The Good, The Bad and The Iatrogenic

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Disclosures: none

Disclosure

I have no relevant relationships with ineligible companies to disclose within the past 24 months

I am presently running for AAPA Secretary/Treasurer

While all these stories are true and used with permission, the photos and names are intermixed

Learning Objectives

1) Using patient examples, highlight medication errors that occur in the office, in the emergency room and in the hospital
2) Using patient examples, review both dosing and medication selection errors including the pathophysiological rationale for medication selection
3) Using patient examples highlight errors in OTC meds and cannabis

Nephrology Axiom

- First blame the drug

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
- These stories highlight the most common dosing errors seen across the US
  - We 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 stories

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 Optimal and high-normal <10	A1 10–29	A2 High 30–299	A3 Very high and nephrotic 300–1999	A3 ⩾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

Sam

45 y/o male
PMH: HTN, IDDM, CKD (eGFR 22), PVD, smoker, diabetic retinopathy, hyperkalemia, edema, SHPT, R BKA, foot ulcer L, obesity, 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

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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 a Retail Clinic

Sam

45 y/o male
PMH: HTN, IDDM, CKD (eGFR 22), PVD, smoker, diabetic retinopathy, hyperkalemia, edema, SHPT, R BKA, foot ulcer L, obesity, 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
RX: Levaquin (Levofloxacin) 750mg daily X 5D

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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'

What Killed Him?

Sam

A) Fast eGFR drop with antibiotics in CKD
B) QT interval increased with Levaquin (Levofloxacin)
C) Sudden death in a poorly controlled IDDM
D) Infectious death from pneumonia

Medication Errors

Each year, in the US alone, 7,000-9,000 people die as a result of a medication error

NIH National Institutes of Health

69% given an incorrect medication in the hospital

In 2020: The total cost of medication-associated errors exceeds $40 billion

Drugs and aging report: Adverse Drug Events in Patients with CKD Associated with Multiple Drug Interactions and Polypharmacy
66% with hyperkalemia, 10% with hypercoag, 33% with QT prolongation

Joan

Forty something ER PA brings her 45 y/o husband to ER due to poor appetite, N&V, weight loss and crackles on his lung field exam (of course she examined him first!)
PMH: kidney transplant at Hopkins 24 years ago, had been slowly failing, HTN
Meds: metoprolol, oral Fe, atorvastatin
Labs: BUN 50, SCr 4.16 (eGFR 16ml/min), Na 140, K 4.5, bicarb 20, Hgb 11.3, UACR 60mg/g, CXR-'fluffy' diffuse white out with lobar consolidation in LLL

DX: Pneumonia
RX: Levofloxacin 750mg qd X 10d, 1st dose in the ED (antibiogram for this hospital includes MRSA)

Joan texts me from the ED

Bina

64 y/o Pakistani female visiting her grandkids
Presents to ED feeling poorly, not eaten x 2 days
PMH: DM, HTN, N&V
Meds: Glucophage (Metformin), lisinopril, Maxide (triamterene + HCTZ), Aleve (naproxen)
Labs: pH 7.17, lactic Acid 9, SCr 8.1mg/dL

What caused Bina's severe lactic acidosis?

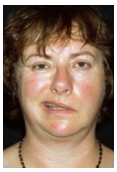
A) Metformin
B) Lisinopril
C) Aleve
D) Maxide (triamterene + HCTZ)

Ronald

65 y/o male
PMH: HTN, CP, chronic leg edema
Meds: lisinopril, furosemide, metolazone

Patient had been living at home with caretaker sister
Sister frustrated that PCP office not handicapped accessed
No follow-up for a year due to inability to get into office
Presents to ED for blood work

BUN 219/SCr 10.5

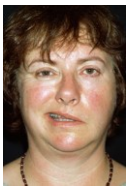


Yvette

48 y/ female
PMH: HTN, CAD, CKD (eGFR 25), obesity
Meds: Diovan (valsartan), ASA, furosemide, Prozac (fluoxetine), Calan (verapamil)
HPI: Patient presents to the urgent care section of the ED with new onset partial paralysis of the L side of her face, pt knows she's at risk of 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

What happened?



Yvette

A) We gave too high a dose
B) We picked the wrong drug
D) Hard to say-I am just randomly guessing at this point
D) She is having an evolving stroke

Ted

64 y/o male
PMH: smoker (previous), CKD (eGFR 45), CAD (1 stent), BPH, BMI 29
Meds: ASA, Plavix (clopidogrel), lisinopril, atorvastatin

Works as the head PA in the OR
Was seen by cardiology recently who doubled his 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

What abnormality is seen on his EKG?

Ted

A) Prolongation of the QT interval
B) 2nd degree heart block
C) Atrial fibrillation
D) Peaked T waves

'Ralph'

38 y/o male presents to ED with hyperemesis X 2weeks, 'peeing blood' for last 2 days, states only hot showers dec N&V
PMH: Medical marijuana
PE: poor skin turgidity, 'ill-looking', N&V, tachycardia, 90/54
Labs: K 6.2, mixed metabolic acidosis, SCr 8.1mg/dL, UA 4+blood on dip, no RBCs on micro

What is the diagnosis?
A) Acute marijuana poisoning
B) Compensated respiratory alkalosis
C) Rhabdomyolysis
D) Nephrolithiasis

Edith

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

Presents to the ED at a teaching hospital on July 1st with an open wound on her L foot
Resident treats for presumed infection in known diabetic
Labs: WBC 11, K 4.5, SCr 2 (eGFR 27ml/min), BG 289
RX: Bactrim DS (sulfamethoxazole/trimethoprim) 2 BID
(MRSA is part of the antibiogram in this area)

What can be the complication?

Edith

A) Metabolic acidosis
B) Nausea with the antibiotic
C) Hyperkalemia
D) Prolonged QT interval

Art

78 y/o male
PMH: DM, CAD, PVD, CKD (eGFR 26), CABG CHF, edema, HLD, gout, obesity
Meds: Ramipril, furosemide, clopidogrel, ASA, colchicine, verapamil, metoprolol, 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 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

Which medication caused Art's MS changes?

Art

A) The combo of all the HTN meds
B) Colchicine
C) Gabapentin
D) Polypharmacy

George

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

What is causing the hyponatremia?

George

A) HCTZ
B) Oxycodone
C) Atorvastatin
D) Duloxetine

Maggie

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

Presents to the ED with sudden-onset CP, SOB, nausea, diaphoresis
EKG shows junctional bradycardia with hypotension
K 7.8 meq/dL

Maxide is a combination of triamterene and HCTZ

Maggie

Why is there an issue with Maxide (triamterene/HCTZ)?

A) The triamterene is less effective at lower eGFRs
B) The HCTZ is less effective at lower eGFRs
C) Mixing allergy medications with Maxide is dangerous
D) I seriously have no bloody idea

Laurie

52 y/o female
PMH: Diabetes, HDL , neuropathy, obesity
Meds: metformin, gabapentin, simvastatin, ASA

Presents to ED with inability to swallow
PE: painful oral herpetic lesions with drooling, healing lesions on face with crusts/pus
Diagnosis: oral herpes zoster
Labs: WBC 11K, SCr 1.2mg/dL (GFR 57), K 3.2meq/L, FENA <1%
Admitted for IV Acyclovir (Zovirax), IV antibiotics

Laurie

52 y/o female
PMH: Diabetes, HDL , neuropathy, obesity
Meds: metformin, gabapentin, simvastatin, ASA
Labs: WBC 11K, SCr 1.2mg/dL (GFR 57), K 3.2meq/L, FENA <1%

What kidney dosing protocol should be used?

A) Dose off the GFR (57ml/min)
B) Dose off the SCr (1.2mg/dL)
C) Dose off both and average
D) Neither one is useful

Caleb

35 y/o male
PMH: ETOH use
Meds: none

Presents to ED with 5 days of crampy lower abdominal pain, N&V, tenesmus
Admits heavy ETOH use
Scr 2.2mg/dL (baseline 0.6mg/dL)
CT of abdomen shows 1.1cm non-obstructing stone on the L
You medicate with IV Ketorolac (30mg)

Why did the nurse look at you funny?

Caleb

A) Wrong medication
B) Wrong dose
C) Didn't cover for thiamine (banana bag!!)
D) She has an issue with vomiting….

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
  - When using **Epocrates Rx**, you need to go to 'adults' and then to renal dosing!