The Good, The Bad and The Iatrogenic

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Disclosures: none

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Polling Instructions

- **To Use the CAPA Events App:** Open the CAPA App, go to "Agenda" and find this session. Click on the session and go to the tab for "Polls." Answer each polling question when instructed.
- **For Text Polling from Your Phone:** You will be provided the Question ID on upcoming poll slides. Text the Question ID to 79905 and you will be given the opportunity to provide your answer.

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Objectives

1) By CKD stage, review common medications taken by CKD patients

2) By CKD stage, review common dosing errors and the pathological rationale for medication selection

3) Using patient examples, discuss medication errors commonly found for CKD patients

4) A quick overview of the OTC meds dangerous for the CKD patient

5) AKI on CKD for the non-nephrology practitioner

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Q1: The Most Common Cause of AKI is

1. Contrast Induced
2. Medication Induced
3. Exercise Induced
4. Unknown

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Q2: The FDA Package Insert renal dosing is dependent on

1. The Serum Creatinine
2. The BMI
3. The GFR
4. The trough level

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Q3: The medication family most likely to be renal-dosed **incorrectly** is

1. Cardiac medications
2. Hypertension medications
3. Diabetic medications
4. Antibiotic medications

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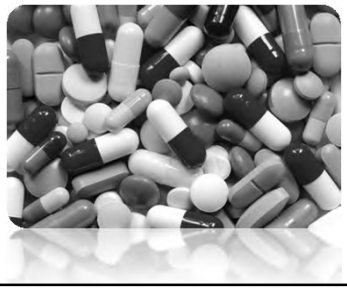
Nephrology Axiom

- First blame the drug



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Nephrology Corollary

- Never Trust a Nephrology Speaker who doesn't wear Yellow….

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Caveats

- All of the stories are true
- Names and faces have been changed 'to protect the innocent'
- This lecture is not to blame but to educate
- My goal is not to be inclusive of all medications
  - I want to encourage use of FDA dosing guidelines
- A pharmacist and a good list serve is everyone's best friends!
- A **HUGE** thank you to the PAs and NPs of the National Kidney Foundation for sharing their cases

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Stages of CKD 2013

Composite ranking for relative risks by GFR and albuminuria (KDIGO 2009)

GFR stages, description and range (ml/min per 1.73 m²)				Albuminuria stages, description and range (mg/g)				
				A1		A2	A3	
				Optimal and high-normal		High	Very high and nephrotic	
				<10	10–29	30–299	300–1999	≥2000
	G1	High and optimal	>105					
			90–104					
	G2	Mild	75–89					
			60–74					
	G3a	Mild-moderate	45–59					
	G3b	Moderate-severe	30–44					
	G4	Severe	15–29					
	G5	Kidney failure	<15					

KDIGO 2012 Clinical Practice Guideline for the Evaluation and Management of CKD, *Kidney International*, Jan 2013, Vol 3, Issue 1

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SF

45 y/o male
PMH: HTN, IDDM, CKD (eGFR 22), PVD, smoker, diabetic retinopathy, hyperkalemia, edema, SHPT, R BKA, foot ulcer L, W/C dependent
Labs:
BUN 50, SCr 4.16, Na 140, K 4.5, bicarb 16, Hgb 11.3, UACR 8380, A1C 8.9%

Pt calls with c/o BP 190-180s w/pain posterior skull, referred to ED
Seen by neph in ED and Bystolic (nebivolol) increased with f/u 3days
ED labs: WBC 12.03 (nl for pt 11.6-13.7), K 4.3, bicarb 13, eGFR 15.4

Neph office calls house 24 hours after ED visit.
Pt refusing to let wife take BP but feels poorly, told to return to ED
Pt presents to CVS Minute Clinic

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SF

45 y/o male
PMH: HTN, IDDM, CKD (eGFR 22), PVD, smoker, diabetic retinopathy, hyperkalemia, edema, SHPT, R BKA, foot ulcer L, W/C dependent
Labs:
BUN 50, SCr 4.16, Na 140, K 4.5, bicarb 16, Hgb 11.3, UACR 8380, A1C 8.9%

Pt diagnosed with pneumonia at Minute Clinic
RX: Levaquin (Levofloxacin) 750mg daily X 5D

Neph office calls pt on Monday after no f/u in ED and he feels worse
Encouraged to go to ED
States he will wait for wife to come home to drive
Wife comes home 2 hours later and he is found dead and 'cold'

Q4: What Killed Him?

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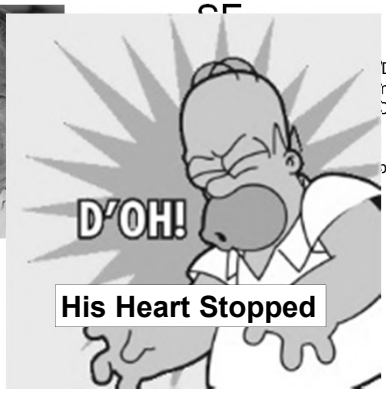

His Heart Stopped

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1. Fast eGFR drop with antibiotics in CKD
2. QT interval increased with Levaquin (Levofloxacin)
3. Sudden death in a poorly controlled IDDM
4. Infectious death from pneumonia

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SF

45 y/o male
PMH: HTN, IDDM, CKD (eGFR 22), PVD, smoker, diabetic retinopathy, hyperkalemia, edema, SHPT, R BKA, foot ulcer L, W/C dependent
Labs:
BUN 50, SCr 4.16, Na 140, K 4.5, bicarb 16, Hgb 11.3, UACR 8380

Pt diagnosed with pneumonia at Minute Clinic
RX: Levaquin (Levofloxacin) 750mg daily X 5D

_____

All Fluroquinolones increase QT intervals
IE: Cipro (Ciprofloxacin) /Levaquin(Levofloxacin)
Black Box Warning
Renal Dosing is ½ to ¼ 'normal dose'
Loading Doses are OK

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AJKD AMERICAN JOURNAL OF KIDNEY DISEASES

You are NOT alone!!!
2/3 had errors in dosing!

Dosing errors in prescribed antibiotics for older persons with CKD: A retrospective time series analysis
AJKD 2014; 63:422-428

JASN Journal of the American Society of Nephrology

PubMed National Library of Medicine NLM

69.3% of patients in a Maryland University setting had a safety event related to medication dosing

JASN 25:1564-1573, 2014

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MG

66 y/o female
PMH: HTN, DM, HLD, PVD, COPD.
CKD (eGFR 21)
Meds: Maxide (triamterene/HCTZ), Coreg (carvedilol)
Norvasc (amlodipine), Nasonex (mometasome furoate)
Allegra (fexofenadine), Glucophage (metformin)
Lipitor (atorvastatin), ASA, Plavix (clopidogrel)

Presents to the ED with sudden-onset CP, SOB, nausea, diaphoresis, EKG shows junctional bradycardia with hypotension

Q5: What is her metabolic abnormality?

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1. Hyperkalemia
2. Hyponatremia
3. Metabolic alkalosis
4. OMG!!! You are kidding-It is too late in the day!!

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MG

66 y/o female
PMH: HTN, DM, HLD, PVD, COPD, CKD (eGFR 21)
Meds: Maxide (triamterene/HCTZ), Coreg (carvedilol) Norvasc (amlodipine), Nasonex (mometasome furoate) Allegra (fexofenadine), Glucophage (metformin) Lipitor (atorvastatin), ASA, Plavix (clopidogrel)

K 7.8
Maxide is a combination of triamterene and HCTZ

Q6: At what eGFR is HCTZ to be stopped?

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1. eGFR 50
2. eGFR 30
3. Stopping Maxide (triamterene/HCTZ) is dependent on age
4. The nephrology office stops it and I never quite know why or when. It is a mystery!

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LB

32 y/o female with c/o freq, burning w/urination
PMH: sickle cell, HTN, ESRD
Pt states no one asked her about medical history
Unable to give urine specimen
Pt treated with Nitrofurantoin100mg bid

Q7: What question was obviously missed PRIOR to antibiotic selection?

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LB

32 y/o female with c/o freq, burning w/urination
PMH: sickle cell, HTN, ESRD
Pt states no one asked her about medical history
Unable to give urine specimen
Pt treated with Nitrofurantoin100mg bid

1. Are you allergic to any antibiotic?
2. Why is there a catheter hanging from your chest?
3. Are you on any medications?
4. Can you bring in a urine specimen another day?

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LB

32 y/o female with c/o freq, burning w/urination
PMH: sickle cell, HTN, ESRD
Pt states no one asked her about medical history
Unable to give urine specimen
Pt treated with Nitrofurantoin100mg bid

Nitrofurantoin Major Contraindications

Anuria, oliguria, or significant impairment of renal function (creatinine clearance under 60 mL per minute or clinically significant elevated serum creatinine) are contraindications. Treatment of this type of patient carries an increased risk of toxicity because of impaired excretion of the drug.

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AF

72 y/o female
PMH: CAD, CHF, CKD (eGFR 28), cataracts orthostatic hypotension, HLD
Meds: Zocor (simvastatin), Lanoxin (digoxin), Cozaar (losartan), eye drops, I vitamins, MVI

S:Presents to the office complaining of SOB and increased 'tiredness'
Upon questioning, she admits to vision changes ('yellow lights') but thinks they occur when she gets up too fast
O: Bradycardia is present with a rate of 48 beats/min, no edema, lungs clear, no vision complaints today

Q8: Which medication is causing her problems?

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1. Zocor (simvastatin)
2. Cozaar (losartan)
3. Lanoxin (digoxin)
4. Eye drops
5. Vitamins

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AF

72 y/o female
PMH: CAD, CHF, CKD (eGFR 28), cataracts orthostatic hypotension, HLD
Meds: Zocor (simvastatin), Lanoxin (digoxin), Cozaar (losartan), eye drops, I vitamins, MVI

You get AF through her Lanoxin (digoxin) toxicity but she is still feeling weak after she leaves the hospital.
She returns to the office complaining about having trouble walking
She cannot go to her weekly bridge game

Q9: You are suspicious of what?

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1. Respiratory Acidosis
2. Hyperkalemia
3. Medication Overdose (look at the title of the talk!!)
4. Lanoxin (digoxin) Toxicity because she may be confused about her new dose

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AF

72 y/o female
PMH: CAD, CHF, CKD (eGFR 28), cataracts orthostatic hypotension, HLD
Meds: Zocor (simvastatin,) Lanoxin (digoxin), Cozaar (losartan), eye drops, I vitamins, MVI

You get AF through her Lanoxin (digoxin) toxicity but she is still feeling weak after she leaves the hospital.
She returns to the office complaining about having trouble walking
She cannot go to her weekly bridge game

Tea and Toast in the Elderly
More common in females
More common with ACE/ARB
Do consider mild rhabdo with statins!!

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TK

81 y/o male admitted thru ED
Complete heart block, hypotension, Intubated in the field
PMH: CKD 3, DM, CAD
Labs: SCr 2.5mg/dL, K 5.5mg/dL, Bicarb 10meq/dL

Q10: What is the most likely cause of his Metabolic Acidosis?

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TK

81 y/o male admitted thru ED
Complete heart block, hypotension, Intubated in the field
PMH: CKD 3, DM, CAD
Labs: SCr 2.5mg/dL, K 5.5mg/dL, Bicarb 10meq/dL

1. Must be a medication in this talk…
2. Seriously I have no idea
3. Diabetic Ketoacidosis
4. Alcohol-induced metabolic acidosis

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TK

81 y/o male admitted thru ED
Complete heart block, hypotension, Intubated in the field
PMH: CKD 3, DM, CAD
Labs: SCr 2.5mg/dL, K 5.5mg/dL, Bicarb 10meq/dL

Patient was on Glucophage (metformin) as noted in the bag brought in by the paramedics
Family states he had been feeling 'poorly' for last week
Eating less but taking all his medications

Q11: When is Glucophage (Metformin) to be stopped?

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TK

81 y/o male admitted thru ED
Complete heart block, hypotension, Intubated in the field
PMH: CKD 3, DM, CAD
Labs: SCr 2.5mg/dL, K 5.5mg/dL, Bicarb 10meq/dL

1. GFR 50ml/min
2. GFR 30ml/min
3. SCr 1.5 mg/dL
4. GFR 40 ml/min

*Metformin in Patients With Type 2 Diabetes and Kidney Disease-A Systematic Review *JAMA. 2014;312(24):2668-2675*

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TK

81 y/o male admitted thru ED
Complete heart block, hypotension, Intubated in the field
PMH: CKD 3, DM, CAD
Labs: SCr 2.5mg/dL, K 5.5mg/dL, Bicarb 10meq/dL

1) GFR 50ml/min
2) GFR 30ml/min
3) SCr 1.5 mg/dL
4) GFR 40 ml/min

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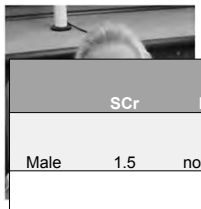

TK

	SCr	Race	Age	eGFR	CKD Stage
Male	1.5	non-white	17	80	1
Male	1.5	non-white	70	60	2
Female	1.5	white	45	39	3a
Female	1.5	white	70	36	3b

GFR calculator at NKF.org

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TK

81 y/o male admitted thru ED

Complete heart block, hypotension, Intubated in the field

PMH: CKD 3, DM, CAD

Labs: SCr 2.5mg/dL, K 5.5mg/dL, Bicarb

TK did not survive his hospital admission
He was placed on comfort care
He died 2 weeks before Christmas

Wh ?

2) GFR 30ml/min
3) SCr 1.5 mg/dL
4) GFR 40 ml/min

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*Metformin in Patients With Type 2 Diabetes and Kidney Disease-A Systematic Review
JAMA. 2014;312(24):2668-2675
KDIGO guidelines, 2013

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MS

64 y/o female
PMH: DM, PVD, morbid obesity, CKD (eGFR 32) CAD, CHF, HTN
Meds: Lantus (glargine), Humalog (insulin lispro) Zestril (lisinopril), Lasix (furosemide), Neurontin (gabapentin), Lipitor (atorvastatin), ASA, Plavix (clopidogrel), Procardia (nifedipine), Lopressor (metoprolol)

Presents to the ED with an open wound on her L foot
States that her shoes are too small
Labs: WBC 11, K 4.5, SCr 2 (eGFR?), BG 289

Pt is treated with Bactrim DS (sulfamethoxazole/trimethoprim)
(MRSA is part of the antibiogram in this area)

Q12: Why does nephrology get so upset?

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1. They always do. We never can figure out why
2. Poor coverage for foot infections
3. We gave too high a dose
4. We picked the wrong drug

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MS

64 y/o female
PMH: DM, PVD, morbid obesity, CKD (eGFR 32) CAD, CHF, HTN
Meds: Lantus (glargine), Humalog (insulin lispro) Zestril (lisinopril), Lasix (furosemide), Neurontin (gabapentin), Lipitor (atorvastatin), ASA, Plavix (clopidogrel), Procardia (nifedipine), Lopressor (metoprolol)

Bactrim (sulfamethoxazole/trimethoprim) works as a potassium competitor in the loop of Henle
K is retained with Bactrim (sulfamethoxazole/trimethoprim)
CKD causes an increase in the half-lives of the drug and its metabolite

Q13: What is a symptom that the patient is toxic from Bactrim (sulfamethoxazole/trimethoprim)**?**

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1. Sudden death
2. Tachycardia
3. Severe leg cramps
4. Peaked T waves

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1) Sudden death
2) Tachycardia
3) Severe leg cramps
4) Peaked T waves (this is a sign, not symptom)

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AB

78 y/o male
PMH: DM, CAD, PVD, CKD (eGFR 26), CABG
CHF, edema, HLD, gout
Meds: Altace (ramipril), Lasix (furosemide), plavix (clopidogrel), ASA, Colcrys (colchicine), Calan (verapamil) Lopressor (metoprolol), Lipitor (atorvastatin)

Presents to his primary care office with complaints of leg/foot pain
Follows stocking glove distribution
Decreased sensitivity with severe pain
Described as 'pins and needles' since he had just seen the commercial on TV!
You agree to start him on Neurontin (gabapentin) and give him 300mg tid
You tell him to take it for 1 week before increasing the dose
You get a call from his son 5 days later telling you Dad is not making sense

Q14: What Happened?

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1. TIA
2. Medication overdose by elderly patient
3. Iatrogenic
4. Tea and toast

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AB

78 y/o male
PMH: DM, CAD, PVD, CKD (eGFR 26), CABG
CHF, edema, HLD, gout
Meds: Altace (ramipril), Lasix (furosemide), plavix (clopidogrel), ASA, Colcrys (colchicine), Calan (verapamil) Lopressor (metoprolol), Lipitor (atorvastatin)

FDA insert:
Usual Dosing (Adults): 300mg q8h.
Usual maintenance dose: 300-600mg q8h. Maximum dosage/day: 3600 mg
Renal Dosing
eGFR >60ml//min: Give usual dosage
eGFR 30-59ml/min: Dosage range: 400-1400mg/day in divided doses - Usually bid
eGFR 15-29ml/min: Dosage range: 200-700mg/day
eGFR<15ml/min: Dosage 100-300 mg/day. Use lower end of this range for CRCL <7.5 ml/min.
Hemodialysis: 100-300 mg/day. Give supplemental dose of 125-350mg after each dialysis.

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AB

78 y/o male
PMH: DM, CAD, PVD, CKD (eGFR 26), CABG
CHF, edema, HLD, gout
M Lasix, ASA, plavix, colchicine,
statin

FDA insert:
Usual Dosing
Usual mainte 3600 mg
Renal Dosin
eGFR >60m
eGFR 30-59 ses - Usually bid
eGFR 15-29
eGFR<15ml/ range for CRCL <7.5 ml/min.
Hemodialysis: 100 25-350mg after each dialysis.

AI FDA inserts after 1998 MUST include renal dosing

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BF

52 y/o male
PMH: ADPKD, HTN, edema secondary to kidney volume, mild CKD (eGFR 40)
Meds: ASA, HCTZ, Zestril (lisinopril), Lipitor (atorvastatin)

Pt coaches baseball for Gallaudet University
While trying to catch a ball and outrun a 19 y/o, falls and sustains a Colles fracture of the L wrist
Pre-op labs show Ca of 10.9 with a hemoglobin of 10.9
Patient is referred to hem/onc for hypercalcemia work-up
Bone marrow biopsy and skeletal survey is negative

Q15: What is the cause of the hypercalcemia in CKD patient?

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1. ADPKD
2. Gout (undiagnosed)
3. Medications
4. Fracture

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Q16: Of course it is a med!
Just look at the title of the talk
Which medication? And Why?

1. HCTZ
2. ASA
3. Zestril (lisinopril)
4. Lipitor (atorvastatin)

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BF

52 y/o male
PMH: ADPKD, HTN, edema secondary to kidney volume, mild CKD (eGFR 40)
Meds: ASA, HCTZ, Zestril (lisinopril), Lipitor (atorvastatin)

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Sometimes the Package insert Can be your Best Friend!

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YC

48 y/ female
PMH: HTN, CAD, CKD (eGFR 25)
Meds: Diovan (valsartan), ASA, Lasix (furosemide)
Prozac (fluoxetine), Calan (verapamil)

Patient presents to the urgent care section of the ED
She has new onset partial paralysis of the L side of her face
She is petrified that she is having a stroke
A STAT CT scan rules out a stroke
Her facial paralysis follows CN VII
Since she fits the 'classic' symptoms of Bell's palsy, you reassure her
She is discharged on prednisone (20mg/day) and Zovirax (acyclovir) 400mg tid)
72 hours later she returns to the urgent care with mental status changes

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Q17: What happened?

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1. We gave too high a dose
2. We picked the wrong drug
3. Hard to say-I am just randomly guessing at this point
4. She is having an evolving stroke

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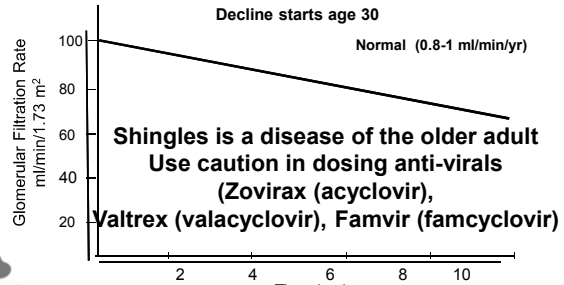
Normal Age Related Kidney Function Loss

Requires Repeated Measures of GFR Over Time



Shingles is a disease of the older adult
Use caution in dosing anti-virals
(Zovirax (acyclovir),
Valtrex (valacyclovir), Famvir (famcyclovir)

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NKF Primer of Kidney Disease 5th edition

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TT

64 y/o male
PMH: smoker (previous), CKD (eGFR 45), CAD (1 stent), BPH
Meds: ASA, Plavix (clopidogrel), Zestril (lisinopril) Lipitor (atorvastatin)

Works as the head PA in the OR
Was seen by cardiology recently who doubled his Zestril (lisinopril)
Is having palpations during surgery and steps away from the OR table
Collapses in the midst of surgery
Anesthesia calls a code and he is rolled the 200 ft to the ED

Q18: What abnormality is seen on his EKG?

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1. Prolongation of the QT interval
2. 2nd degree heart block
3. Atrial fibrillation
4. Peaked T waves

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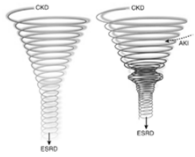
TT



His K corrects to 4.5 from **6.8** with IV fluids and a foley
His GFR drops to 12 and rebounds to 15
He undergoes a TURP
He starts the work-up for a kidney transplant
At 5 months post AKI, his eGFR rises to 24!
However, he will be at continued risk of ESRD due to his AKI

Remember: All males above 50 have some BPH

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GG

78 y/o male
PMH: HDL, HTN, neuropathy, CKD (eGFR 48)
BPH, hypothyroidism
Meds: HCTZ, Synthroid (levothyroxine), Cymbalta (duloxetine), Lipitor (atorvastatin), Fosamax (alendronate), Zestril (lisinopril), omega 3, Norvasc (amlodipine), MVI, CoQ10, Percocet (oxycodone)

Retired military who still works full time @ golf shop
Presents to ED with unsteadiness, sleepiness, sluggish
Confusion and difficulty concentrating
Recently started on Percocet (oxycodone) & Cymbalta (duloxetine) for neuropathy
Serum Na is ***108***

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Q19: What is causing the hyponatremia?

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1. HCTZ
2. Percocet
3. Atorvastatin
4. Cymbalta

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GG

78 y/o male
PMH: HDL, HTN, neuropathy, CKD (eGFR 48)
BPH, hypothyroidism
Meds: HCTZ, Synthroid (levothyroxine), Cymbalta (duloxetine), Lipitor (atorvastatin), Fosamax (alendronate), Zestril (lisinopril), omega 3, Norvasc (amlodipine), MVI, CoQ10, Percocet (oxycodone)

SSRIs and SRNIs can cause hyponatremia
More common in the elderly
While considered rare per the literature* (9%)
we see 4-5/year
Mechanism of action felt to be SIADH or polydipsia

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*Characteristics, prevalence, risk factors, and underlying mechanism of hyponatremia in elderly patients treated with antidepressants: a cross-sectional study. Maturitas. 2013 Dec;76(4):357-63.

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MC

32 y/o female
PMH: diabetes
Meds: Lantus (glargine), Humalog (insulin lispro), Lipitor (atorvastatin)

On her quarterly visit to office
A1C 7.2%, UACR 45mg/24H (or microalbuminuria)
Because you went to CKD lecture, you know to add RAAS

Q20: What is the most important thing to do now to protect her kidneys?

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MC

32 y/o female
PMH: diabetes
Meds: Lantus (glargine), Humalog (insulin lispro), Lipitor (atorvastatin)

1. Increase the Lantus (glargine)
2. Cover with BCP
3. Decrease the Lipitor (atorvastatin)
4. I really have no idea…..

Take the poll in the CAPA App or text **37190** to 79905 RESULTS

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MC

32 y/o female
PMH: diabetes
Meds: Lantus (glargine), Humalog (insulin lispro), Lipitor (atorvastatin)
A1C 7.2%, UACR 45mg/24H

You start Zestril (lisinopril) - 10mg/day
You also add BCPs - Choose Yaz (*drospirenone / ethinyl estradiol)*

Because you just started RAAS, you have her repeat CMP in 2 weeks
Her K is 6.0
Q21: After ***your*** heart starts again, you try to figure out what happened

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MC

32 y/o female
PMH: diabetes
Meds: Lantus (glargine), Humalog (insulin lispro), Lipitor (atorvastatin)

1. Shipment of oranges from Florida
2. Zestril (lisinopril)
3. Yaz (*drospirenone / ethinyl estradiol)*
4. UTI

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MC

32 y/o female
PMH: diabetes
Meds: Lantus (glargine), Humalog (insulin lispro), Lipitor (atorvastatin)

Yaz (*drospirenone / ethinyl estradiol)* is related to Aldactone (spironolactone)
Spironolactone inhibits the action of aldosterone thereby causing the kidneys to excrete salt and fluid in the urine while retaining potassium
That means if spironolactone is classified as a K-sparing diuretic,
then so is Yaz (*drospirenone / ethinyl estradiol)*

Don't worry, it took the acid/base guru from UT Dallas to solve this one!

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KB

35 y/o JAG officer with family hx ADPKD
Preeclampsia with 2 pregnancies
Nephrology consult TN – SCr 1.9 (GFR 32)
Recently moved to your area

Presents with URI sx, has 2 kids in elementary school
Volunteers at elementary school
Temp 102, feels 'horrible', rales, crackles, looks 'wiped out'
You cover for flu with Tamiflu *(*oseltamivir phosphate) 75mg bid X 5d
On day 4, she returns with severe GI symptoms
Can't keep anything down

Q22: What is going on?

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KB

35 y/o JAG officer with family hx ADPKD
Preeclampsia with 2 pregnancies
Nephrology consult TN – SCr 1.9 (GFR 32)
Recently moved to your area

1. GI bug (those kids are little bug factories)
2. Food poisoning
3. Acute Kidney Injury (AKI)
4. Toxic dose of Tamiflu *(*oseltamivir phosphate)

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KB

35 y/o JAG officer with family hx ADPKD
Preeclampsia with 2 pregnancies
Nephrology consult TN – SCr 1.9 (GFR 32)
Recently moved to your area

Presents with URI sx
Temp 102, feels 'horrible', rales, crackles, looks 'wiped out'
SCr in ED 2.9 (GFR 19)

Think dehydration!!!!
AKI on CKD along with toxic levels of
Tamiflu *(*oseltamivir phosphate)

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KB

35 y/o JAG officer with family hx ADPKD

2)

GFR	Dose
GFR >60-90 mL/min	75mg daily
GFR >30-60 mL/min	30mg daily
GFR 10-30ml/min	30mg every other day
ESRD	30mg after dialysis cycle
	30 mg qweek for PD

Prese
Temp
SCr i

Think dehydration!!!!
AKI on CKD along with toxic levels of Tamiflu

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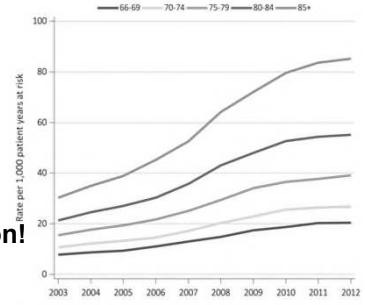
Unadjusted rates of first hospitalization with AKI for Medicare patients aged 66+ by age and year, 2003-2012

AKI On CKD Is Common!



Data Source: Medicare 5 percent sample. Age as of January 1 of specified year. All patient-years at risk for Medicare patients aged 66 and older who had both Medicare Parts A & B, no Medicare Advantage plan (Part C/HMO), no ESRD by first service date from Medical Evidence form, and were alive on January 1 of year shown. Censored at death, ESRD, end of Medicare Parts A & B participation, or switch to Medicare Advantage program. Abbreviation: AKI, acute kidney injury.

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Conclusions

- Medication dosing errors are common in CKD
- A pharmacist can be your best friend
- When in doubt, look it up! (***I do!!***)
- CKD = go low, go slow and recheck labs often
- All FDA inserts have renal dosing protocols

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The Most Common Cause of AKI is

A. Contrast Induced
B. Medication Induced
C. Exercise Induced
D. Unknown

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The FDA Package Insert renal dosing is dependent on

A. The Serum Creatinine
B. The BMI
C. The GFR
D. The trough level

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The medication family most likely to be renal-dosed **incorrectly** is

A. Cardiac medications
B. Hypertension medications
C. Diabetic medications
D. Antibiotic medications

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