CLINICAL PEARLS: GERIATRICS

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Disclosures

No conflicts of interest to disclose
LEARNING OBJECTIVES

1) Understand benefits/risks of using bisphosphonates to prevent osteoporotic fractures

2) Use evidence to guide the management of dementia

3) Prescribe exercise and vitamin D in frail patients

4) Realize the benefits of minimizing polypharmacy
CASE 1: Compressed Catherine

72 yo woman with COPD and HTN, gets a CXR to rule out pneumonia. T-spine compression fracture incidentally noted on CXR. No back pain. What is the best next step?

a) Calculate a FRAX score
b) Order a DXA
c) Start a bisphosphonate
FRAX Calculator

• Developed by the WHO
• Standard for osteoporosis risk assessment in the U.S.
• Evaluates risk of fracture based on individual clinical risk factors and femoral neck BMD scores
• Outputs a 10 year probability of hip fracture and major osteoporotic fracture
Calculation Tool

Please answer the questions below to calculate the ten year probability of fracture with BMD.

Country: US (Caucasian)  Name/ID:  

About the risk factors

1. Age (between 40-90 years) or Date of birth
   - Age: ___  M: ___  D: ___
   - Date of birth: Y: ___

2. Sex
   - Male
   - Female

3. Weight (kg)

4. Height (cm)

5. Previous fracture
   - No
   - Yes

6. Parent fractured hip
   - No
   - Yes

7. Current smoking
   - No
   - Yes

8. Glucocorticoids
   - No
   - Yes

9. Rheumatoid arthritis
   - No
   - Yes

10. Secondary osteoporosis
    - No
    - Yes

11. Alcohol 3 or more units per day
    - No
    - Yes

12. Femoral neck BMD (g/cm²)
    - Select DXA
    - ___

Clear  Calculate
<table>
<thead>
<tr>
<th>FRAX Risk Factors: <a href="http://www.sheffield.ac.uk">www.sheffield.ac.uk</a></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Age</strong></td>
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<tr>
<td>The model accepts ages between 40 and 90 years. If ages below or above are entered, the programme will compute probabilities at 40 and 90 year, respectively.</td>
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<tr>
<td><strong>Sex</strong></td>
</tr>
<tr>
<td>Male or female. Enter as appropriate.</td>
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<tr>
<td><strong>Weight</strong></td>
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<tr>
<td>This should be entered in kg.</td>
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<tr>
<td><strong>Height</strong></td>
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<tr>
<td>This should be entered in cm.</td>
</tr>
<tr>
<td><strong>Previous fracture</strong></td>
</tr>
<tr>
<td>A previous fracture denotes more accurately a previous fracture in adult life occurring spontaneously, or a fracture arising from trauma which, in a healthy individual, would not have resulted in a fracture. Enter yes or no (see also notes on risk factors).</td>
</tr>
<tr>
<td><strong>Parent fractured hip</strong></td>
</tr>
<tr>
<td>This enquires for a history of hip fracture in the patient’s mother or father. Enter yes or no.</td>
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<tr>
<td><strong>Current smoking</strong></td>
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<tr>
<td>Enter yes or no depending on whether the patient currently smokes tobacco (see also notes on risk factors).</td>
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<tr>
<td><strong>Glucocorticoids</strong></td>
</tr>
<tr>
<td>Enter yes if the patient is currently exposed to oral glucocorticoids or has been exposed to oral glucocorticoids for more than 3 months at a dose of prednisolone of 5mg daily or more (or equivalent doses of other glucocorticoids) (see also notes on risk factors).</td>
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<tr>
<td><strong>Rheumatoid arthritis</strong></td>
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<tr>
<td>Enter yes where the patient has a confirmed diagnosis of rheumatoid arthritis. Otherwise enter no (see also notes on risk factors).</td>
</tr>
<tr>
<td><strong>Secondary osteoporosis</strong></td>
</tr>
<tr>
<td>Enter yes if the patient has a disorder strongly associated with osteoporosis. These include type I (insulin dependent) diabetes, osteogenesis imperfecta in adults, untreated long-standing hyperthyroidism, hypogonadism or premature menopause (&lt;45 years), chronic malnutrition, or malabsorption and chronic liver disease</td>
</tr>
<tr>
<td><strong>Alcohol 3 or more units/day</strong></td>
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<tr>
<td>Enter yes if the patient takes 3 or more units of alcohol daily. A unit of alcohol varies slightly in different countries from 8-10g of alcohol. This is equivalent to a standard glass of beer (285ml), a single measure of spirits (30ml), a mediumsized glass of wine (120ml), or 1 measure of an aperitif (60ml) (see also notes on risk factors).</td>
</tr>
<tr>
<td><strong>Bone mineral density (BMD)</strong></td>
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<tr>
<td>(BMD) Please select the make of DXA scanning equipment used and then enter the actual femoral neck BMD (in g/cm2). Alternatively, enter the T-score based on the NHANES III female reference data. In patients without a BMD test, the field should be left blank (see also notes on risk factors) (provided by Oregon Osteoporosis Center).</td>
</tr>
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</table>
Caveats to FRAX

- Does not include all clinical risk factors for fracture
- Does not include history of multiple fractures
- Does not model known dose-dependence of several risk factors
  - Dose of glucocorticoids
  - Alcohol intake
  - Cigarettes per day
- Does not apply to patients on osteoporosis treatment, premenopausal women, younger men, or the very old (>90 yo)
**FRAX Risk Thresholds: Screening vs Treating (osteopenia)**

<table>
<thead>
<tr>
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<th>Screen**</th>
<th>Treat</th>
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<tbody>
<tr>
<td>Major Osteoporotic Fx*</td>
<td>9.3%</td>
<td>20%</td>
</tr>
<tr>
<td>Hip Fx</td>
<td>1.2%</td>
<td>3%</td>
</tr>
</tbody>
</table>

*clinical spine, forearm, hip, or shoulder fx

**Screening thresholds are for a “typical” 65yo woman - Caucasian, BMI=25 kg/m², and no clinical risk factors**

ANA Tosteson et al. Osteoporosis Intl, 2008;19:437-447
What is DXA Measuring?

- BMD = g/cm²
- Areal Density
Osteoporotic Fractures
down

Bone Density ➔ down

60%

Bone Quality
40%

Bone Strength

osteoporotic fractures
National Osteoporosis Risk Assessment (NORA) Trial

Rate of Fracture/1000 woman-years

# of Women with Fractures

BMD Distribution

Arch Intern Med. 2004;164:1108-1112
What is a fragility fracture?

- Fracture of the spine, hip, wrist, or shoulder
  - Not fingers, toes, ankle, or nose

  AND

- Fall from a standing height
  - Not related to significant trauma
# Fracture Predicts Future Fracture

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<tr>
<th>Prior Fracture</th>
<th>Relative Risk of Future Fracture</th>
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<tbody>
<tr>
<td></td>
<td>Wrist</td>
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<tr>
<td>Prior Wrist Fracture</td>
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<tr>
<td>Prior Vertebral Fracture</td>
<td>1.4</td>
</tr>
<tr>
<td>Prior Hip Fracture</td>
<td>N/A</td>
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</table>

CASE 1: Compressed Catherine

2 yrs later . . . 74 yo woman with COPD, HTN, and OP, presents with a note from her dentist requesting that her alendronate be stopped and a CTX level checked because she needs to get a tooth pulled. What is the best next step?

a) Reassure/educate the patient and her dentist
b) Stop the bisphosphonate
c) Order a CTX level
d) Order a CT of the jaw
Osteonecrosis of the Jaw (ONJ)

Bisphosphonate-associated ONJ as defined by ASBMR

Exposed bone in the maxillofacial region, with no healing within 8 weeks in a patient with bisphosphonate exposure and no hx of craniofacial radiation therapy

Possible risk factors

- Poor dental hygiene
- Glucocorticoid therapy
- Chemotherapy
- Duration of bisphosphonate therapy
- Concomitant use of oral steroids
- Other disease states
- Frequent IV bisphosphonate use
- Dental procedure
American Dental Association (ADA) Recommendations

1) Routine dental treatment should not be modified

2) No validated diagnostic technique available to determine which patients are at increased risk

3) Holding BP therapy may not eliminate any risk and stopping therapy could have negative impact on bone mass.

4) Significant dental risks would need to be present to consider cessation of antiresportive therapy.

5) Active dental or periodontal disease and emergency dental procedures should be treated despite risks for ONJ

ADA BRONJ Prevention Strategies (1)

Prior to starting bisphosphonates
• Establish a lifetime oral health awareness
• Perform invasive procedures or tooth removal
  – Less stringent requirement for BP for OP vs for cancer
• Dentist should work with patient and PCP

Therapy <2 Years
• Risk in this time period is very low
• Even procedures involving periosteal penetration or intramedullary bone exposures (e.g. extractions, implants) seem to have minimal risk
• Chlorhexidine rinses are advised

Therapy >2 Years
• Risk increases with extended drug use

ADA BRONJ Prevention Strategies (2)

Any length of therapy

- Dentist to discuss antiresorptive therapy related to oral health with the patient’s physician
- Discontinuation of antiresorptive therapy should be based upon the risk for skeletally related events secondary to low bone density, NOT the potential risk of ONJ
- No oral and maxillofacial surgical procedures are strictly contraindicated
  - Plans that minimize periosteal and/or intrabony exposure or disruption are preferred
- Serum CTx testing is not recommended to predict risk
  - Levels have not shown reliability or accuracy in predicting risk for BRONJ
Osteonecrosis of the Jaw: putting risk in perspective

Rate per 100,000 Persons per Year

Any Fragility Fracture: 2,668
Hip Fracture: 387
Anaphylaxis by PCN: 32
Death by MVC: 11
Murdered: 6
ONJ: 0.7
Death by Lightning: 0.6

National Center for Health Statistics. JADA. 2006;137: 1144-1150
CASE 2: *Demented Darrin*

80 yo man with HTN, CAD, OA, BPH presents with wife who is concerned that his memory has been getting worse over several years. The wife took over managing the checkbook 12 mos ago because bills weren’t being paid on time but she is most concerned that Darrin got lost while out walking the dog the other day.

Vitals: 145/72, 64, 14, 93% RA
Well-appearing AA man in NAD, A&Ox2
Exam only remarkable for an antalgic gait
Meds: Aspirin, Metoprolol, Terazosin, Simvastatin
B12=654, TSH=2.3
SLUMS=18/30; GDS=2/15
CASE 2: Demented Darrin

80 yo man with HTN, CAD, OA, BPH presents due to wife’s concerns about memory issues progressing over years, exam only remarkable for antalgic gait, and SLUMS 19/30. What is the best next step?

a) Refer the wife to the Alzheimer’s Association

b) Stop the simvastatin

c) Order a head CT

d) Order PET Amyloid imaging
Dementia

- 1% per year incidence
- 6-8% prevalence for those >65yo
- 30% prevalence for those >85 yo
Dementia

- 4.5 million elderly with dementia
- 5\textsuperscript{th} leading cause of death in those 65+
- $\sim$100 billion annually
  - formal and informal care giving costs
- Delay onset by 5yrs, prevalence would decline 50\%
Diagnostic Criteria for Dementia

- Impairments in at least two of the following domains: memory, executive function, abstract thinking and reasoning, spatial ability and orientation, or language

- Impairments must interfere with functioning

- Decline from prior level of functioning

- Not exclusively due to delirium

- Not better explained by a psychiatric diagnosis
Algorithm for Dementia Diagnosis

Suspected Cognitive Dysfunction

- NL ADL Normal MS
  - Cognitively Intact
- Abnormal ADL Normal MS
  - Consider depression or FTD
- NL ADL Impaired MS
  - Mild Cognitive Impairment
- Abnormal ADL Impaired MS
  - Dementia

When to Consider Brain CT?

Canadian Consensus Conference on the Assessment of Dementia

1) age <60 years
2) use of anticoagulants or hx of a bleeding disorder
3) recent head trauma
4) hx of cancer (especially in sites that metastasize to the brain)
5) unexplained neurologic sx’s (e.g., new severe HA or seizures)
6) rapid (i.e., 1 to 2 mos) unexplained decline in cognition/function
7) "short" duration of dementia (less than 2 years)
8) hx of urinary incontinence and gait disorder early in the course of dementia (i.e., NPH)
9) any new localizing sign (e.g., hemiparesis or Babinski's reflex)
10) gait ataxia

CCCAD, CMAJ 1991; 144(7):851-3.
Does Brain CT Impact Outcome?

- Prospective study of 200 patients presenting to memory clinic
- 31 patients with possible reversible cause identified
- At 6 month f/u, only 1% felt to truly have reversibility
- Blood tests but neither CT nor EEG changed clinical diagnosis
  

- Retrospective study of 196 patients presenting to memory clinic
- Potentially reversible lesions on CT in 6 (3.1%) – 4 NPH, 2 tumors
- Cognitive outcome after surgery:
  - 2 worse, 2 unchanged, 2 improved (none with complete resolution)
- 5/6 met consensus criteria for CT scan at baseline
  - Glioma in the 1 who didn’t meet criteria and no improvement post-op
- None with *probable* AD at initial dx had a reversible CT lesion
  
When is Amyloid Imaging Appropriate?

Individuals with all of the following characteristics:
A) cognitive complaint with objectively confirmed impairment
B) Alzheimer’s as a possible diagnosis, but when the diagnosis is uncertain after a comprehensive evaluation by a dementia expert; and
C) when knowledge of the presence or absence of amyloid-beta pathology is expected to ↑ diagnostic certainty and alter management

PLUS at least 1 of the following:
1) Persistent or progressive unexplained mild cognitive impairment
2) Possible Alzheimer’s dx because of unclear clinical presentation, either atypical clinical course or etiologically mixed presentation
3) Progressive dementia and atypically early age of onset (≤65 yrs)

When is Amyloid Imaging Inappropriate?

- Clinical criteria for probable Alzheimer’s with typical age of onset
- To determine dementia severity
- Solely based on a positive family hx of dementia or presence of APOE4
- Cognitive complaint that is unconfirmed on clinical examination
- In lieu of genotyping for suspected autosomal mutation carriers
- In asymptomatic individuals
- Non-medical usage (e.g. legal, insurance coverage, or employment screening)

Therapeutic Approach in Dementia

• Educate and support patient and caregiver

• Geriatric assessment to:
  – Discuss advance directives
  – Optimize function and safety (discuss driving)
  – Consider “reversible” issues worsening dementia

• Consider pharmacotherapy
“Reversible” Causes of Dementia

- Drugs, Depression
- Eyes/ears
- Metabolic – hypoxia, B12 deficiency, thyroid dz
- Endocrine – DM, hypercalcemia
- Normal pressure hydrocephalus (NPH), Neoplasm
- Trauma (subdural hematoma)
- Infection – syphilis, HIV
- Alcohol
**CASE 2: Demented Darrin**

2 years later . . . 82 yo man with HTN, CAD, OA, BPH, and Dementia presents due to wife’s concerns about increasing withdrawal/apathy coupled with occasional aggressive outbursts. She is managing him at home with a day program for respite. VSS, Get-up-and-Go=25 secs using walker, SLUMS 14/30, Cornell Scale for Depression in Dementia = 8 (<6=neg; 18+=depression). What is the best next step?

a) Admit to long-term care facility

b) Add acetaminophen

c) Add low dose risperidone

d) Add donepezil
Management of Behavioral and Psychological Symptoms in Dementia

- 60-90% of demented patients have these symptoms
- 25% of NH residents with dementia receive antipsychotics
- Antipsychotics are not FDA approved for this indication; short-term studies show only modest efficacy
- Both conventional and atypical antipsychotics have now been associated with increased mortality in elderly, demented patients
- Atypicals have lower side effect profiles than typical antipsychotics
- Cholinesterase inhibitors also have only modest benefits (e.g., 1.72 point improvement on the NPI)
- Behavioral interventions also with limited effectiveness, but no drug side effects
- BOTTOM LINE: no therapy available with consistent clinically significant response

What About Acetaminophen for Behaviors Associated with Dementia?

- RCT of 25 NH residents with mod-severe dementia (19/25 on antipsychotics at baseline)
- 4 wks placebo and 4 wks acetaminophen (1 gm TID), randomized cross-over design with 1 wk washout
- Significant $\uparrow$ in activity/engagement (Dementia Care Mapping)
- No significant impact on agitation (CMAI)


- Cluster RCT of 352 NH residents with mod-severe dementia
- Usual care vs stepped pain management regimen x 8 wks (step1=acetaminophen (68%), then narcotics or pregabalin)
- Significant 17% relative $\downarrow$ in agitation (CMAI) & $\downarrow$ aggression (NPI)
- Worsening agitation in 4 wk f/u after meds stopped

  Husebo BS et al. BMJ 2011; 343.
CASE 3: Frail Fiona

92 yo woman with HTN, CKD4, Osteoporosis, OA, Hypothyroid, Depression, Mild Cognitive Impairment, resident in Assisted Living, meds monitored, ambulates with a FWW, coming to see you due to a recent fall, last Vit D level in normal range

Meds: ASA, Alendronate Q 2wks, Mirtazapine, Lisinopril, Acetaminophen, Levothyroxine

What is the best next step?

a) Add 400 IU Vit D daily

b) Add 1000 IU Vit D daily

c) Add Ca+D 500/200mg BID
“Frail Fiona”: What is frailty?

- Decreased physiologic reserve that results in increased vulnerability to stressors
Homeostasis vs Homeostenosis

Asymptomatic

Symptomatic

Hypothesized cycle of frailty

Environment, Disease, Medications

↓Total Energy Expenditure

↓Activity

↓Walking Speed

Chronic Undernutrition

↓Resting Metabolic Rate

→ CYCLE of FRAILTY

Sarcopenia

↓Strength & Power

↓Insulin sensitivity

Osteopenia

↓VO₂ max

Immobilization

Immobility

Dependency

Falls & Injury

Impaired Balance

Disease Medications Aging-related changes

Frailty Phenotype

- 3 of 5 = diagnosis
  1. Weak grip strength
  2. Slow walking speed
  3. Low energy expenditure/little physical activity
  4. Self-reported exhaustion
  5. Weight loss

# Prevalence of Frailty: Cardiovascular Health Study

<table>
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<th>Prevalence</th>
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<tbody>
<tr>
<td><strong>AGE</strong></td>
<td></td>
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<tr>
<td>65-74 years</td>
<td>3.9%</td>
</tr>
<tr>
<td>75-84 years</td>
<td>11.6%</td>
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<tr>
<td>85+ years</td>
<td>25.0%</td>
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<tr>
<td><strong>SEX</strong></td>
<td></td>
</tr>
<tr>
<td>Women</td>
<td>8.2%</td>
</tr>
<tr>
<td>Men</td>
<td>5.2%</td>
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<tr>
<td><strong>RACE</strong></td>
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<tr>
<td>African American</td>
<td>12.9%</td>
</tr>
<tr>
<td>White</td>
<td>5.9%</td>
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</tbody>
</table>

Frailty Algorithm

- Age?
- Assistance with meds?
- Assistance with bathing?
- Do health conditions interfere with function?

10 year follow-up from KPNW:
82% mortality rate for frail persons vs 34% for non-frail

Vitamin D and Hip Fracture

CASE 3: Frail Fiona

2 years later . . . 94 yo woman with HTN, CKD4, Osteoporosis, OA, Hypothyroid, Depression, Dementia, Falls, now a resident in Long Term Care, whose daughter wants to know if there is any reason to encourage her mom to take part in strength training program

You should tell the daughter:

a) Exercise might increase her risk of a fall-related injury

b) No studies her age group, but it might help

c) Studies suggest she could gain strength but not function

d) Studies suggest both strength and function can improve
Strength Training

• Hebrew Rehabilitation Center in Boston
• Mean age = 90; 6 women and 4 men
• About 4 chronic diseases/person
• 7 used an assistive device for ambulation
• Length of NH stay about 3.5 yrs

Strength Training

- 8-wk quadriceps training protocol
- Supervised training sessions 3x/wk
- 3 sets of 8 reps with each leg
- 1st wk at 50% of 1 RM
- 2nd wk at 80% of 1 RM
- Re-established 1 RM q 2 wks

Strength Training

- Average strength gain at 8 wks was 175%
- Muscle area via CT increased
- Time for tandem gait decreased
- 2 subjects stopped using canes
- 1/3 subjects who needed their arms to arise from the chair pre-intervention did not require this post-intervention

Detraining

- After 4 wks of detraining, the average loss of strength was 32%

- **USE IT OR LOSE IT?!**

- But how often do you need to use it . . .

- 1 session per wk at 60-100% of 1 RM maintained the strength gains!

CASE 4: Sleepless Sally

70 yo woman with hx of DM2, HTN, Hypothyroid, OP, who presents with a complaint of inability to sleep since you refused to refill her lorazepam that she was getting from her prior doctor. What is the best next step?

a) Prescribe lorazepam
b) Prescribe zolpidem
c) Prescribe amitriptyline
d) Cognitive behavioral therapy
Take a Sleep History

• What is your usual bedtime/ wake up time?
• Trouble falling asleep or staying asleep? How many times do you wake up at night and why? (pain, nocturia?)
• Snoring/ Apnea?
• Restless legs?
• Meds/ Caffeine/ Alcohol?
• Depression/ Anxiety symptoms?
For every 13 sedative-hypnotic scripts given you will:

Help 1 patient sleep an extra 15-25 min per night

AND

Cause serious side effects (e.g., falls, hip fx, MVC) for at least 2 patients
Cognitive Behavioral Therapy (CBT)

• CBT focuses on changing stressful negative thoughts about sleep, changing behaviors that interfere with sleep, improving relaxation skills, and making lifestyle changes that improve sleep

• CBT has been shown to be more effective than zolpidem for long term sleep outcomes, increasing sleep time by 38 minutes. Effects persist even after active treatment has stopped. And no side effects!

Sleep medication options: none are ideal; try CBT first!

- **Trazodone:**
  - Start at 25 mg qhs
  - Monitor for orthostasis

- **Mirtazapine:**
  - Start at 7.5 mg qhs, titrate to max of 15 mg qhs
  - Lower doses better for insomnia

- **Nortriptyline:**
  - 10-25 mg qhs
  - Caution: anticholinergic side effects

- **Melatonin:**
  - 3 to 6 mg qhs
## Estimated Anticholinergic Activity at Typical Doses in Healthy Older Adults

<table>
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<td>Oxybutinin ER</td>
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<td>Tolterodine</td>
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ML Chew, JAGS 56:1333–1341, 2008
TAKE HOME PEARLS

1) Fragility fracture = just treat (no need to DXA)

2) Do not check ctx or stop bisphosphonates for dental procedures

3) No indication to *routinely* perform a head CT for a dementia dx

4) Acetaminophen is a safe/effective strategy for dementia with behaviors

5) Vitamin D supplementation prevents falls

6) Exercise improves function even in very frail patients

7) Benzodiazepines should not be prescribed for chronic insomnia