

Safe Prescribing and Renal Dosing:

Can Your EMR Help?



Faculty / Presenter Disclosure

- Faculty / Speaker's Name: Lisa Ruddy RN
- Relationships with commercial interests:
 - No relationships with commercial interests

Faculty / Presenter Disclosure

- Faculty / Speaker's Name: Stephen McLaren BSc, MD, CCFP, FCFP
- Relationships with commercial interests:
 - No relationships with commercial interests

Disclosure of Commercial Support

- This program has not received financial support or in-kind support from any organization
- **Potential for conflict(s) of interest:**
 - Lisa Ruddy and Stephen McLaren have not received payment or funding from any organization supporting this program AND/OR organization whose product(s) are being discussed in this program.

Mitigating Potential Bias

- There are no potential sources of bias.

Safe Prescribing and Renal Dosing: Outline

- Impetus
- Manpower, Tools and Technique
- Clinical Lessons
- Data Lessons
- EMR Lessons
- Change Management Lessons

Safe Prescribing and Renal Dosing:

- Impetus

Result	08-Aug-2016	13-May-2016	09-May-2016	09-Sep-2015	08-Apr-2015	14-Oct-2014	28-Apr-2014	08-Aug-2012	28-Mar-2012
CREATININE	133		122	111	112	95	114	92	78
eGFR	33		36	41	41	49	40	51	62

HbA_{1c}
LDL < 2 < 7%
BP < 130/80
Foot Exam
Eye Exam



Safe Prescribing and Renal Dosing:

- Impetus **Metformin**
- **Renal Clearance**
- **Therapeutic Index**
- **Fraction Excreted Unchanged**
- **Creatinine Clearance**

Diabetes
NOACs
Allopurinol
Lithium
Amoxil
HmGCoA
NSAIDS

Safe Prescribing and Renal Dosing:

- Impetus **Safe Dosing**

One patient at a time OR

Can technology assist a population of at risk patients?

When serum creatinine is measured in $\mu\text{mol/L}$:

$$eC_{Cr} = \frac{(140 - \text{Age}) \times \text{Mass (in kilograms)} \times \text{Constant}}{\text{Serum Creatinine (in } \mu\text{mol/L)}}$$

Where *Constant* is 1.23 for men and 1.04 for women.

Safe Prescribing and Renal Dosing:

- Manpower, Tools and Technique

1 person, Accuro EMR, Excel, web resources

Calculate Creatinine Clearance

Identify “AT RISK” Cohort

Search for Drugs of concern

Safe Prescribing and Renal Dosing:

- Calculate Creatinine Clearance

- EMR Lesson – no formula application
- Solution - Excel

- EMR Lesson – No mass import / populate tool
- Solution – Manual entry and Worksheet

Safe Prescribing and Renal Dosing:

Manually Populate CPP , then manually enter CrCl

The image shows two overlapping software windows. The top window is titled 'Diagnostic Search' and contains a search interface. The 'Code' field is populated with 'r944' and the 'Description' field contains 'Diagnostic Description'. A 'Search' button and a settings gear icon are visible. Below the search fields is a table with the following data:


Code	Type	Description
R944	ICD10	Abnormal results of kidney function studies

The bottom window is titled 'History of Problems' and displays a list of entries. The first entry is:

Date	Problem
12-Dec-2012	Abnormal results of kidney function studies




Safe Prescribing and Renal Dosing:

Lab Tests ✕



Select a Test Name:

CREATININE CLEARANCE (OTL-Manual ml / min Manual Entry) ★	PATIENT WEIGHT (OTL-Manual, Numeric)
CREATININE CLEARANCE (MSH-Manual) ★	PATIENT HEIGHT (OTL-Manual, Numeric)
CREATININE CLEARANCE (ON CML HealthCare) ★	CREATININE SERUM (OTL-Manual, Numeric)
Creatinine Clearance (OLIS) ★	CREATININE URINE (OTL-Manual, Numeric)
CREATININE CLEARANCE (Gamma-Dynacare) ★	CREATININE (OTL-Manual, Numeric)
CREATININE CLEARANCE (MDS-Manual) ★	CREATININE CLEAR. UNCORR. (OTL-Manual, Numeric)
CREATININE CLEARANCE (ON MSH) ★	BODY SURFACE AREA (OTL-Manual, Numeric)
	CREATININE CLEARANCE CORR (OTL-Manual, Numeric)
	CREATININE CLEARANCE (OTL-Manual, Numeric)
	PATIENT HEIGHT (OTL-Manual, Numeric)
	PATIENT WEIGHT (OTL-Manual, Numeric)
	TOTAL VOLUME 24 HR URINE (OTL-Manual, Numeric)
	CREATININE 24 HR URINE (OTL-Manual, Numeric)

Patient: TEST, LISA (Elizabeth) 777777777111
 DOB: 21-Apr-1978

		DOS: 08/28/2016 <input type="button" value="Select Recent Values"/>
Current Value		
Initial Steps	Identify patients at risk for ckd	<input type="checkbox"/> Hypertension <input type="checkbox"/> Diabetes <input type="checkbox"/> CVD + age 60-75
Lab Values for Diagnosis	Urine ACR (random)	<input type="text"/> <input type="button" value="+"/>
	eGFR	<input type="text"/> <input type="button" value="+"/>
If eGFR >= 60 and ACR <3 The patient does NOT have CKD	Retest Annually for patients with DM	<input type="checkbox"/> F7 to set a Task
If eGFR<30 OR ACR>60, the patient has CKD	For low eGFR: Urine R+M, CBC, lytes, Ca, PO4, PTH, Albumin	<input type="checkbox"/> ordered
	For albuminuria: Urine R+M, lytes	<input type="checkbox"/> ordered
	Consider Referral to Nephrology	<input type="checkbox"/> completed
If eGFR 30-59 and/or ACR 3-60, The patient has CKD	Check Urine R+M, lytes, follow eGFR & ACR q6m	<input type="checkbox"/> ordered
	Refer if:	<input type="text"/>
	If eGFR stable x 2 yrs follow eGFR and ACR q12m	<input type="checkbox"/> F7 to set a Task
CKD Labs	K+ (Serum Potassium)	<input type="text"/> <input type="button" value="+"/>
	Na+ (Serum Sodium)	<input type="text"/> <input type="button" value="+"/>
	PTH	<input type="text"/> <input type="button" value="+"/>
	Calcium	<input type="text"/> <input type="button" value="+"/>
	Creatinine	<input type="text"/> <input type="button" value="+"/>
	Urine RBC	<input type="text"/> <input type="button" value="+"/>
	Urine Casts	<input type="text"/> <input type="button" value="+"/>
	Weight	<input type="text"/> <input type="button" value="+"/>
	Height	<input type="text"/> <input type="button" value="+"/>
	CrCl	<input type="text"/> <input type="button" value="+"/>
Manage	Smoking Cessation Required?	<input type="text"/>
	Lipids Optimized?	choose- <input type="text"/>
	Minimize Renal Injury	Nsaid caution <input type="checkbox"/> IV Dye caution <input type="checkbox"/>
	CKD Hypertension	ACE / ARB as 1st line <input type="text"/>
Comments and Follow Up	If eGFR stable x 2yrs follow eGFR and ACR q12m	<input type="checkbox"/> F7 to set a Task
	General Comments	<input type="button" value="Add Comment"/>
	Follow Up	3 Months <input type="checkbox"/> 6 Months <input type="checkbox"/> Other: <input type="text"/>

New Worksheet

Ontario Renal Network Identification, Detection, and Management of CKD in Primary Care

IDENTIFY
 Identify patients in your practice with elevated risk of CKD based on the following:
 Hypertension Diabetes mellitus Age 60-75 with cardiovascular disease (CVD)

DETECT
 • CKD detection should be done in the absence of acute renal impairment. Low eGFR (estimated Glomerular Filtration Rate) (eGFR) generally may reflect acute kidney injury and require more rapid evaluation.
 • Test with eGFR and urine ACR (Albumin-to-Creatinine Ratio).
 • When eGFR calculation needs to be adjusted for black patients (multiply eGFR by 1.21).
 • eGFR < 60 mL/min/1.73m² repeat test in 3 months to confirm if clinical concern (diabetes (i.e. rapid decline from previous eGFR result or very low eGFR)).
 • Urine ACR > 3mg/mmol on initial testing, repeat 1 yr if more stable, and the next 3 months (at least 2 out of 3 consecutive urine ACRs must be elevated in order to be considered abnormal).
 • Always consider reversible causes prior to re-testing (e.g. recent treatment with NSAIDs, recent use of contrast dye for diagnostic imaging, (hemorrhagic infection)).

Results after 3 months

Box A: eGFR < 30 or ACR > 60
 • Patient has CKD.
 • Based on above parameters, consider seeking consultation from nephrology.
Work up:
 • For low eGFR: Urine R+M, CBC, electrolytes, Ca, PO₄, Albumin, PTH.
 • For albuminuria: Urine R+M, electrolytes.

Box B: eGFR 30-59 and/or ACR 3-60
 • Patient has CKD.
 • See history log below for management.
 • Check urine R+M, electrolytes.
 • Perform eGFR & urine ACR every 6 months.
Work up:
 • eGFR < 60 and decline ≥ 3 within 6 months (confirmed on repeat testing within 2 to 4 weeks), or eGFR < 30 or ACR > 60.
 • eGFR < 45 and urine ACR between 30 and 60 on 2 occasions, at least 3 months apart.
 • Identify by primary care physician (e.g. HF) or significant V. disorder. (MC cases or transfusion > 20 RBC/hpf).

Box C: eGFR ≥ 60 and ACR < 3
 • Patient does not have CKD.
 • Re-test annually for patients with diabetes, less frequently otherwise, unless clinical circumstances dictate more frequent testing.
 • eGFR stable for 3 years, follow eGFR and urine ACR every 12 months.

REFER TO NEPHROLOGIST
 Write waiting list consultation (see MMS/CKD Box below for management)

MANAGE

Implement measures to modify CV risk factors
 • Lifestyle modifications, smoking cessation.
 • Lipid management for patients with CKD (see CKD guidelines for further details).
 • If with diabetes, age < 60: treat with a statin.
 • If without diabetes, age ≥ 50: treat with a statin.
 • If without diabetes, age 50-60, has been secondary primary disease, either stroke, or 10 year Framingham risk > 10%: treat with a statin.
 • For patients with diabetes, target HbA1c to appropriate level (see CKD guidelines).
 • For patients with diabetes, target HbA1c to appropriate level (see CKD guidelines).

Minimize further kidney injury
 • If possible, avoid nephrotoxins such as NSAIDs, IV and intra-arterial contrast, etc. (eGFR < 60).
 • If contrast is necessary, consider oral hydration, withholding diuretics (refer to Safe Dye Medication List (see Evidence Summary)).

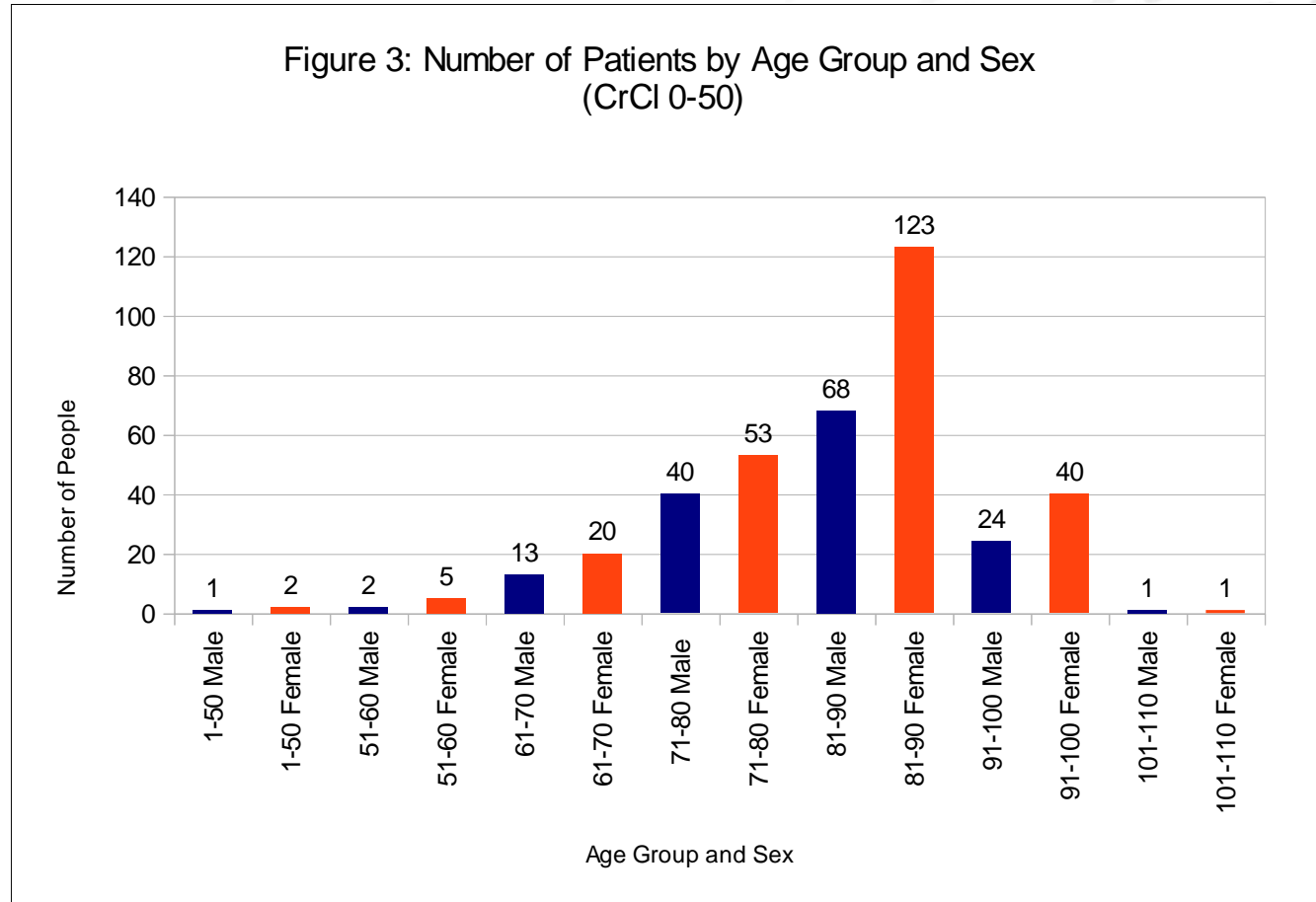
Implement measures to slow rate of CKD progression
 • ACE and SRAAS blockade (treat systolic and diastolic blood pressure (BP) to target).
 • For CKD, target BP < 130/80, otherwise target BP < 140/90.
 • For patients with diabetes and ACR > 3, start use of an ACE/ARB as first line therapy (BP already < 130/80, use ACE/ARB secondary monitoring for signs and symptoms of hyperkalemia).
 • For patients with diabetes, ACE > 30 and BP < 140/90, start use of an ACE/ARB as first line therapy.

kidneywise.ca Page 2 of 7

Ontario Renal Network

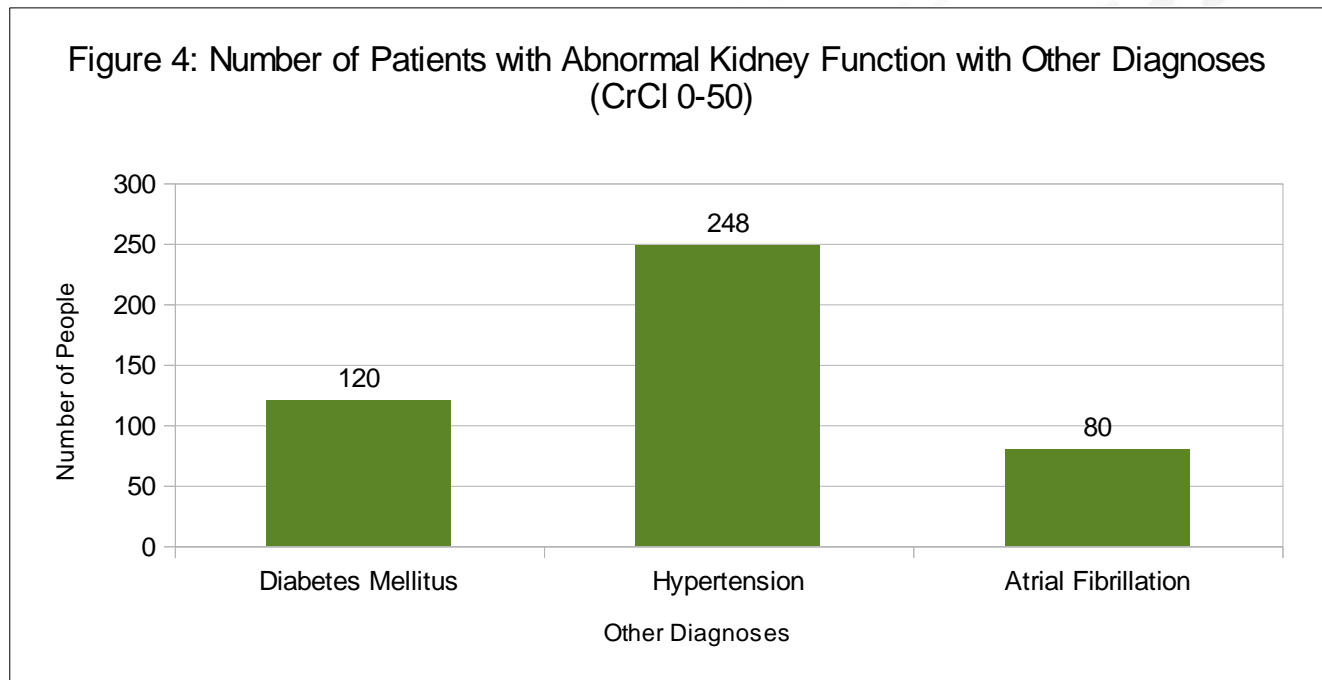
Safe Prescribing and Renal Dosing:

- Data Lessons



Safe Prescribing and Renal Dosing:

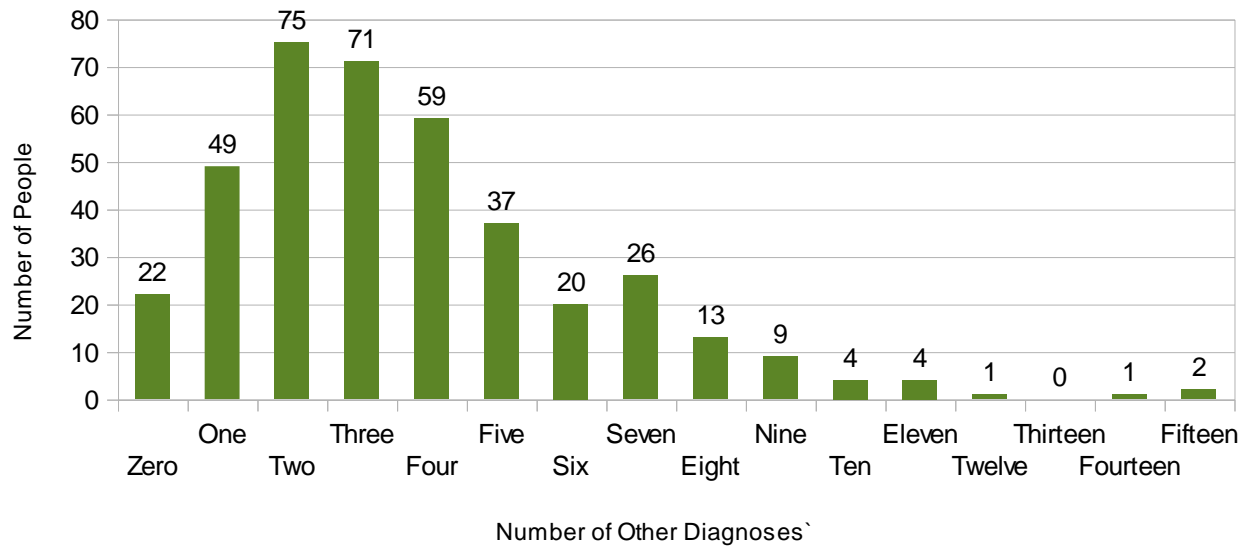
- Data Lessons



Safe Prescribing and Renal Dosing:

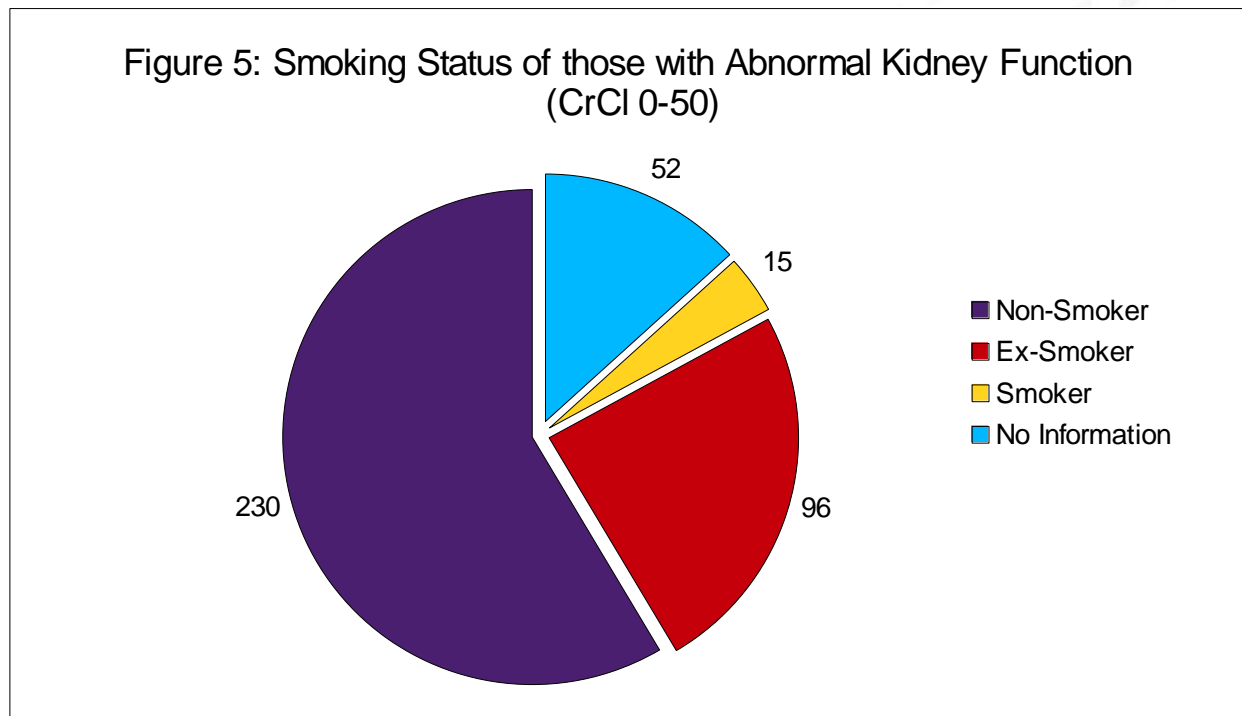
- Data Lessons

Figure 6: Number of Patients that have Other Diagnoses (CrCl 0-50)



Safe Prescribing and Renal Dosing:

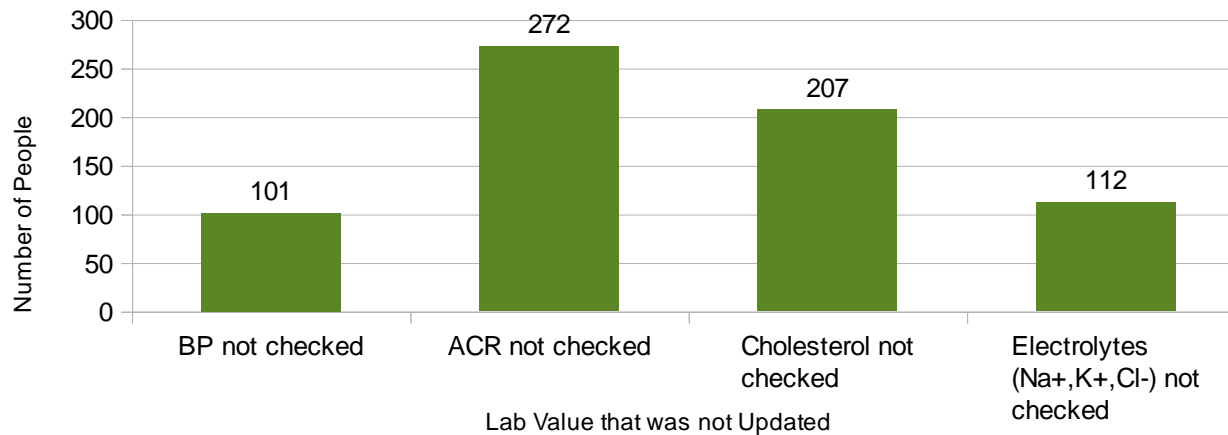
- Data Lessons



Safe Prescribing and Renal Dosing:

- Data Lessons

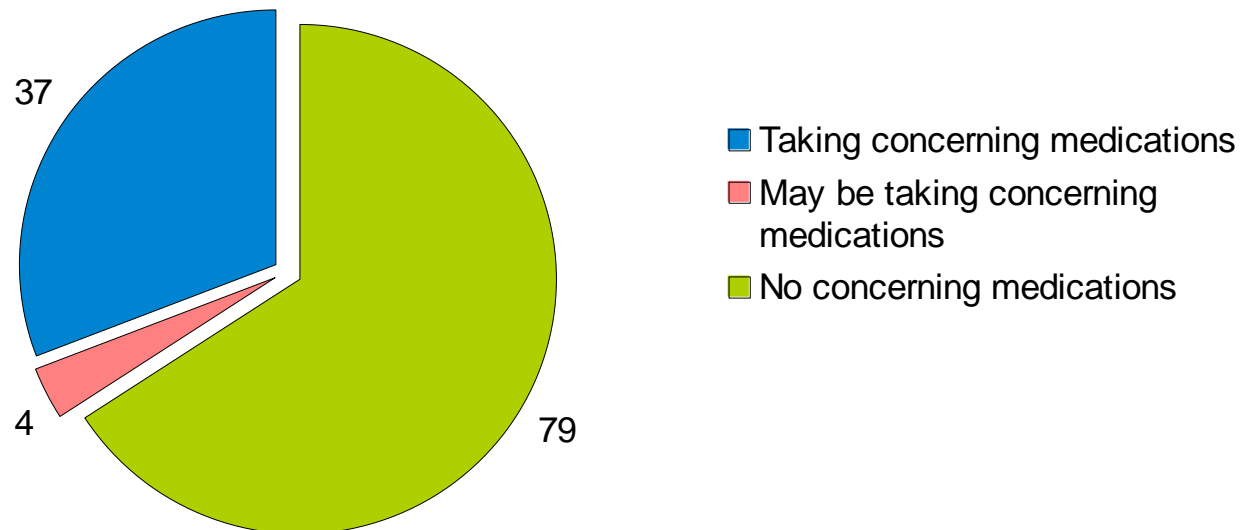
Figure 7: Number of Patients that have not had Lab Values Updated in the Past Year (CrCl 0-50)



Safe Prescribing and Renal Dosing:

- Data Lessons

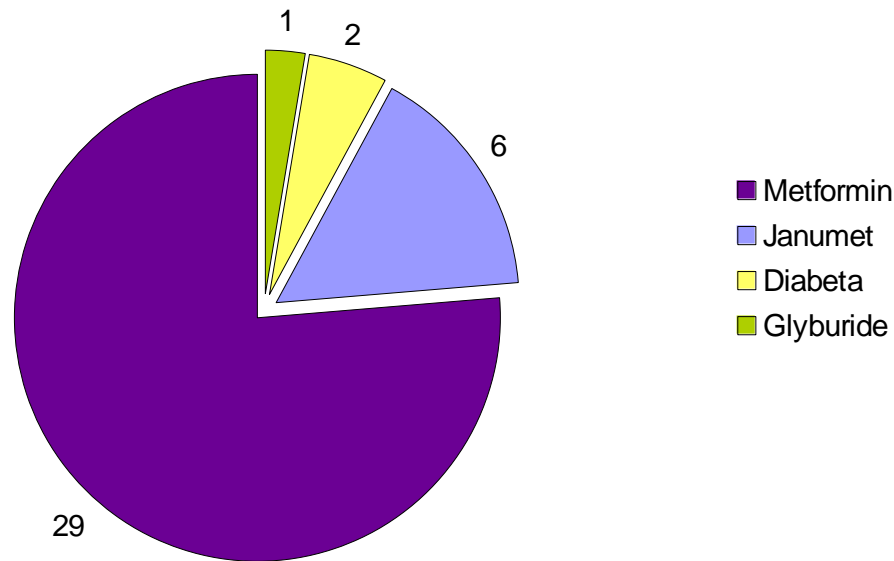
Figure 8: Number of Patients that take Concerning Medications for Diabetes Mellitus (CrCl 0-50)



Safe Prescribing and Renal Dosing:

- Data Lessons

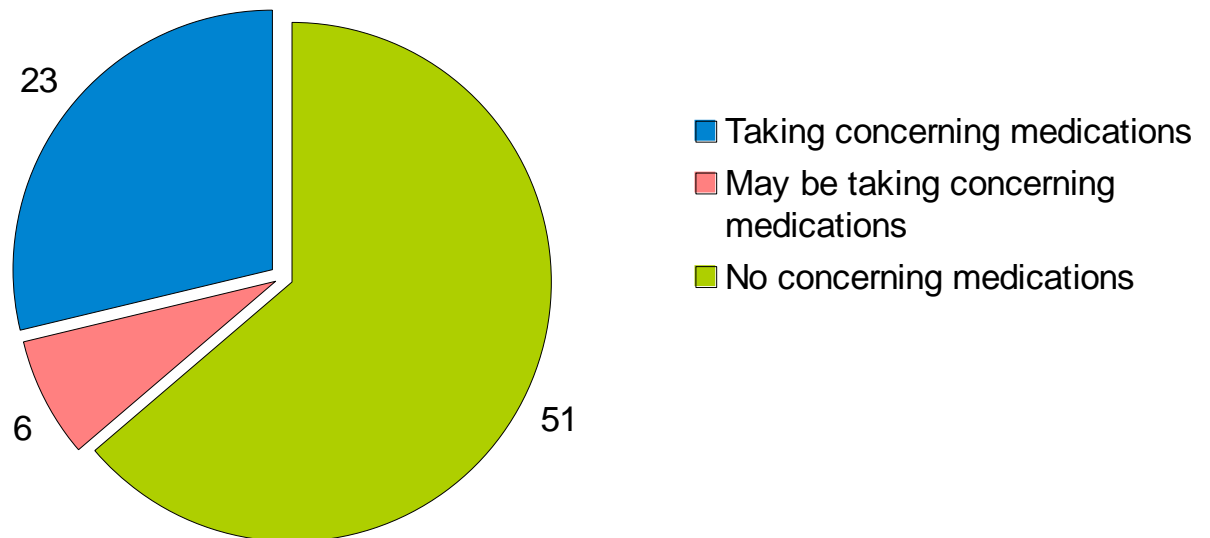
Figure 10: Types of Renal Sensitive Medications for Diabetes that are Being Used (CrCl 0-50)



Safe Prescribing and Renal Dosing:

- Data Lessons

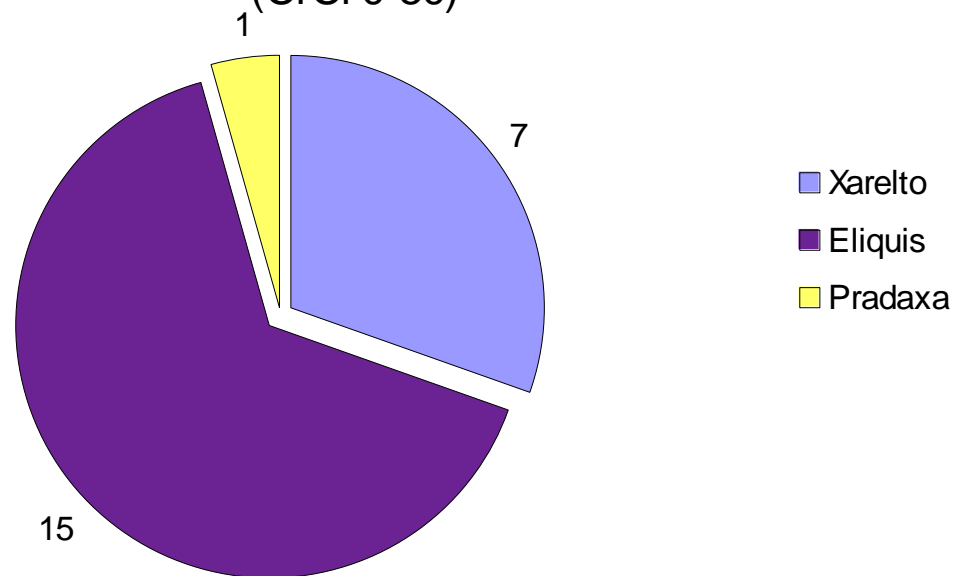
Figure 9: Number of Patients that take Concerning Medications for Atrial Fibrillation (CrCl 0-50)



Safe Prescribing and Renal Dosing:

- Data Lessons

Figure 11: Types of Renal Sensitive Medications for Atrial Fibrillation that are Being Used (CrCl 0-50)



Safe Prescribing and Renal Dosing:

- Data Lessons
- Allopurinol
- HmGCoA
- NSAIDs

Safe Prescribing and Renal Dosing:

- Data Lessons

renal r944

Current Rules

Status = 'Inactive'

Patient Cohort of r944 group contains the patient.

Worksheet Title Contains 'CKD' AND CDM Field = 'Urine ACR (random)' AND Date In the Last 2 Years AND Field Contains a Value

Worksheet Title Contains 'CKD' AND CDM Field = 'eGFR' AND Date In the Last 2 Years AND Field Contains a Value



Safe Prescribing and Renal Dosing:

renal r944

Current Rules

Status = 'Inactive'

Patient Cohort of r944 group contains the patient.

Classification Search

angio

ATC	Product Name
B06AC (DRUGS USED IN HEREDITARY ANGIOEDEMA)	24:08.44 (RENIN-ANGIOTENSIN-ALDOSTER.INHIB(HYPOTN))
C01CX06 (ANGIOTENSINAMIDE)	24:08.44.04 (ANGIOTENSIN-CONVERT.ENZYME INHIB(HYPOTN))
C09 (AGENTS ACTING ON THE RENIN-ANGIOTENSIN SYSTEM)	24:08.44.08 (ANGIOTENSIN II RECEPTOR ANTAGON.(HYPOTN))
C09C (ANGIOTENSIN II ANTAGONISTS, PLAIN)	24:32.00 (RENIN-ANGIOTENSIN-ALDOSTERONE SYS. INHIB)
C09CA (ANGIOTENSIN II ANTAGONISTS, PLAIN)	24:32.04 (ANGIOTENSIN-CONVERTING ENZYME INHIBITORS)
C09D (ANGIOTENSIN II ANTAGONISTS, COMBINATIONS)	24:32.08 (ANGIOTENSIN II RECEPTOR ANTAGONISTS)
C09DA (ANGIOTENSIN II ANTAGONISTS AND DIURETICS)	24:32.92 (RENIN-ANGIOTEN.-ALDOST. SYS. INHIB, MISC)
C09DB (ANGIOTENSIN II ANTAGONISTS & CALC CHANNEL BLOCKERS)	
C09DX (ANGIOTENSIN II ANTAGONISTS, OTHER COMBINATIONS)	
C09X (OTHER AGENTS ACTING ON RENIN-ANGIOTENSIN SYSTEM)	

Add Rule Remove Rule

Instances 1

Cancel

External. IS NOT External

Classification: [] [] []

+ New

Prescription Count

PROBLEM LIST-ACTIVE - IMPORT

Programs

SOCIAL HISTORY

Surgical / Medical History

Safe Prescribing and Renal Dosing:

- EMR Lessons

Strengths –

- search a Worksheet,
- ATC class searches
- Build a cohort & search,
- Data export

Weakness –

- ** ACR **
- limited formulae,
- slow searches of lab
- No Rx Sig: on search
- customer cannot mass data import
- cannot mass apply a CPP entry to a cohort,
- Worksheet building is tedious & poorly documented

Safe Prescribing and Renal Dosing:

- Change Management Lessons

Medical Record Sanctity

Communication

Peer Influence

Safe Prescribing and Renal Dosing:

- Summary ... CrCl
 - .. Great exercise in learning about your EMR, your data & your practice.
 - .. Meaningful application of data to enhance safe prescribing.

Safe Prescribing and Renal Dosing:

- Next Steps



Thank you!



The views expressed in this publication are the views of OntarioMD and do not necessarily reflect those of the Province.