proteinuria

**Recommended tests:**

- eGFR (estimate glomerular filtration rate)
- Urine:
  - Random Urine ACR (albumin:creatinine ratio)
  - Urinalysis for hematuria
How to diagnose CKD?

Either of the following present for >3 months:

- Markers of kidney damage:
  Albuminuria (ACR ≥ 3 mg/mmol)

  OR

- Decreased eGFR:
  eGFR < 60 mL/min/1.73 m²

What eGFR constitutes a diagnosis of CKD?

<table>
<thead>
<tr>
<th>eGFR category</th>
<th>eGFR (mL/min/1.73 m²)</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>G1</td>
<td>&gt;90</td>
<td>Normal or high</td>
</tr>
<tr>
<td>G2</td>
<td>60-89</td>
<td>Mildly decreased</td>
</tr>
<tr>
<td>G3a</td>
<td>45-59</td>
<td>Mildly to moderately decreased (CKD)</td>
</tr>
<tr>
<td>G3b</td>
<td>30-44</td>
<td>Moderately to severely decreased (CKD)</td>
</tr>
<tr>
<td>G4</td>
<td>15-29</td>
<td>Severely decreased (CKD)</td>
</tr>
<tr>
<td>G5</td>
<td>&lt;15</td>
<td>Kidney failure (CKD)</td>
</tr>
</tbody>
</table>
How is ACR categorized?

<table>
<thead>
<tr>
<th>Category</th>
<th>ACR (Approximate equivalent) (mg/mmol)</th>
<th>Terms</th>
</tr>
</thead>
<tbody>
<tr>
<td>A1</td>
<td>&lt;3</td>
<td>Normal to mildly increased</td>
</tr>
<tr>
<td>A2</td>
<td>3-30</td>
<td>Moderately increased</td>
</tr>
<tr>
<td>A3</td>
<td>&gt;30</td>
<td>Severely increased</td>
</tr>
</tbody>
</table>

Abbreviations: ACR, albumin:creatinine ratio

* Note that where albuminuria measurement is not available, urine reagent strip results can be substituted

Heat Map: Risk of ESRD, Death, CV Events

Levey et al, Kidney Int, 2010
Management of CKD

• Treat underlying disorder
• General management
All patients with CKD should be on an ACEI or ARB

ACEI and ARBs

• Pillar of BP management for proteinuric renal disease
  – Diabetic nephropathy
  – Non-diabetic proteinuria

• What degree of proteinuria?
  – 0.5 to 1g per day
  – Meta – analyses of trials
    • No statistically significant benefit at ~1g/day or less
    • Magnitude of benefit increases greatly with increasing proteinuria
ACEI and ARBs

- Non-proteinuric renal disease
- Implications for treatment:

Elderly (≥70):
- Not included in majority of trials
- Majority of patients with CKD have <0.5 g/day (AKDN, NHANES)
- Benefit is long term (competing risk)

Hyperkalemia
Other BP meds

A rise in serum creatinine after initiation of an ACEI or ARB is a poor prognostic sign
ACEI / ARB
- Vasodilate efferent arteriole
- Decrease intra-glomerular pressure
- Decrease GFR
ACEI and ARBs

What do I do if the creatinine increases?
- Rule of thumb: 20-25% increase acceptable

Which is better ACEI or ARBs?
Are some drugs within a class better than others?
ACEI and ARBs

Which one?
- meta-analyses suggest similar level of protein reduction (surrogate outcome)
- Diabetic (Type 2) nephropathy – most trials use ARBs

- Basic principles (daily dosing)

Use of combination ACEI and ARB is better
ACEI and ARBs

Both?
- Dual therapy reduces proteinuria further than monotherapy
- HOWEVER
  - Increased risk of serious adverse events
    - Doubling of serum creatinine
    - AKI requiring dialysis
    - Hyperkalemia, hypotension
    - No difference in mortality

A clear easily accessible guide for primary care providers at the point of care is lacking for patients with CKD
Background

Evidence-practice gap

< 50% of Canadians receive appropriate preventative care

25% receive care that is unnecessary or harmful
Physician-level Barriers

Knowledge Barriers

Indications for nephrology referral?

When do you assess for proteinuria?

Use of statins in CKD?

Bring the information to the point of decision making

Where can I find more detailed information?

Evidence based recommendations from:

- Kidney Disease Improving Global Outcomes (KDIGO)
- Canadian Cardiovascular Society (CCS)
- Canadian Diabetes Association (CDA)
- Canadian Hypertension Education Program (CHEP)
- Canadian Society of Nephrology (CSN)

ckdpathway.ca
Why a clinical pathway?

• Coordination & continuity of care enhanced
• Increase clinic efficiency
• Improve patient safety
• Increase team function

Case: Helen
68 year old retired teacher

PMHX:
- Type 2 DM
- Hypertension
- Anxiety
- OA
- Dyslipidemia

Medications:
- HCTZ 12.5 mg od
- Amlodipine 5 mg od
- Metformin 500 mg TID

BP: 149/84 mmHG
Diagnosis

Diagnosis
Diagnose

Lab prompt & hyperlink

<table>
<thead>
<tr>
<th>GLUCOSE</th>
<th>GLUCOSE, RANDOM</th>
<th>6.8 mmol/L</th>
<th>3.0-11.0</th>
</tr>
</thead>
<tbody>
<tr>
<td>CREATININE, SERUM</td>
<td>CREATININE, SERUM</td>
<td>127 umol/L</td>
<td>H 35-100</td>
</tr>
<tr>
<td>CALCIUM</td>
<td>CALCIUM</td>
<td>2.43 mmol/L</td>
<td>2.10-2.55</td>
</tr>
<tr>
<td>ELECTROLYTES</td>
<td>SODIUM</td>
<td>141 mmol/L</td>
<td>133-145</td>
</tr>
<tr>
<td>POTASSIUM</td>
<td>POTASSIUM</td>
<td>4.9 mmol/L</td>
<td>3.3-5.1</td>
</tr>
<tr>
<td>CHLORIDE</td>
<td>CHLORIDE</td>
<td>106 mmol/L</td>
<td>98-111</td>
</tr>
<tr>
<td>ESTIMATED GFR</td>
<td>ESTIMATED GFR</td>
<td>33 mL/min/1.73m2</td>
<td>L &gt;=60</td>
</tr>
</tbody>
</table>

eGFR <60 mL/min/1.73m2 or urine Albumin/creatinine ratio >=3.00 mg/mmol for more than 3 months suggests chronic kidney disease. For more information on diagnosis, managements and referral see [www.diagnoseckd.ca](http://www.diagnoseckd.ca)
Case: Helen
68 year old retired teacher

Labs:
• eGFR = 33 ml/min/1.73m²
• ACR = 38 mg/mmol

Diagnose
# Medical Management

## Lifestyle Management
- Regular exercise, reduce your risk of heart disease.
- Limit alcohol intake.
- Maintain a healthy body weight.
- Eat a balanced diet rich in fruits, vegetables, and whole grains.
- Quit smoking, if you smoke.
- Use available tools and information to make healthier choices.

## Drug Therapy

<table>
<thead>
<tr>
<th>Acetaminophen</th>
<th>Tablets</th>
<th>Capsules</th>
</tr>
</thead>
<tbody>
<tr>
<td>Management of pain and fever</td>
<td>Acetaminophen 500mg</td>
<td>Acetaminophen 325mg</td>
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**Sodium Foods**

- **Choose**
  - Fresh fruit, vegetables, and lean meats.
  - Low-sodium broth, soups, and sauces.
- **Limit**
  - Canned soups and vegetables.
  - Processed meats and cheeses.

**Nutrition Tips**
- Read food labels carefully.
- Choose foods with low sodium content.
- Limit the use of salt in cooking and at the table.

**More Information**
- Sodium and heart health.
- Tips for reducing sodium in your diet.

**Resources**
- American Heart Association.
- National Institutes of Health.
- American Dietetic Association.
# Medical Management

## Case: Helen

**68 year old retired teacher**

- **PMHX:**
  - Type 2 DM
  - Hypertension
  - Anxiety
  - OA
  - Dyslipidemia

- **Meds:**
  - HCTZ 12.5 mg od
  - Amlodipine 5 mg od
  - Metformin 500 mg TID

- **BP:** 149/84 mmHg
# Medical Management

## Drug Therapy

### ACE/ARB

| Prescribing Information | | Other Considerations |
|-------------------------|--------------------------|
| Diuretics | No Diabetes | Management of increased serum potassium (IHK) |
| Prescribe an ACE or ARB unless contraindicated. | Prescribe an ACE or ARB if ACI > 30 mg/min and no contraindications. | Potassium-sparing diuretics (PSD) |
| | | Drugs that may have nephrotoxic effects |
| | | Common drugs that may require renal dose adjustments |
| | | Sick day Medication List |

## Other Considerations

- Management of increased serum potassium (IHK)
- Potassium-sparing diuretics (PSD)
- Drugs that may have nephrotoxic effects
- Common drugs that may require renal dose adjustments
- Sick day Medication List

## Management of increased serum potassium (IHK)

- Potassium-sparing diuretics (PSD)
- Drugs that may have nephrotoxic effects
- Common drugs that may require renal dose adjustments
- Sick day Medication List
Case: Helen
68 year old retired teacher

PMHX:
• Type 2 DM
• Hypertension
• Anxiety
• OA
• Dyslipidemia

Medications:
• HCTZ 12.5 mg od
• Amlodipine 5 mg od
• Metformin 500 mg TID

BP: 149/84 mmHg

Metformin should be stopped in patients with CKD
Medical Management

Case: Helen – 1 year later
69 year old retired teacher

Labs:

- eGFR = 32 ml/min/1.73m²
- ACR = 70 mg/mmol
Opportunity Availability of standard referral criteria

- Acute deterioration of kidney function
  - GFR <30ml/min/1.73m²
  - Significant and sustained albuminuria (albumin/creatinine ratio >300mg/g, equivalent to protein/creatinine ratio >500mg/g or proteinuria >500mg/24h)
  - CKD progression (sustained decrease in the GFR >5ml/min/1.73m² per year or due to a change of category [from G1 to G2, from G2 to G3a, from G3a to G3b, from G3b to G4 or from G4 to G5], whenever the latter is accompanied by a GFR loss of >5ml/min/1.73m²)

- Microhaematuria not explained by other causes, sedimen with >20 red blood cells/field, especially in the case of red blood cell casts
- Resistant HBP (not controlled with a combination of three antihypertensive drugs, including a diuretic)
- Persistent serum potassium abnormalities
- Recurrent nephrolithiasis
- Hereditary kidney disease

KDIGO, Kidney Int, 2012
Case: Helen
68 year old retired teacher

• Ankle injury from skiing
• Ibuprofen over the counter

It’s ok to use NSAIDs / COX-II inhibitors in patients with CKD
Are NSAIDs Nephrotoxic?

Adverse renal events in 1-5% of all patients

- Risk factors:
  - CKD
  - Volume depletion (diuretic?)
  - Decreased effective circulating volume (CHF)
  - ACEI or ARBs

NSAIDs
- Constrict afferent arteriole

ACEI / ARB
- Vasodilate efferent arteriole
- Decrease intra-glomerular pressure
ACEI / ARB
- Vasodilate efferent arteriole
- Decrease intra-glomerular pressure

Case: Helen
68 year old retired teacher

Common drugs that may have nephrotoxic effects

- NSAIDs & COX-2 inhibitors
- Contrast Media
- Combination ACEI/NSAID
- Diuretic
- Lithium
- Aminoglycosides
- Tacrolimus
- Cyclosporine
- Other

NSAIDs and COX-2 inhibitors

Nephrotoxic Effects
- Altered intraglomerular hemodynamics resulting in acute kidney injury (AKI)
- Acute or chronic interstitial nephritis
- Glomerulonephritis

Management
- Avoid in patients with eGFR less than 30 mL/min/1.73m²
- Avoid long term use
- Use alternative agents that are less likely to cause nephrotoxicity such as acetaminophen or certain opioids

• Ankle injury from skiing
• Ibuprofen over the counter
3 Key Messages

1. Who should be tested?

- Hypertension
- Diabetes Mellitus
- Family hx Stage 5 CKD or hereditary kidney dz
- Vascular disease (CVD, stroke/TIA or PVD)
- Multisystem disease with potential kidney involvement (SLE)
2. **What tests should be ordered?**
   - eGFR to assess kidney function
   - Random urine ACR to assess for significant persistent albuminuria
   - Urinalysis to assess hematuria

3. **What do you do with the results?**
   - BP control
   - ACEI or ARB (proteinuria)
   - Other management: CV, avoid nephrotoxins
Teaser
Other tools for primary care

- eConsult and eReferral
- Conservative Kidney Management
  ckmpathway.com

CONCEPT e-Consult / eReferral Advice Request

Initiation of referral
Demographics & clinical information (Creat, proteinuria, BP, CV risk etc).

Decision steps:
1. etiology of the CKD
2. renal risk assessment
3. CV risk evaluation

1 week

be seen:
- summary for PCP
- follow up details for PCP
- thresholds for re-referral
- summary for patient
- educational material for patient: self management, BP, life style)

Patient needs to be seen:
- additional required investigations
- appointment
- initial steps (? urgent start of medication)

Branko Braam, 2014
Step 1: Choosing CKM
If your patient requires support, consider using the Patient Decision Aid

Step 2: Initiate Care Planning
- Care Plan
- Engage Primary Care

Step 3: CKM Care
- Clinical Assessments
  - Symptom Management
  - CKD Management
- Advance Care Plan
- Establish Community Support & Referrals
- Crisis Management Plan
- End of Life Plan
- Update CKM Care Plan

Step 4: Grief & Loss