Mrs. Waters

87 y.o. female presents to ED with K+ = 5.5 from routine outpatient lab; No ECG changes and feeling well and with a normal physical exam

PMHx: CAD, Htn, Chol, CRF (Cr 132), anemia,
GERD, mild dementia, previous CVA (uses a walker), chronic leg edema, spinal stenosis
Meds: lisinopril, lasix, isosorbide, ASA, pantoprazole,

Disposition: Instructed to stop lisinopril & start amlodipine

Two weeks later the patient presents to ED in respiratory distress:
HR104, RR 22, BP 174/96, SaO2 94%
Exam: bilateral crackles
CXR: CHF w/ bilateral effusions
ECG: sinus tachycardia
Troponin: 8.7 c/w NSTEMI

Disposition: Cath Lab and admission to CCU

What happened?
Patient stopped the "L pill": lasix!

Questions:

How did this happen? What strategies do you have for preventing what happened?
What elements of polypharmacy does this case illustrate (consider drug-drug and drug-disease interactions, duplicate or futile or inappropriate medication)?
What elements of aging physiology (both normal and pathological) in this woman made this outcome more likely?

Discussion guide

1. This case highlights the importance of ***communication.*** This woman already has mild cognitive impairment therefore multiple strategies should be in place for communicating ANY changes to her care: something in writing; getting full understanding from the patient herself is going to be difficult since this involves learning a new task. Her principal care giver(s) need to be involved (eg. written communication back to LTCH or in this case to her care-giver); communication to her FD (?fax the chart); home care referral for a visiting RN to do a medication check; suggest getting a dosette (very difficult for a cognitively impaired person to manage multiple medications) through CCAC.
"doctorspeak" complicates our communication – all patients have difficulty with our persistent use of two different words (one generic, one commercial) to refer to the same thing.

2. Polypharmacy: limited number of medications so it's not just the number of medications but other considerations: ACEI is probably not appropriate in a person with impaired renal function as she ages; amlodipine can increase peripheral edema which is already on her problem list; it's valuable to point out that the first physician's plan was a reasonable one which did not have any of the characteristics of polypharmacy – just poorly communicated.

3. Aging physiology: decreased **renal** function and ability to clear the drug; amlodipine is renally excreted (10% unchanged) so its effect is going to be magnified especially in someone with an already increased volume of distribution (peripheral edema); decreased CytP450 function – CCBs are metabolized by liver--decreased **cardiac** function especially decreased cardiac output;
Pathology: cognitive impairment impairs ability to manage new medication/changes; already impaired cardiac function
Generally speaking the decreased physiologic reserve that characterizes normal aging is relevant here.

Mr Klotz

78 year old man. four months post angioplasty presents with post-prandial RSCP and epigastric tenderness;

- Meds: Atenolol, diltiazem, clopidogrel, atorvastatin, glyburide
- ED work up (serial enzymes) suggest no ACS or stent occlusion
- Emerg Physician suggests omeprazole for GERD

Three weeks later Mr Klotz is back with NSTEMI and stent stenosis

What happened?

Questions:

How did this happen? What strategies do you have for preventing what happened?
What elements of polypharmacy does this case illustrate (consider drug-drug and drug-disease interactions, duplicate or futile or inappropriate medication)?
What elements of aging physiology (both normal and pathological) in this man made this outcome more likely?

1. What happened? Patient developed post-angioplasty clot stenosis because he no longer had effective anti-platelet coverage:
PPIs (except pantoprazole) seem to inhibit enough of the Cyt P450 system to prevent the conversion of clopidogrel to its active form thus removing the anti-platelet effect of the medication. This effect is exacerbated in the elderly with their decreased enzyme activity.

(Juurlink DN, Gomes T, Ko DT, et al. A population-based study of the drug interaction between proton pump inhibitors and clopidogrel. *CMAJ* 2009;180:713-8)

How can you prevent – check drug-drug interactions before starting a new medication – avoid starting a new medication: would maalox and acetaminophen have been sufficient?

2. Polypharmacy: drug-drug interaction

3. Physiology of aging: significant decrease in Cyt P450 system function puts the older patient much more at risk; decreased physiologic reserve;

Mr. E. Dema

84 y.o. male presents with fatigue, generalized weakness

PMHx: COPD, CRF (Cr 145), CHF, A fib, OA

Meds: furosemide, diltiazem, lisinopril, warfarin, Tiotropium (spiriva), bupropion, acetaminophen, glucosamine;

He saw cardiologist 1 week ago who started him on spironolactone for ankle edema

On exam: HR 42; BP 94/40;

ECG: sinus brady; wide QRS; prolonged PR
Bloodwork: Cr 320; K 8.4

Questions:

What do you think happened? What strategies do you have for preventing what happened?

What elements of polypharmacy does this case illustrate (consider drug-drug and drug-disease interactions, duplicate or futile or inappropriate medication)?

What elements of aging physiology (both normal and pathological) in this man made this outcome more likely?

Discussion Points:

1. Ankle edema is frequent "side effect" of diltiazem: adding spironolactone led to volume depletion and acute renal failure and hyperkalemia and bradycardia. Being aware of common side effects of medications would help us avoid treating new symptoms with new drugs.

2. Polypharmacy: drug-drug interactions: adding a diuretic to another diuretic will potentiate each;
drug-disease interaction: diuretics and CKD; ACEI and CKD;
duplicate meds: diuretic plus diuretic;
futile or irrational: using a drug to treat a side effect of another drug
"pill for every ill": how problematic was the ankle edema? Were there non-drug options for treating? How badly does she need the CCB?

3. Physiology of Aging: decreased renal function; decreased physiologic reserve.

The Out-of-Towner

76 yo man sent from Walk-in to "r/o ACS" because of severe intermittent chest pain for six weeks; he has had two other admissions in two other hospitals in the past month; multiple stress tests all negative

Meds: ASA, metoprolol, (both new according to ODB record)

On careful review of medication history (which was never previously done): Ibuprofen was added in another WIC for a sore ankle three days before the onset of symptoms (patient had never mentioned this to his family or any of previous hospitals!)

Questions:

How did this happen? What strategies do you have for preventing what happened?

What elements of polypharmacy does this case illustrate (consider drug-drug and drug-disease interactions, duplicate or futile or inappropriate medication)?

What elements of aging physiology (both normal and pathological are relevant here?

Discussion Points

1. This highlights the importance of a **scrupulous medication history** (in all patients but especially in the elderly): not only asking the patient (or relying on the nursing notes) but also confirming with the ODB registry – not always complete itself since some meds are not covered), but also checking with pharmacy, asking other care-givers, and always doing a "brown bag check." This also illustrates the importance of **communication:** a single prescriber/good communication between prescribers (if the WIC had communicated back to the FD, a lot could have been avoided)

2. Polypharmacy: drug-disease interaction; inappropriate medication (NSAIDs are probably not appropriate for MSK pain – acetaminophen is a better first-line drug); futile medication: treating a symptom of a drug as a new disease (here "chest pain" was NSAID-gastritis); drug-drug interaction: adding ASA to an NSAID

3. Physiology of Aging: the elderly have increased some acidity and decreased GI motility making them more sensitive to NSAID-related problems (gastritis and GERD);

Mrs. D. Klein

82 yo woman living with her daughter at home with progressive dementia; functioning; In ED on Saturday morning because “not doing well” -- eating poorly, and incontinent of urine.

Meds: donepezil (started three weeks ago), acetaminophen, alendronate, metoprolol, warfarin (for previous valve replacement)

On exam: VSS; looks well not significantly dehydrated; no acute findings, daughter says no acute change in mental status; CT head unchanged from previous; bloodwork unremarkable; INR therapeutic; good support available at home.

Emerg disposition: nutrition supplement and oxybutynin for urge incontinence and referral to CCAC for PSW support

Questions:

What would you say are the problems with this disposition?
What strategies do you have for avoiding these problems?

What elements of polypharmacy does this case illustrate (consider drug-drug and drug-disease interactions, duplicate or futile or inappropriate medication)?

What elements of aging physiology (both normal and pathological) in this woman are relevant here?

Discussion Points:

1. Problems: Donepezil is a cholinesterase inhibitor – frequent side effects are nausea and appetite loss and incontinence (because of cholinergic effect) -- it makes no sense to add an anti-cholinergic with a strong side-effect profile to treat the symptoms of a pro-cholinergic drug; this strategy is likely going to cause further more serious problems; oxybutynin is hepatically metabolized: will compete with warfarin and likely increase INR; if you're adding a new medication, ensure good communication to patient, care-giver, and most responsible physician.

2. **Polypharmacy:** drug-drug interactions: adding one medication associated nausea and anorexia to another one (alendronate) with similar side effects; also adding a new hepatically metabolized drug will change INR;
Drug-disease interactions: anti-cholinergic medication in dementia is likely to cause delirium;
Futile/irrational medication: adding a medication with a strong side effect profile to treat the symptoms of a new medication; avoid the "pill for every ill" approach.

3. Physiology of Aging: aging CNS has reduced acetylcholine and is particularly sensitive to anti-cholinergic medications;
significant decrease in renal function (most people in 80s meet the criterion for mod CKD) (relates to warfarin which is 90% excreted unchanged in urine);
significant decrease in hepatic enzymes therefore adding any new drug is going to have a significant competitive effect on metabolism of others.

Mr. Federer

79 yo man presented to Ambulatory Area after straining his right thigh while playing tennis

PMH: P. a. fib; cholecystectomy

Meds: Warfarin, (INR =2.1) ASA

Physical exam suggests partial quad tear

Disposition: Weight Bearing as tolerated; add ibuprofen, APAP/oxycodone

Four days later: returns with chest pain

- INR: 6.2
- Hgb: 71
- BUN/Cr normal; no melena
- Troponin: 6.8

Questions:

What do you think happened? What strategies do you have for preventing what happened?

What elements of polypharmacy does this case illustrate (consider drug-drug and drug-disease interactions, duplicate or futile or inappropriate medication)?

What elements of aging physiology (both normal and pathological) in this man made this outcome more likely?

Discussion Points:

1. Probably a combination of bedrest, constipation, poor dietary intake, new hepatically metabolized drug led to hyperanticoagulation and ongoing blood loss into thigh. Decreased O2-carrying capacity led to ACS/MI.
Strategies: Awareness of high-risk medication (warfarin) and the consequences of adding a new drug could have prevented this; better communication to FD emphasizing the importance of INR monitoring.

2. Polypharmacy: drug-drug interactions: adding a hepatically metabolized medication to warfarin;
drug-disease interaction

3. Physiology of Aging: decreased physiologic reserve (small alterations in physiologic parameters can lead to major disease decompensation);
decreased hepatic enzymes

Combination of bedrest, constipation, poor dietary intake, Cyt P450 competition hyperanticoagulation and ongoing blood loss into thigh

Mr. Teow

79 yo man triaged to Ambulatory with apparent flare of great toe gout and urinary frequency/dysuria; disturbed sleep and fatigue;

PMH: A Fib, CHF, Htn, Gout, Anxiety, COPD, BPH

Meds: furosemide, amiodarone, digoxin, allopurinol, dimenhydrinate, diazepam, erythromycin, salbutamol, Calcium

Questions:

What problems do you see with his medication list:

How would you suggest managing his problem list?

What elements of polypharmacy does this case illustrate (consider drug-drug and drug-disease interactions, duplicate or futile or inappropriate medication)?

What elements of aging physiology (both normal and pathological) in this man make his management more complicated?

Discussion Points:

Problems with Medication List:
At least three Potentially Inappropriate medications: 1. dimenhydrinate (anti cholinergic presumably being used for night-time sedation); 2. diazepam, a long-acting benzodiazepine; 3. digoxin (only if no safe alternative because of low therapeutic index);
Several significant drug-disease interactions – a diuretic in someone with recurrent gout;
Significant drug-drug interactions; aminoglycosides and amiodarone can produce ventricular arrhythmias;

For the insomnia: a Benzodiazepine? → prolonged half life; risk of delirium
An Opioid? → sedation
Treat the underlying problems causing the symptom

For the UTI: TMP/SMX → induce warfarin
Ciprofloxacin → warfarin, Ca supplements; CNS
Nitrofurantoin → risk of renal failure
Cephalexin → may be the best choice

For the Gout: Indomethacin? → delirium; poor combination with warfarin
Ibuprofen? → CHF, Htn, warfarin
Colchicine? → 20% renally excreted; high risk for toxicity
Prednisone?→ may be best choice

Mrs. Vikan Tizzi

80 yo woman living independently, brought by daughter because of one week of increasing fatigue, anorexia, poor oral intake, “too weak to get out of bed”; “still peeing all the time”

PMH: Htn, chol, recent UTI

Meds: Metoprolol, simvastatin, started MacroBid last week (finished today)

On exam: petite slim woman (=60 kg), normal vitals but quite dehydrated looking, listless, oriented

Bloodwork: Na 148, BUN 9.2, Cr 80 (do the math!)

Questions:

What would you say are the problems with the medication list?

What strategies do you have for avoiding these problems?

What elements of polypharmacy does this case illustrate (consider drug-drug and drug-disease interactions, duplicate or futile or inappropriate medication)?

What elements of aging physiology (both normal and pathological) in this woman are relevant here?

Discussion guide:

1. An apparently low risk medication was added without attention to side effect profile and to renal function.

2. **Polypharmacy**: very few medications but at least one is "contraindicated in patients with decreased renal function (CrCl < 60mL/min) due to systemic accumulation and subtherapeutic levels reached in the urinary tract."

3. **Physiology of Aging**: decreased renal function (even in an otherwise healthy woman with apparently "normal" serum creatinine); decreased functional reserve: one week of poor oral intake has taken her from functional to bed-ridden; decreased whole body water makes her much more sensitive to effects of dehydration.