TH3- Latest Approaches to Difficult Medical Issues in PA/LTC

Thursday, March 22
8:00 AM- 11:30 AM

Session Description

This popular session, by four experienced speakers from Saint Louis University and the University of North Carolina, will present an intensive session covering current and difficult clinical topic in the care of frail elders in the continuum of care. Topics will reflect best recent medical evidence, evidence-based guidelines, and current health care best practices.

Learning Objectives

Consider a multi-faceted approach to manage lower extremity mobility and polysubstance abuse in PA/LTC.

Discuss treatment options for epilepsy and hepatitis management in PA/LTC.

Use guidelines for management of anemia and vaccination in PA/LTC.

Choose appropriate medications for joint pain and osteoporosis in PA/LTC.

Presenter(s): Milta Little, DO, CMD; Philip Sloane, MD, PhD; Angela Sanford, MD, CMD; Julie Gammack, MD, CMD

Presenter(s) Disclosures: All speakers have reported they have no relevant financial relationships to disclose.
Latest Approaches to Difficult Medical Issues in PA/LTC - Immunization in the Elderly - Gammack

**Immunization in the Elderly**

Julie K. Gammack, MD
Saint Louis University School of Medicine

**Disclosure**

- I have no relevant financial or other relationships to disclose.

**Learning Objectives:**

By the end of the presentation, participants will be able to:
1. List vaccines recommended for older adults.
2. Discuss challenges in managing vaccinations in the long-term care setting.
3. Describe the risks and benefits of recommended immunizations in the long-term care population.

**Vaccines commonly recommended**

- TDap or TD: $30/dose
- Pneumovax-13 valent: $198/dose
- Pneumovax-23 valent: $102.28/dose
- Zostavax: $240.42/dose
- Shingrix: $151/dose
- Influenza: $24Fluvirin/Fluzone
- Hep B (3 shot series): $156 (3 shots)
Latest Approaches to Difficult Medical Issues in PA/LTC - Immunization in the Elderly - Gammack

Administrative Challenges
- Record Keeping
- Longitudinal vaccination documentation
- Dose-series tracking
- Facility population monitoring
- Cost
- Employee immunization tracking
- Immunization education and consent
- Standing orders — order sets — order tracking
- Timing and sequencing of vaccine initiation
- Collection of past vaccination records
- Target populations — special populations

Medical Director Role in Immunizations
- Approve standing orders, opt-out, consent process
- Educate on vaccine and illness guidelines
- Role-model and incentivize staff vaccination
- Assist in assessing vaccination contraindications and indications
- Guide policies/procedures, standing orders on vaccination
- Assist in illness tracking
- Assist in decisions on vaccination periods, shortages, tracking

2017-2018 Flu Season
- 5% oseltamivir & peramivir (IV) resistance

2017-2018 influenza vaccine preparations

<table>
<thead>
<tr>
<th>Antigen</th>
<th>Form</th>
<th>Potency</th>
<th>Route</th>
<th>Age</th>
</tr>
</thead>
<tbody>
<tr>
<td>Quadrivalent</td>
<td>[2A, 2B]</td>
<td>Inactivated</td>
<td>IM, Needle-free</td>
<td>Y All adults 18-64</td>
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*Aluminum salts or monophosphoryl lipid A strengthens the immune response to these vaccines.

Influenza administration considerations
- Per CDC: hives-only egg allergy can receive standard inactivated vaccine
- Severe egg allergy can get immunization in supervised setting
- If tolerate cooked eggs can tolerate standard vaccine
- A 2012 review of 513 with severe egg allergic had no anaphylaxis with standard influenza vaccine
- Live attenuated: not recommended currently
- ID or IM routes appropriate for aged 18-64
- Ongoing research with priming, adjuvanted and redosing using alternate vaccine strains
- Standard or high dose appropriate for >65 years

Influenza Benefits
- Illness/mortality benefit in LTC subjects with vaccination
- Meta-analysis: 11 studies; 11,000 LTC subjects
  - Reduction in pneumonia 27%, 95% CI 10%-42%, P < .001
  - Death 34%, 95% CI 15%-53%, P < .01
- MDS database: 1 million subjects
  - Well-matched vaccine to viral strains: reduced deaths by 2.0% and hospitalizations by 4.2%
  - 50-60% effective
  - Reduces hospitalization and death
  - 90% effectiveness in those age 60+
- Staff immunization on LTC illness
  - Meta-analysis: 5 studies; 13,700 LTC subject
  - No difference in deaths/mortality in residents with higher staff vaccination
  - RCT: 70% staff vaccination vs 23%
    - 20% reduced resident mortality
    - Lower respiratory illness in residents
    - Lower sick leave in staff

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Latest Approaches to Difficult Medical Issues in PA/LTC - Immunization in the Elderly

Immunization Misconceptions

Staff may not encourage or may influence residents NOT to get vaccinated
  - National estimates of LTC employee vaccination rates (around 60%)
  - Influenza is inconvenient not harmful.
  - Flu vaccine causes the flu or viral illness.
  - Flu vaccine is not effective.
  - Risk of getting flu is low.
  - 28% of staff with + flu serology unaware of flu infection.
  - Flu vaccine causes Guillain Barre and autism.
  - Flu vaccine is unsafe in pregnancy.

High dose influenza vaccine

Patients receiving the high-dose vaccine had significantly less risk of developing laboratory confirmed influenza infections (RR 0.76, 95%CI 0.65 - 0.90).

Tetanus, Diphtheria, Pertussis

- 40% of cases nationwide (50 per year) are age 65+
- Mortality in elderly: 18%
- CDC recommendation
  - Age 65+: Td every 10 years
  - Age 18-65+: Tdap once (ACIP 2012) then Td every 10 years
  - Health care workers: Tdap once then Td every 10 years
  - RCT Tdap vs Td
    - 1104 subjects age 65+
    - Tdap non-inferior to Td for response

Tdap or DT administration recommendations

- Adults with no/unknown Tdap status: 1 dose Tdap and q10 year Td booster
- Adults with unknown 3-dose Td series: Td 2 doses at least 4 weeks apart and third dose 6 to 12 months after with Tdap X1.
- Avoid pertussis-containing vaccines: progressive or unstable neurologic disorder, uncontrolled seizures, or progressive encephalopathy

Pneumococcal 23 & 13-valent administration considerations

- Single dose of PCV13 for adults age 65+
- Give 1st in sequence for better immune response
- No re-dosing PPSV23 when vaccinated at age 65+
- Age 19-64 with immune compromise*: 1 dose PCV13, 2 doses PPSV23 (5 yr apart), minimum 8 weeks between PCV13 and PPSV23.
- PPSV23 indicated age 19-64 with: CHF, CAD, COPD, asthma, ESLD, ETOH abuse, DM, smokers

*Immune compromise: immune deficiency, HIV, CKD, blood malignancies, sickle cell disease, asplenia

Pneumococcal benefits

- 23-valent pneumovoccal vaccine in LTC subjects
  - RCT 1600 subjects
    - Pneumonia 12.5% vaccine vs 20.6% placebo (P<0.001)
    - Pneumococcal pneumonia 2.8% vs 7.3% placebo (P<0.001).
    - Pneumococcal death: 0% vs 35.1% placebo (P<0.01).
    - All pneumonia death 20.6% vs 25.0% placebo (P=0.5).
- 13-valent CAPITA Trial
  - RCT 85,000 elders
  - Reduced pneumonias (40% efficacy) in vaccine
  - No difference mortality

Bonten MJ. NEJM. 2015; 372(12): 1114.
Recombinant zoster vaccine (RZV)

- In October 2017, ACIP recommended:
  - for the prevention of herpes zoster and related complications for immunocompetent adults aged 50 years and older
  - for the prevention of herpes zoster and related complications for immunocompetent adults who previously received ZVL.
  - RZV is preferred over ZVL for the prevention of herpes zoster and related complications.

Shingrix: recombinant zoster vaccine (RZV)

- Non-live, recombinant, two-dose IM vaccine
- 2-6 months between doses
- can be administered concurrently at different sites, with other adult vaccines
- recommended and approved in immunocompetent aged 50 +
- ZVL is recommended for aged 60 +
- Shingles prevention: 97% efficacy age 50–69 & 91% age 70+
- PHN prevention: 91% efficacy age 50-69 & 89% age 70+
- Efficacy >85% at 4 years post-vaccination age 70+
- NNT = 13 (age 50s) & 11 (age 60s) to prevent 1 zoster case
- RZV, compared with no vaccination, cost $31,000 per QALY

Wait 8 weeks after ZVL to use RZV

RZV efficacy

- 2 RCT efficacy trials N= 15,000
- Equal efficacy across age groups
- Lower HZ and PHN events
- Fewer side effect in age 70+

F-Tag 334/883

Influenza and Pneumococcal Immunizations

Must have policy and procedure
- Offer influenza annually when it becomes available during season (typically October 1 and March 31)
- Offer to all eligible
  - Pneumococcal 23-V, 13-V based on ACIP age guidelines
  - Provide education on influenza/pneumococcal risk/benefit before administration
  - Document of refusal, acceptance, past immunization, or contraindication
  - May provide self-report of past influenza immunization
  - Ensure patient has right to refuse vaccines
  - Consent for vaccine may be verbal and need only occur once (e.g. upon admission)
  - Does NOT require staff immunization

Flu Policy and Procedure
Conclusions

- Ensure annual flu vaccine program, policy/procedure
- Follow/track individual pneumococcal vaccine administration
- Consider risk/benefits of program for Tdap, HZV and other immunizations
Latest Approaches to Difficult Medical Issues in PA/LTC -
Seizures in the Elderly - Gammack

Seizures in the Elderly
Julie K. Gammack, MD
Saint Louis University School of Medicine

Disclosure
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Objectives
- Describe common features and presentations of seizure in the elderly
- Discuss drug interactions and aging-related metabolic changes that affect epileptic drug dosing
- List common side effects of antiepileptic medications

Case History
A 83-year-old woman with dementia and recurrent falls was seen in an ER after suffering a GTC seizure in the nursing facility. She was loaded with intravenous phenytoin and admitted. MRI showed a small chronic subdural hematoma but was otherwise normal, and EEG demonstrated few left temporal sharp waves. She was placed on phenytoin at 300 mg/d and discharged. Facility staff noted no further tonic-clonic activity but she was more lethargic and noted to be falling more frequently. Repeat brain imaging showed no new changes. The phenytoin level, was at 18 mg/l.

What are the potential issues?
What to do next?

Case Questions
- Does she have epilepsy?
- What is her renal function?
- What other medications is she taking? Recent changes?
- Is her dilantin level toxic? What is the unbound level?
- Is she having medication side effects?
- Is she seizing?
- Should she be treated for this first seizure?

New Epilepsy Definition (2014)
- At least two unprovoked (or reflex) seizures occurring greater than 24 hours apart.
- One unprovoked (or reflex) seizure plus a probability of further seizures at least 60%
- Diagnosis of an epilepsy syndrome
  clusters of features, EEG findings, imaging findings, age-dependent features, triggers and sometimes prognosis that occur together.
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Basic/Expanded Seizure Classification (2017)

1. Where seizures begin in the brain
2. Level of awareness during a seizure
3. Other features of seizures

Basic/Expanded Seizure Classification

<table>
<thead>
<tr>
<th>Final Threat</th>
<th>Generalized Great</th>
<th>Indusnare Great</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Mural Great</td>
<td>Motor</td>
</tr>
<tr>
<td></td>
<td>Motor</td>
<td>Sensory</td>
</tr>
<tr>
<td></td>
<td>Motor</td>
<td>Motor</td>
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<td></td>
<td>Motor</td>
<td>Motor</td>
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<td></td>
<td>Motor</td>
<td>Motor</td>
</tr>
</tbody>
</table>

Epilepsy In Elderly

INCIEN

PREVALENCE (1995-UK STUDY) IN ELDERLY

65–69 years : 6.01 /1000
70–74 years : 6.53 /1000
75–79 years : 7.39 /1000
80–84 years : 7.54 /1000
85 + years : 7.73 /1000

Seizure Etiology in Elderly

- **Stroke**: leading cause of new-onset epilepsy
  - Hemorrhage: 8% develop seizures within 2 weeks
  - Ischemic: 5% develop seizures within 2 weeks
  - Delayed epilepsy: 3–12 months
- **Head Trauma**: 20% of epilepsy in the elderly
- **Brain tumor**: 30% present with seizure
- **Brain metastasis**: 18% present with seizure

Medication Lowering Seizure Threshold

- Theophylline
- Isoniazid, metronidazole, quinolones, imipenem
- Tricyclics, serotonin-specific agents, bupropion
- Chlorambucil, cyclosporine
- Lidocaine, bupivicaine
- Fentanyl, meperidine, tramadol
- Amphetamines, methylphenidate
- Clozapine, phenothiazines, quetiapine, risperidone
- Anticholinergics
- Baclofen
- Lithium
- Oral hypoglycemics
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Diagnosis of Epilepsy

- Clinical history is key
  - Experience at onset
  - Report of observers
  - Post-ictal experiences
  - New/high risk medications
- Electroencephalogram
  - Generalized syndrome: Commonly abnormal
  - Focal seizures: Rarely abnormal on first recording
- Imaging study: MRI
- Laboratory evaluation
  - new metabolic, ischemia, infection, hypoxia, hypoglycemia

2/3 of Seizures in Elderly are Focal

Diagnosis of Epilepsy

- Clinical history is key
  - Experience at onset
  - Report of observers
  - Post-ictal experiences
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- Electroencephalogram
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- Imaging study: MRI
- Laboratory evaluation
  - new metabolic, ischemia, infection, hypoxia, hypoglycemia

3/2 of Seizures in Elderly are Focal

Diagnosis of Epilepsy

- Clinical history is key
  - Experience at onset
  - Report of observers
  - Post-ictal experiences
  - New/high risk medications
- Electroencephalogram
  - Generalized syndrome: Commonly abnormal
  - Focal seizures: Rarely abnormal on first recording
- Imaging study: MRI
- Laboratory evaluation
  - new metabolic, ischemia, infection, hypoxia, hypoglycemia

Syncope vs Seizure

<table>
<thead>
<tr>
<th>Before</th>
<th>After</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Paled</td>
<td>• Confusion/Disorientation</td>
</tr>
<tr>
<td>• Cyanosis</td>
<td>• Diffuse Myalgia</td>
</tr>
<tr>
<td>• Pallor</td>
<td>• High CK Elevation</td>
</tr>
<tr>
<td>• Autonomic symptoms</td>
<td>• Head or eye deviation</td>
</tr>
<tr>
<td>• Automatisms</td>
<td>• Head or eye deviation</td>
</tr>
</tbody>
</table>

Non-convulsive Status Epilepticus

- Impairment of cognition
- Fluctuation of consciousness
- Excessive somnolence
- Speech difficulty, Speech repetition
- Subtle facial or limb twitches
- Head or eye deviation
- Automatisms or repetitive behavior

Challenges of Managing Seizures in the Elderly

- Comorbidities
- Compliance
- Polypharmacy increases risk of:
  - Side effects
  - Drug interactions
- Physiologic response affected:
  - volume status
  - protein stores
  - renal-hepatic functions

Pharmacokinetics in Elderly

- Absorption
  - Less gastric acid (acid blockage)
  - Phenytoin
  - Phenobarbital
  - Carbamazepine
  - Gabapentin
  - Delayed emptying
  - Decreased blood flow
  - Decreased TBW
  - Decreased drug binding
  - Hypoalbuminemia
- Distribution
  - Decreased renal metabolism
- Elimination
  - Decreased hepatic metabolism
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Treating Single Seizures in Elderly

**PRO**
- Falls Injury Prevention
- Cardiovascular stress
- Likely recurrence (20% treated vs 40% untreated)
- Aspiration
- Progression to dementia with recurrent seizure
- Delirium complications
- (Driving)
- (Employment)

**CON**
- AED side effects
- Increased sensitivity to neurotoxicity
- Pharmacokinetic factors
- Drug interactions
- Effect on quality of life
- Drug-disease interactions
- Polypharmacy

Management of Seizures Associated With aSAH:

Treatment Strategies

- Selected a non-inducing drug
- Avoid highly protein bound drugs
- Simplify dosing schedules
- Extended release formulations
- Increases compliance
- Reduces peak-related side effects
- Monotherapy when possible
- Titration to clinical responses
- Free drug levels when appropriate
- Interactions

Seizure Prophylaxis

Management of Seizures Associated With aSAH:

- The use of prophylactic anticonvulsants may be considered in the immediate posthemorrhagic period (Class IIb, Level of Evidence B).
- Chronic Subdural Hematoma: No RCTs
- Acute intracranial hemorrhage: small mixed studies
- TBI: mixed hemorrhage type: cohort study no benefit, Small + RCT 1990

Choice and Use of Drugs

<table>
<thead>
<tr>
<th>Focal</th>
<th>Generalized</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tonic</td>
<td>Tonic</td>
</tr>
<tr>
<td>Myoclonic</td>
<td>Myoclonic</td>
</tr>
<tr>
<td>Tonic</td>
<td>Atomic</td>
</tr>
<tr>
<td>Absence</td>
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</tr>
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</table>

**PRO**

- Extended release formulations
- Simplify dosing schedules
- Avoid highly protein bound drugs
- Select a non-inducing drug
- Expect interactions
- Titration to clinical responses
- Monotherapy when possible

**CON**

- Polypharmacy
- Drug-disease interactions
- Effect on quality of life
- Drug interactions
- Pharmacokinetic factors
- Increased sensitivity to neurotoxicity
- AED side effects

Side

<table>
<thead>
<tr>
<th>Drug Interaction</th>
<th>Common Side Effects</th>
</tr>
</thead>
<tbody>
<tr>
<td>Phenytoin</td>
<td>Decreases ECT, TCA</td>
</tr>
<tr>
<td>Carbamazepine</td>
<td>Decreases COE, serum, digoxin, TCA, fluoxetine, neurotoxicity, papular rash</td>
</tr>
<tr>
<td>Valproic acid</td>
<td>Increases benzodiazepine, phenobarbital, propofol, phenytoin, diphenylhydantoin, warfarin</td>
</tr>
<tr>
<td>Gabapentin</td>
<td>Increases benzodiazepine, phenobarbital, propofol, phenytoin, diphenylhydantoin, warfarin</td>
</tr>
<tr>
<td>Lamotrigine</td>
<td>Levels increase with ELS, levetiracetam, thiamine, riboflavin, vitamin D, vitamin E</td>
</tr>
<tr>
<td>Levetiracetam</td>
<td>Levels increase with ELS, folic acid, warfarin, methotrexate, mesilates, related dysphonia</td>
</tr>
<tr>
<td>Topiramate</td>
<td>Decreases warfarin, increases phenytoin, decreases warfarin, increases phenytoin</td>
</tr>
<tr>
<td>Oxcarbazepine</td>
<td>Increases phenytoin, decreases warfarin, increases phenytoin</td>
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<tr>
<td>Etorcazine</td>
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**Dosing & Pharmacokinetics in Elderly: 1st Generation AEDs**

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<th>Free/Unbound Range</th>
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<tr>
<td>Cyclazapine</td>
<td>12.3-20 mg/L</td>
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<tr>
<td>Phenytoin</td>
<td>3-5 mg/kg</td>
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**Case History**

- A 83-yr woman with new seizure, dementia, recurrent falls with chronic subdural hematoma on phenytoin with lethargic and level of 18 mg/L.
  - Does she have epilepsy?
  - What is her renal function?
  - What other medications is she taking? Recent changes?
  - Is her dilantin level toxic? What is the unbound level?
  - Is she having medication side effects?
  - Is she seizing?
  - Should she be treated for this first seizure?

Summary

- Seizures are common in the elderly with vascular disease, hypertension, dementia, and diabetes
- Seizures are more likely to be focal than generalized
- Absorption, albumin binding, renal, and hepatic function affects medication levels
- Consider measuring unbound concentrations of highly protein-bound AEDs (eg, carbamazepine, phenytoin, and valproic acid)
- Anticipate drug interactions when adding or withdrawing medications
- Monitor for AED-related adverse effects
- Slowly transition to alternate AED

**Drug Monitoring**

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**Switching AED in Sz Free**

1. Introduce the new drug at 1/4 - 1/2 target dose
   - continue standard drug dose
2. Reduce standard drug slowly (25% per week)
   - increase new drug 25% weekly toward the target dose
3. Continue until the patient has converted fully to new drug
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Seizures in the Elderly -Gammack

Acknowledgements

L. James Willmore, MD Professor of Neurology  
Saint Louis University School of Medicine  
Chris Laohathai, MD Assistant Professor of Neurology  
Saint Louis University School of Medicine
Difficult Issues in Long Term Care: Osteoporosis Hepatitis

Milda Oyola Little, DO, CMD
Saint Louis University, Division of Geriatric Medicine

Speaker Disclosures
Dr. Little has no financial relationship(s).

Interesting Case Study…

58 y/o male with cervical spine fracture → quadriplegia and neurogenic bladder
chronic ileus with distended abdomen
chronic decubitus ulcers
major depression & probable personality disorder
has been living in present NH for 5 years

Hepatitis

Interesting Case Study…

- Weight loss (refused to eat) 11/2016
- Persistent pancytopenia 12/2016 (refused w/u)
- Rectal bleed (refused w/u) 9/2017
- Increased abdominal distension 11/2017
- Abdominal/pelvic US showed extensive ascites, HSM, nodular liver (consistent with cirrhosis)
- Sent to hospital – Dx: portal HTN

- Labs over time:
  - Patient often refused lab draws
  - CBC
  - Thrombocytopenia early 2012, then normalized
  - Normal 2012, 2013
  - Pancytopenia 2016
  - Liver enzymes and function
    - Transaminases normal 2013, 2016, 2017
    - Low albumin beginning in 2016
  - Hepatitis panel 11/3/2017
    - Hepatitis B surface Ag (-)
    - Hepatitis B surface Ab (-)
    - Hepatitis B core Ab (-)
    - Hepatitis A Ab (-)
    - Hepatitis C Ab (+)

- Hepatitis C RNA PCR: 1.066,221 IU/mL (ref <15)
- 6.03 log/U (ref <1.2)

Interesting Case Study

- Initial hospitalization:
  - Hep C genotype obtained
  - Large volume paracentesis
- One week later, increased abdominal pain and distention
- Two more hospitalizations for large volume paracenteses
- Died two weeks later of fulminant liver failure

- Missed opportunities for early screening
- Risk factor assessment
- Confounding illnesses and co-morbid issues
- Atypical presentation
- Hepatitis prevention
- Infection control
- Immunizations

Lessons Learned
Latest Approaches to Difficult Medical Issues in PA/LTC - Osteoporosis Hepatitis - Little

Hepatitis Objectives

By the end of the session, participants will be able to
1. Identify high-risk individuals in LTC who need to be screened for hepatitis B and C
2. Describe infection control policies, including immunization practices, to prevent hepatitis infections
3. Distinguish active hepatitis infections from normal laboratory serologic testing
4. Recommend appropriate treatment protocols for active hepatitis infections in the LTC population

Hepatitis Viruses Lead to Acute or Chronic Inflammation of the Liver

Hepatitis Viruses

<table>
<thead>
<tr>
<th>Virus</th>
<th>Symptoms</th>
<th>Transmission</th>
<th>Genotype</th>
</tr>
</thead>
<tbody>
<tr>
<td>HAV</td>
<td>anorexia, nausea, dark urine, jaundice</td>
<td>Enteric</td>
<td>type A</td>
</tr>
<tr>
<td>HBV</td>
<td>fatigue, abdominal pain, loss of appetite</td>
<td>Parenting</td>
<td>type B/C</td>
</tr>
<tr>
<td>HCV</td>
<td>intermittent nausea, vomiting</td>
<td>Parenting</td>
<td>type C</td>
</tr>
<tr>
<td>HDV</td>
<td>diarrhea</td>
<td>Parenting</td>
<td>type D</td>
</tr>
</tbody>
</table>

Hepatitis in LTC: Is the Threat Real?

- Outbreaks in LTC do occur with regularity
- 26 reported Hepatitis B NH outbreaks in literature
- 1 recent outbreak of Hepatitis C in PA-LTC
- All related to break-down of infection control practices

Impact

- Current national and global estimates do not include residents of LTC

Infection Control Breakdown: Opportunities for Improvement

- Blood glucose monitoring
- Poor hand hygiene
- Lack of monitor cleaning
- Reusable lancets
- Single-use lancets on multiple residents
- Frequent blood monitoring (e.g. INR)
- Failure to disinfect reusable podiatric equipment
- Poor vaccination practices

Hepatitis B

- Acute Case Definition Clinical Criteria
  - An acute illness with:
    - discrete onset of symptoms (e.g. fatigue, abdominal pain, loss of appetite, intermittent nausea, vomiting), and jaundice or elevated serum aminotransferase levels
  - Case classification:
    - Confirmed = A case that meets the clinical criteria and is laboratory confirmed

- Chronic Case Definition Clinical Criteria
  - Persons with chronic Hepatitis B virus (HBV) infection may be asymptomatic.
  - No evidence of liver disease – chronic hepatitis – cirrhosis – liver cancer
- Case Classification:
  - Confirmed = A case that is laboratory confirmed

Hepatitis Viruses in LTC: Is the Threat Real? • Outbreaks in LTC do occur with regularity • 26 reported Hepatitis B NH outbreaks in literature • 1 recent outbreak of Hepatitis C in PA-LTC • All related to break-down of infection control practices • Impact • Current national and global estimates do not include residents of LTC

Infection Control Breakdown: Opportunities for Improvement • Blood glucose monitoring • Poor hand hygiene • Lack of monitor cleaning • Reusable lancets • Single-use lancets on multiple residents • Frequent blood monitoring (e.g. INR) • Failure to disinfect reusable podiatric equipment • Poor vaccination practices (Hepatitis B only)

Hepatitis B

- Acute Case Definition Clinical Criteria
  - An acute illness with:
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  - Confirmed = A case that is laboratory confirmed
When Hepatitis B Becomes Chronic

Hepatitis B Risk Factors Most Relevant to LTC
- Immigrants/refugees from endemic regions and their U.S. born children not vaccinated as children
- Healthcare workers
- Persons with diabetes
- Persons with chronic liver disease
- Developmentally disabled persons in long-term-care facilities
- Hemodialysis patients
- Men who have sex with men
- Injection-drug users
- HIV-positive persons

Hepatitis B Testing Procedures

Hepatitis B Treatment
- Cure is not possible, only viral suppression
- Prevention with vaccine is paramount to disease control
- Candidates for antiviral treatment
- Presence of cirrhosis
- Moderate to severe inflammation or fibrosis
- HBV DNA 2000-20,000 IU/ml + high ALT
- HBV DNA >20,000 IU/ml
- First-line medications = 12 months of:
  - Injectable PEG-interferon (30% effective, no resistance)
  - Entecavir oral (over 90% effective, <1% resistance in naïve)
  - Tenofovir oral (over 90% effective, <1% resistance)

Preventing Hepatitis B: Vaccination

Hepatitis C

Acute Case Definition Clinical Criteria
- Usually asymptomatic and unrecognized
- An acute illness with
  - discrete onset of symptoms consistent with acute viral hepatitis
  - jaundice or elevated serum aminotransferase levels

Case Classification
- Confirmed = A case that meets the clinical case definition and is laboratory confirmed.
- Virus cleared in ~ 15-25%

Chronic Case Definition Clinical Criteria
- Persons with chronic Hepatitis C virus (HCV) infection may be asymptomatic.
- No evidence of liver disease – chronic hepatitis – cirrhosis – liver cancer

Case Classification
- Persistent viremia 12-24 weeks after infection
- Confirmed = A case that is laboratory confirmed.
  - Positive + anti-HCV positive EIA and ALT/SGPT above the upper limit of normal, but the anti-HCV EIA result has not been verified.
Latest Approaches to Difficult Medical Issues in PA/LTC - Osteoporosis Hepatitis - Little

Extrahepatic manifestations of chronic Hepatitis C
- Fatigue
- Diabetes mellitus
- Glomerulonephritis
- Essential mixed cryoglobulinemia
- Porphyria cutanea tarda
- Non-Hodgkin’s lymphoma

Hepatitis C Risk Factors Most Relevant to LTC
- Current or former injection drug users (even once!)
- Chronic hemodialysis patients
- People with known exposures to HCV
- Health care workers after needle sticks
- Recipients of blood/organs from HCV+ donor
- Intranasal drug use and tattoos lower risk but possible

Hepatitis C Risk Factors Most Relevant to LTC
- Current or former injection drug users (even once!)
- Chronic hemodialysis patients
- People with known exposures to HCV
- Health care workers after needle sticks
- Recipients of blood/organs from HCV+ donor
- Intranasal drug use and tattoos lower risk but possible

Recommended Testing Sequence for Identifying Current Hepatitis C Virus (HCV) Infection

History of Hepatitis C Treatment
- 1991: Subcutaneous interferon-alpha monotherapy
- 1998: Ribavirin added to regimen
- 2001: Pegylated interferon decreased injection frequency and increased SVR to 44%
- 2011: Direct antivirals (DAAs) approved: protease inhibitors: boceprevir and telaprevir
- 2016+: Newer interferon-free combination antiviral regimens, genotype-based

Hepatitis C Treatment
- Genotyping is important: (7 + 67 subtypes)
- GOAL IS CURE!
- Prevent clinical decompensation (3-6% annual risk)
- Prevent hepatocellular carcinoma (HCC, 1-5% annual risk)
- HCC surveillance should continue indefinitely if cirrhosis
- Limitations to treatment are mostly HIGH COST
Latest Approaches to Difficult Medical Issues in PA/LTC - Osteoporosis Hepatitis - Little

Hepatitis is a Reportable Illness!

Report test results positive for any of the following to CDC:
- IgM antibody to HAV (IgM anti-HAV)
- Hepatitis B surface antigen (HBsAg)
- IgM antibody to Hepatitis B core antigen (IgM anti-HBc)
- Antibody to HCV (anti-HCV).

Hepatitis Take Home Points

- Hepatitis B is incurable
- It can be prevented with vaccination and infection control practices
- Viral suppression to seronegativity is goal to reduce long-term complications, including cirrhosis and HCC

- There is no vaccine to prevent Hepatitis C but it can be cured with ~12 weeks of antiviral therapy
- Surveillance for HCC is lifelong for chronic Hepatitis B and C as long as life expectancy warrants

Osteoporosis

Adequate treatment of Osteoporosis includes identifying and treating frailty and fall risks

There’s a CPG for that!
Objectives

At the end of the session, participants will be able to
1. Describe the causes of bone loss and turnover
2. List the most effective ways to prevent osteoporosis
3. Diagnose osteoporosis in the long term care setting using cost-effective measures
4. Discuss the risks versus benefits of various treatment options for PA-LTC patients and residents

What Causes Osteoporosis?

Osteocytes: The Constraints of Living in a Cave
- Osteocytes are dendritic cells surrounded by unmineralised matrix (osteoid)
- 90-95% of adult bone cells
- Secrete E11/gp38 in response to shear stress
- Osteocytes are mechanosensors
- IMPORTANT REGULATOR CELLS!

Risk Factors for Osteoporosis
- Low calcium and vitamin D intake/exposure
- Seizure medications
- Thin build
- Ethanol
- Hypergonadism
- Prior fracture
- Thyroid excess
- Race
- Other relatives
- Steroids
- Inactivity
- Smoking
How prevalent is osteoporosis in LTC?

- Affects 70-80% of LTC population
- Only diagnosed in 6.2-24.2%
- Hip fracture in NH residents 2-3X & are less likely to recover function following a fracture

<table>
<thead>
<tr>
<th>T-score</th>
<th>BMD Category</th>
</tr>
</thead>
<tbody>
<tr>
<td>&gt; -1.0</td>
<td>Normal</td>
</tr>
<tr>
<td>-1.1 to -2.4</td>
<td>Osteopenia</td>
</tr>
<tr>
<td>-2.5 and lower</td>
<td>Osteoporosis</td>
</tr>
</tbody>
</table>

Assessment of Bone Mineral Density

- **DEXA**
  - Hip/Spine (misses silent vertebral fractures)
  - Heel (peripheral DEXA) = 93.7% sensitivity T score <1
  - Cannot delineate Renal Osteodystrophy!

- **Heel ultrasound**
  - 70% sensitivity
  - 80% specificity
  - Probably under-estimates

- **FRAX-BMD** (not validated in this setting)

Low Tech/High Touch Diagnosis?

- **BMD ≠ bone quality**
  - Poor bone quality may not respond to antiresorptives (hasn’t been studied)

- **Clinical features**
  - Presence of kyphosis
  - Height reduction
  - Fracture history or "silent" vertebral fractures on X-ray
  - Presence of multiple risk factors

- **FRAX-BMI** (probably over-estimates)
Latest Approaches to Difficult Medical Issues in PA/LTC -
Osteoporosis Hepatitis - Little

Primary Prevention
- Risk factor reduction
- Fall risk and fall injury reduction
- Adequate calcium and vitamin D intake
- Assessment of BMD and pertinent lab tests
- Weight-bearing exercise (not passive or hydrotherapy)

Secondary Prevention
As per primary prevention PLUS
- Early mobilization: **WBAT POD #1!**
  - Whether intramedullary nailing or hemiarthroplasty
- Adequate antiresorptive therapy – regardless of BMD
  - From 1995-2004, only 11.5% PA-LTC post-fx patient on Rx
  - Follow-up study of 180 NH, only 5.5% (range 0-40%)
  - No reason to delay start – order on admission

---

**Treatment**

**Table 1**

<table>
<thead>
<tr>
<th>Potential Cause</th>
<th>Referral Test</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cushing’s syndrome</td>
<td>24-hr free cortisol, salivary cortisol</td>
</tr>
<tr>
<td>Hypothyroidism or excess thyroid hormone replacement</td>
<td>T4, TSH</td>
</tr>
<tr>
<td>Secondary hypertension</td>
<td>24-hr ambulatory BP, 24-hr proteinuria</td>
</tr>
<tr>
<td>Hypogonadism [men]</td>
<td>T, estradiol, testosterone</td>
</tr>
<tr>
<td>Hyperlipidemia</td>
<td>Lipid profile, LDL-cholesterol</td>
</tr>
<tr>
<td>Diabetes mellitus</td>
<td>HbA1c, fasting glucose</td>
</tr>
<tr>
<td>Multiple sclerosis</td>
<td>Serum protein electrophoresis and immunoglobulins</td>
</tr>
<tr>
<td>Osteoporosis</td>
<td>Alkaline phosphatase, 25-hydroxyvitamin D</td>
</tr>
<tr>
<td>Thyroid hyperfunction</td>
<td>Serum TSH, free T4, free T3</td>
</tr>
</tbody>
</table>

**Secondary Prevention**

**Appendix 3**

**Osteoporosis Testing and Treatment Pocket Card**

- Recommended lab tests: Serum 25(OH) vitamin D, Alkaline Phosphatase
- Supplemental test: Serum 1,25(OH)2 vitamin D
- Intact PTH if calcium is elevated

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**Parker, et al.** BMJ 2006; 332:571–574
**Cosman, et al.** Osteoporos Int 2014; Online first

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**Siebens, et al.** PM&R 2012;4:548–555
**Kates SL, Mears SC.** Geriatric Orthopaedic Surgery & Rehabilitation 2011;2:5–37
Latest Approaches to Difficult Medical Issues in PA/LTC - Osteoporosis Hepatitis - Little

Treatment: Non-pharmacologic

Table 3. Nonpharmacologic Interventions in Individuals With Low Bone Density.

- Smoking cessation
- Cutting down on alcohol consumption
- Regular weight-bearing and strengthening exercises
- Drinking coffee with milk
- Avoiding medications known to decrease bone mass
- Ensuring a well-balanced diet
- Fall assessment and implementing interventions to decrease risk of falling
- Recommending hip protectors for individuals willing to wear them

BMD and Pharmacologic Treatment

<table>
<thead>
<tr>
<th>T-score</th>
<th>BMD Category</th>
<th>Management</th>
</tr>
</thead>
<tbody>
<tr>
<td>&gt; -1.0</td>
<td>Normal</td>
<td>Non-Rx prevention</td>
</tr>
<tr>
<td>-1.1 to -2.4</td>
<td>Osteopenia</td>
<td>Ca/Vit D Reduce meds with risk factors/fracture</td>
</tr>
<tr>
<td>-2.5 and lower</td>
<td>Osteoporosis</td>
<td>Anti-resorptive Medications</td>
</tr>
</tbody>
</table>

Treatment: Calcium and Vitamin D

- Fortified food shown to improve markers of bone turnover, as well as PTH and Vitamin D levels
- In NH population, supplemental Ca + Vitamin D
  - ↓ fracture and ↑ BMD if Vitamin D at least 800 IU daily
  - High dose IM vitamin D not effective
  - Calcium alone likely not effective and high dose → CV events

Recommended regimen:
- Vitamin D 3000 IU daily plus fortified yogurt or Calcium 500 mg at HS

Treatment: Anti-resorptives

- Bisphosphonates
- Calcitonin (Vertebral fx)
- SERM (Raloxifene)
- Testosterone
- Teriparatide
- Denosumab

Latest Approaches to Difficult Medical Issues in PA/LTC - Osteoporosis Hepatitis - Little

**Bisphosphonates: ↑ BMD and ↓ fracture**

- Best evidence for Zoledronic Acid
- Infusion site reactions (fever, myalgia, arthralgia, HA) ameliorated by pre-treatment with acetaminophen
- Evidence from RCT for safety and improved BMP/biomarkers in frail LTC and ALF women over 2 years
- 57% of LTC residents on & tolerating bisphosphonates had CrCl <35 ml/min


**Bisphosphonates: Side Effects**

- Esophagitis
- Uveitis
- Esophageal cancer
- Renal failure
- Osteonecrosis of the jaw
- Atrial fibrillation
- Atypical shaft fractures – consider limiting treatment duration to 5 years

Jamal, S. A. et al. JAMA 2011;305:800-807
Morley. JAMDA 2015;16:265-267

**Estrogens**

- Estrogen…needed if premature menopause or symptoms…should be taken for no more than 5 years
- Raloxifene increases BMD and reduces spine fractures.
  - 65% reduction in breast cancer over 8 years
  - Improved markers of bone turnover in LTC


**Osteoporosis and Testosterone**

- Low testosterone is associated with minimal trauma hip fracture.

**Teriparatide (PTH (1-34))**

- Increases BMD more than alendronate
- Recommended for
  - BMD <-3.0
  - Significant fractures
  - Failure to respond to bisphosphonates
  - Contraindication to bisphosphonate (low renal function)
  - Risk of Osteosarcoma? (seen in rats)
- Taken for maximum of 2 years
- Limited evidence in LTC population

Morley. JAMDA 2015; 16:265-267
Nimni, et al. JAGS 2016; 64(4):911-12
Latest Approaches to Difficult Medical Issues in PA/LTC - Osteoporosis Hepatitis - Little

Denosumab: Side Effects

- Serious Infections (4.4% (1.15 – 17.14%)
- Skin Rashes
- Osteonecrosis of Jaw
- Pancreatitis
- New Malignacies (4.3% vs 4.85%)

Post marketing surveillance: www.proliasafety.com

Cost effective?

<table>
<thead>
<tr>
<th>Drug</th>
<th>Cost/$/year</th>
</tr>
</thead>
<tbody>
<tr>
<td>Vitamin D</td>
<td>$10-90</td>
</tr>
<tr>
<td>Alendronate</td>
<td>$100-300</td>
</tr>
<tr>
<td>Ibandronate</td>
<td>$500-2300</td>
</tr>
<tr>
<td>Zoledronic Acid</td>
<td>$25-50</td>
</tr>
<tr>
<td>Risedronate</td>
<td>$1,080-2400</td>
</tr>
<tr>
<td>Denosumab</td>
<td>$2,400-4200</td>
</tr>
<tr>
<td>Teriparatide</td>
<td>$36,000</td>
</tr>
</tbody>
</table>

GoodRx.com

Cost of a fracture: ~ $13,000/patient Or $20 billion/year

QAPI Interventions

- Widespread education to interprofessional staff
- Practice redesign project for fracture reduction

Mao FX. JAMDA 2008; 9:449-453

Table 2: Treatable Risk Factors for Osteoporosis

<table>
<thead>
<tr>
<th>Risk Factor</th>
<th>Prevalence</th>
</tr>
</thead>
<tbody>
<tr>
<td>Postmenopausal status</td>
<td>50%</td>
</tr>
<tr>
<td>Family history</td>
<td>5-10%</td>
</tr>
<tr>
<td>Smoking</td>
<td>15%</td>
</tr>
<tr>
<td>Sedentary lifestyle</td>
<td>20%</td>
</tr>
<tr>
<td>Steroid use</td>
<td>2%</td>
</tr>
<tr>
<td>Low calcium diet</td>
<td>25%</td>
</tr>
<tr>
<td>Chronic diseases</td>
<td>30%</td>
</tr>
</tbody>
</table>

Denosumab is cost-effective for all risk factors.

Take Home Points

- Osteoporosis in the PA-LTC care setting is underdiagnosed and undertreated
- Barriers exist to adequate diagnosis and treatment
- Fall risk and fall injury reduction probably more important than assessing and treating BMD

Thank You!

What questions do you have?
Anemia in the Elderly

Angela Sanford, MD CMD
Assistant Professor of Internal Medicine-Geriatrics
Saint Louis University School of Medicine

Speaker Disclosures

Dr. Sanford has no financial relationships.

Learning Objectives

By the end of the session, participants will be able to:

• Define anemia
• Differentiate between and diagnose anemia due to iron deficiency, vitamin B12 deficiency, anemia of chronic disease and anemia of CKD
• Initiate treatment in the most common causes of anemia in the elderly
• Recognize myelodysplastic syndrome and know when to refer

Case 1

• 90 y/o WF w/ PMH significant for dementia and pancytopenia living in the dementia unit
• Pancytopenia slowly worsening over past 5 yrs, but largely asymptomatic
• HgB ~ 9-10 range, WBC ~3.0, platelets ~120
• Dx w/ "low grade" MDS in 2016
• Checking routine CBCs every 3 mos.

My questions...

• What is the most common type of anemia in the elderly? How does this compare with most common type in all age groups?
• How do we diagnose iron deficiency in light of chronic inflammation (ferritin = acute phase reactant)?
• Is there any role for iron supplementation in anemia of chronic disease or CKD?
• How long do we continue supplementation for iron and B12 deficiency anemias?
• When do we chose IV vs PO supplementation?

Case 1

• Labs stable until last July when HgB dropped to 6-7 mg/dL range
• Remained >6.0 mg/dL until January 2018 when HgB was found to be 4.8 on routine lab f/u.
• Hematologist recommended pt be seen in ER, so pt was sent out
• Found to have a sigmoid adenocarcinoma which was resected
Latest Approaches to Difficult Medical Issues in PA/LTC - Anemia in the Elderly - Sanford

**Background**

- **World Health Organization (WHO) established the definition of anemia in 1968:**
  - Hgb level of <13 g/dL in men and <12 g/dL in women
  - Cohort in this original study excluded elderly pts
  - Should there be different cut-offs for the elderly?

**Term is derived from Greek:**
- An = not
- Haima = Blood
- Bloodlessness

**Correlations have been shown between anemia and:**
- Functional status
- Impairment in ADLs
- Weakness
- Fatigue
- Frailty
- Impaired quality of life
- Frequency and duration of hospital stay
- Depression
- Falls
- Fractures
- Cognitive impairment

**Background**

- Can be classified by etiology:
  - Impaired production of RBCs
    - Nutritional deficiencies
    - Chronic inflammation
    - CKD
    - Clonal (i.e. MDS, aplastic anemia)
  - Blood loss
  - Accelerated RBC destruction
    - Hemolytic anemia (i.e. malaria, autoimmune)
  - Unexplained

**Can be classified by morphology of RBCs:**
- Microcytic hypochromic
- Normocytic normochromic
- Macrocytic normochromic

**Epidemiology**

- **Anemia is quite common in older adults**
  - Prevalence of 10-25% in those >65
  - Increases with age, with prevalence of up to 50% in those >80
  - Seen in ~47% of nursing home (NH) residents

**One study in the elderly found prevalence of:**
- Anemia of chronic disease/inflammation—62.1%
- Anemia of CKD—11.3%-45.1%
- Multifactorial—28.1%
- Iron deficiency—14.4%
- Clonal disorders—10%
- Folate deficiency—6.7%
- Vitamin B12 deficiency—2%
Iron Deficiency Anemia (IDA)

- **Most common cause of anemia worldwide**
- **Can result from:**
  - Inadequate iron intake
  - Decreased iron absorption
  - Increased iron demand
  - Increased iron loss

Iron Deficiency Anemia—Diagnosis:

**Table 2. Stigmata of Iron Deficiency Anemia**

<table>
<thead>
<tr>
<th>Stigmata</th>
<th>Reference(s)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Abnormal uterine bleeding 20 to 38</td>
<td>16</td>
</tr>
<tr>
<td>Long-term use of aspirin 18 to 16</td>
<td>18</td>
</tr>
<tr>
<td>Long-term use of nonsteroidal anti-inflammatory drugs</td>
<td>1, 16</td>
</tr>
<tr>
<td>Colonic carcinoma 9 to 16</td>
<td>16</td>
</tr>
<tr>
<td>Anemiaemia</td>
<td>16</td>
</tr>
<tr>
<td>Hemorrhage</td>
<td>16</td>
</tr>
<tr>
<td>Gastric carcinoma</td>
<td>16</td>
</tr>
<tr>
<td>Peptic ulcer disease</td>
<td>16</td>
</tr>
<tr>
<td>Celiac disease 4 to 6</td>
<td>16</td>
</tr>
<tr>
<td>Gastritis</td>
<td>16</td>
</tr>
<tr>
<td>Intestinal intussusception 1 to 2</td>
<td>16</td>
</tr>
<tr>
<td>Hemorrhoids 2 to 2</td>
<td>16</td>
</tr>
<tr>
<td>Gastrointestinal cancers 1 to 2</td>
<td>16</td>
</tr>
<tr>
<td>Small bowel tumors 1 to 2</td>
<td>16</td>
</tr>
<tr>
<td>Hiatus hernia</td>
<td>16</td>
</tr>
<tr>
<td>Anorexia</td>
<td>16</td>
</tr>
<tr>
<td>Nocturnal pain</td>
<td>16</td>
</tr>
<tr>
<td>Renal failure</td>
<td>16</td>
</tr>
<tr>
<td>Carotid artery disease, idiopathic hypothyroidism</td>
<td>16</td>
</tr>
<tr>
<td>Hypertension</td>
<td>16</td>
</tr>
<tr>
<td>Renal failure</td>
<td>16</td>
</tr>
</tbody>
</table>

Reference(s):

Iron Deficiency Anemia—Diagnosis

- **IDA dx** → low Hgb, low serum iron, low ferritin
  - Typically associated with microcytic anemia, but up to 40% of pts will have normocytic RBCs. Should not be considered in pts w/ macrocytosis and MCV >95 fL (sensitivity 98%).
  - Ferritin levels <30 ng/mL (sensitivity 92%, specificity 98%).
  - Ferritin levels >100 ng/mL generally exclude IDA even w/ a co-existing inflammatory state.

- **Soluble transferrin receptor level** → indirect measure of erythropoiesis and iron status and is increased in IDA.
  - Unaffected by inflammatory states and can identify concomitant iron deficiency with anemia of chronic dz.

Iron Deficiency Anemia—Treatment

- **Aim**: supply enough iron to normalize Hgb concentration and replenish iron stores.

  - **Two options**—IV vs PO iron supplementation.
    - Choice is based on Hgb level, tolerance to oral supplementation, presence of conditions which may affect oral absorption.
    - IV iron repletes stores quicker.
Iron Deficiency Anemia—Treatment

- **PO iron formulations:**
  - Ferrous gluconate 240 mg → 27 mg elemental iron
  - Ferrous sulfate 325 mg dose → 65 mg elemental iron
  - Ferrous fumarate
  - Once daily is sufficient because receptor saturation occurs, preventing absorption of further doses
  - If using PO, should treat for 3-6 months and then recheck levels to ensure iron stores have been replete

Iron Deficiency Anemia—Treatment

Vitamin B12 Deficiency

- AKA “Cobalamin” deficiency
- One of the 3 most common causes of macrocytosis in older adults
  - Alcoholism, Vitamin B12 deficiency, folate deficiency
- Prevalence of Vit. B12 deficiency increases with age
  - Canadian study of 412 NH residents → B12 def prevalence of 13.8% on admission; 4% new incidence at one year post-admission
  - Is associated with a 2-4x higher risk of cognitive impairment

Vitamin B12 Deficiency Anemia

- Plays an important role in cellular metabolism
- Converts folic acid to its active form, and when deficient, folic acid is also often deficient
- Stored in the liver, stores deplete very slowly, taking as long as 5-10 yrs for symptoms to manifest following the onset of deficiency
Vitamin B12 Deficiency—Pathophysiology

- Caused by inadequate intake, inadequate bioavailability or malabsorption

<table>
<thead>
<tr>
<th>Cause</th>
<th>Pathophysiology</th>
</tr>
</thead>
<tbody>
<tr>
<td>Inadequate intake</td>
<td>Alcohol consumption</td>
</tr>
<tr>
<td>Vegetarian diet</td>
<td>Malabsorption</td>
</tr>
<tr>
<td>Food lacking B12</td>
<td>Methylmalonic acid (MMA) and homocysteine levels should be obtained when B12 levels are low-normal (200-350 pg/mL).</td>
</tr>
<tr>
<td>Deficiency</td>
<td>At a B12 level of &lt;200 pg/mL, homocysteine, MMA elevate and using these levels increase sensitivity of dx Vit. B12 def to &gt;96%.</td>
</tr>
<tr>
<td>Defective transport</td>
<td>Transcobalamin deficiency (orally)</td>
</tr>
</tbody>
</table>

*Positive association between B12 deficiency and use of PPI/H2 blockers and/or Metformin*

Vitamin B12 Deficiency—Diagnosis

- Diagnosis relies on the presence of anemia, low levels of B12
  - WHO suggests a B12 level <200 pg/mL to be considered deficient
  - Methylmalonic acid (MMA) and homocysteine levels should be obtained when B12 levels are low-normal (200-350 pg/mL).
  - At a B12 level of <200 pg/mL, homocysteine, MMA elevate and using these levels increase sensitivity of dx Vit. B12 def to >96%.

Vitamin B12 Deficiency—Treatment

- Aim: alleviate symptoms, if present, and correct B12 stores
- Two options: IM vs PO
  - Typical IM dose is 1000 mcg and ~10-15% of this is absorbed.
  - Each dose will provide ~100 mcg, so repletion of stores occurs quickly.
**Treatment—Vitamin B12 Deficiency**

- PO B12 can circumvent malabsorption from inadequate acid secretion because it does not have to be broken apart from animal protein and can bind to intrinsic factor
- Higher doses (2000 mcg daily) can be used indefinitely to treat B12 deficiency from pernicious anemia because small amounts of passive free absorption occur throughout the GI system
- For all other patients, PO dose and duration of treatment is not evidence-based

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**Inflammatory Anemia**

**Anemia of Chronic Disease**

- AKA “anemia of chronic inflammation”
- 70% of hospitalized elderly meet the criteria for anemia of chronic disease
- Most common type of anemia in the NH
- Also highly common in morbidly obese pts
- 52% of those in a bariatric clinic met criteria

---

Anemia of Chronic Disease—Pathophysiology

- Immune Driven. Cytokines induce changes in:
  - Iron Homeostasis
    - Increased uptake and retention of iron within macrophages and hepatocytes (bound to ferritin)
    - Increase in hepcidin → decrease in intestinal iron absorption
    - Increase in ferritin expression
  - Production of Erythropoietin
  - Also causes down-regulation of EPO receptors
  - Proliferation of RBC progenitor cells
  - Life span of RBCs
- Increased phagocytosis of RBCs by macrophages

Anemia of Chronic Disease—Diagnosis

<table>
<thead>
<tr>
<th>Variable</th>
<th>Anemia of Chronic Disease</th>
<th>Iron Deficiency Anemia</th>
<th>Both Conditions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hemoglobin (Hgb)</td>
<td>Low</td>
<td>Low</td>
<td>Low</td>
</tr>
<tr>
<td>Serum Iron</td>
<td>Low to normal</td>
<td>Low to normal</td>
<td>Low to normal</td>
</tr>
<tr>
<td>Ferritin</td>
<td>Normal</td>
<td>Normal</td>
<td>Normal</td>
</tr>
<tr>
<td>Transferrin Sat %</td>
<td>Normal</td>
<td>Normal</td>
<td>Normal</td>
</tr>
<tr>
<td>Soluble Transferrin</td>
<td>Low</td>
<td>Low</td>
<td>Low</td>
</tr>
<tr>
<td>Epo Level</td>
<td>Normal to elevated</td>
<td>Normal to elevated</td>
<td>Normal to elevated</td>
</tr>
<tr>
<td>CRP/ESR</td>
<td>Elevated</td>
<td>Elevated</td>
<td>Elevated</td>
</tr>
<tr>
<td>Retic Count</td>
<td>Low</td>
<td>Low</td>
<td>Low</td>
</tr>
</tbody>
</table>

* Relative changes are given in relation to the respective normal values.
* Patients with both conditions include those with anemia of chronic disease and iron deficiency.

Anemia of Chronic Disease—Treatment

- Best treatment is to eradicate the underlying disease

“Iron therapy is currently not recommended for patients with anemia of chronic disease who have a ferritin level of >100 ng/mL owing to possible adverse outcomes in this setting.”

- Erythropoietic agents for tx of anemia of chronic dz are approved for use in those with cancer undergoing chemo, CKD pts, and those with HIV receiving myelosuppressive tx
- Iron deficiency must be ruled out or tx initiated before starting EPO
Anemia of Chronic Kidney Disease (CKD)

- 40% of all LTC residents have CKD
- 30% w/ CKD-III or above
- Prevalence of anemia in one NH study:
  - No CKD → 42%
  - CKD-IIIa → 51%
  - CKD-IIIb → 66%
  - CKD-IV/V → 60%

Anemia of CKD—Pathophysiology

- Results largely from reduced renal production of erythropoietin
- Epo levels may be normal or even slightly increased, but they are low in proportion to the degree of anemia
- Shares many overlapping features with anemia of chronic disease because of underlying inflammation
- Called “functional iron deficiency”
- Pts additionally have increased blood losses through HD, frequent phlebotomy, uremia-associated platelet dysfunction, shortened RBC life and are often iron deficient

Anemia of CKD—Diagnosis

- National Kidney Foundation recommends w/u of anemia of CKD w/ HgB <12 g/dL in males and <11 g/dL in women
- Unclear how useful erythropoietin levels are
- No assay available to measure biologically active hormone levels
Anemia of CKD—Diagnosis

Concurrent iron deficiency and anemia of CKD is common

Anemia of CKD—Treatment

• 2 forms of EPO approved in US:
  • Epoetin alfa
  • Darbepoetin alfa
• Must be sure any iron deficiency is corrected.
  (Ferritin >100 ng/dL in non-dialysis CKD pts and >200 ng/dL in those on HD and transferrin saturation >20% prior to administering EPO)¹
• Many protocols aim for transferrin saturation of 30-50% w/ repletion
• Unknown upper limit of ferritin?²

Anemia of CKD—Treatment

• Hgb maintenance goal is 10-12 g/dL¹
  • Higher mortality if Hgb is higher than this²
• Hgb should be monitored monthly after initiation of EPO
• Dose can be adjusted every two weeks during titration period
• Should expect a response in Hgb in 4-6 weeks

Anemia of Clonal Disorders

MYELODYSPLASTIC SYNDROME

Anemia of Myelodysplastic Syndrome (MDS)

• MDS results from genetic aberrations in hematopoietic stem cells
• Leads to:
  • Pancytopenia
  • Abnormal blood cell proliferation and differentiation → progressive bone marrow failure
• Risk factors include:
  • Age, male sex
  • Previous chemotherapy or radiation
  • Tobacco use
  • Environmental Exposures

Table 1: Classification of Myelodysplasia, According to World Health Organization Criteria.

<table>
<thead>
<tr>
<th>Acute myeloid leukemia and related neoplasms¹</th>
</tr>
</thead>
<tbody>
<tr>
<td>Myelodysplastic syndromes</td>
</tr>
<tr>
<td>Refractory anemia with ring sideroblasts &lt;15% of erythroid precursors</td>
</tr>
<tr>
<td>Refractory anemia with multilineage dysplasia</td>
</tr>
<tr>
<td>Refractory anemia with ring sideroblasts (angiopathy limited to erythroid lineage and ring sideroblasts &lt;15% of bone marrow erythroid precursors)</td>
</tr>
<tr>
<td>Refractory anemia with excess blasts (RAEB)</td>
</tr>
<tr>
<td>Refractory anemia with excess blasts (RAEB-1)</td>
</tr>
<tr>
<td>Refractory anemia with excess blasts (RAEB-2)</td>
</tr>
<tr>
<td>Myelodysplastic syndrome with isolated del(5q)</td>
</tr>
<tr>
<td>Myelodysplastic syndrome (unclassifiable)</td>
</tr>
<tr>
<td>Myelodysplastic/myeloproliferative neoplasms</td>
</tr>
<tr>
<td>Myelodysplastic/myeloproliferative neoplasms</td>
</tr>
<tr>
<td>Identification of myelodysplasia with atypical features</td>
</tr>
</tbody>
</table>

¹ WHO 2001
² Christiano 2007
³ Tefferi 2009
⁴ Vardiman 2009
⁵ Haas 2009
Pathophysiology—Anemia of Clonal Disorders

Diagnostic clues:
- Macrocytic anemia
- Anemia often concurrent w/ leukopenia, thrombocytopenia
- Low to normal reticulocyte count
- Peripheral blood smear → oval-shaped RBCs, dysplastic neutrophils (uni-lobed), “mega” platelets w/o granules
- If suspected, needs referral to hematology for bone marrow bx and cytogenetics

Case 2
- 94 y/o WF admitted to SNF after falling at home and sustaining a pelvic and hip fx and bladder rupture
- Poor PO intake
- Albumin of <1.5

Key Points
- Anemia is highly prevalent in the elderly and in the NH
- Most common type in the NH is anemia of chronic dz
- Iron deficiency anemia → low iron, low ferritin, low transferrin sat, high TIBC
  - Should be treated with ONCE daily iron supplement vs IV iron until stores are replete
- Vitamin B12 deficiency → low B12 level, elevated methylmalonic acid, elevated homocysteine
  - High daily PO doses of B12 supplementation are usually equally as effective as IM injections

Key Points
- Anemia of chronic dz → low to normal serum iron, elevated ferritin, low to normal transferrin saturation and elevated CRP/ESR
  - Think of the ferritin jail in the sea of hepatocytes before electing to use iron supplementation!
- Anemia of chronic kidney disease
  - Similar mechanisms to anemia of chronic dz except EPO deficiency is more pronounced
  - May be a role for use of iron supplementation, especially w/ concurrent use of erythropoietic stimulating agents
- MDS → refer to hematology
Anemia in the Elderly - Sanford

References

• Also carry drugs, physiologically active substances (NO)

Quick Review

• RBCs = erythrocytes
• Main function:
  - Transfer of O2 from lungs to tissues
  - Transfer of CO2 from tissue to lungs
  - Also carry drugs, physiologically active substances (NO)
  - Maintain blood pH
• Structure:
  - Biconcave
  - Maintain blood pH
  - Cytoplasms contain hemoglobin, which binds O2 and CO2
  - No nucleus to allow for more room for hemoglobin
Quick Review

- ~2.4 million RBCs are produced every second
- These cells mature in the bone marrow and are then released into circulation
- Average lifespan in 120 days and then they are recycled by macrophages
- ~25% of all cells in the body are RBCs
- We have 20-30 trillion RBCs in our circulation at any given time
Latest Approaches to Difficult Medical Issues in PA/LTC
Legs that Don’t Work and Teeth that Don’t Get Clean - Sloane

**Difficult Issues in Post-Acute and Long-Term Care: Legs that Don’t Work and Teeth that Don’t Get Clean**

Philip D. Sloane, MD, MPH
Professor of Family Medicine and Geriatric Medicine
University of North Carolina at Chapel Hill
Co-Editor-in-Chief, JAMDA

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**Speaker Disclosures**

Dr. Sloane has no financial relationships related to the discussion of lower extremity impairment.
Dr. Sloane rather reluctantly markets Mouth Care without a Battle training materials, which will be discussed in the section on oral hygiene care.

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**Learning Objectives**

By the end of the session, participants will be able to:

- Understand better the extent, causes and impact of lower extremity impairment
- Understand better the issues around prevention and treatment of lower extremity impairment
- Be familiar with new techniques and options for improving mouth care
- Understand better the approaches and barriers to implementing quality oral hygiene care in a nursing home

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**Improving Lower Extremity Function**

- What’s with All Those Wheelchairs and Walker? -

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Latest Approaches to Difficult Medical Issues in PA/LTC
Legs that Don’t Work and Teeth that Don’t Get Clean - Sloane

A Few Statistics

Mobility Device Use in Community-Dwelling US Elderly
- by Age and Sex -

Overall, 26% of adults aged 65 and older use one or more mobility devices in the prior month.

Mobility Device Use in USA

<table>
<thead>
<tr>
<th>Mobility Status</th>
<th>Community %</th>
<th>Assisted Living %</th>
<th>Nursing Homes %</th>
</tr>
</thead>
<tbody>
<tr>
<td>Wheelchair</td>
<td>1,851,055</td>
<td>197,991 (27%)</td>
<td>978,044 (77%)</td>
</tr>
<tr>
<td>Walker</td>
<td>4,125,845</td>
<td>337,318 (46%)</td>
<td>471,692 (37%)</td>
</tr>
<tr>
<td>Cane or Crutch</td>
<td>6,214,786</td>
<td>n.a.</td>
<td>24,029 (2%)</td>
</tr>
</tbody>
</table>

Sources:
* 2016 National Health and Aging Trends Study; aged 65+ only.  
* MDS Frequency Report, Fourth Quarter 2017; all residents.

Mobility Impairment vs Cognitive Impairment

<table>
<thead>
<tr>
<th>Impairment Level</th>
<th>Mobility</th>
<th>Cognition</th>
</tr>
</thead>
<tbody>
<tr>
<td>Severe Impairment</td>
<td>3,000,000 [wheelchair]</td>
<td>3,100,000 [mod/severe dementia]</td>
</tr>
<tr>
<td>Moderate Impairment</td>
<td>5,000,000 [walker]</td>
<td>4,000,000 [mild dementia]</td>
</tr>
<tr>
<td>Mild Impairment</td>
<td>6,500,000 [cane / crutch]</td>
<td>3,950,000 [mild cognitive impairment]</td>
</tr>
</tbody>
</table>

Sources:  

Immobility Independently Affects Hospitalization Rate

Latest Approaches to Difficult Medical Issues in PA/LTC
Legs that Don’t Work and Teeth that Don’t Get Clean - Sloane

Proportion of New or Worsening Disability that is Progressive vs Catastrophic, by Age and Sex

The Rule of 4’s in Geriatric Medicine
- Disease
- Dis-Use
- Mis-Use
- Normal Aging

Common Disease Causes of Legs No Longer Working Effectively
- Vascular Disease
- Spinal Disease
  - Cervical Stenosis
  - Lumbar Spinal Stenosis

Cognitive and Motor Disorders
- Dementia
- Parkinson’s disease
Latest Approaches to Difficult Medical Issues in PA/LTC
Legs that Don’t Work and Teeth that Don’t Get Clean - Sloane

**Hip Fracture**
- Estimated 471,000 hip fractures occurred in persons 65 and older in 2016
- Only 40% will have regained full pre-fracture function at 1-year post injury checkup

**Osteoarthritis**

**Common Dis-Use and Mis-Use Causes of Legs No Longer Working Effectively**

**Mis-Use**

**Dis-Use**

**Dis-Use by Younger Adults**
Latest Approaches to Difficult Medical Issues in PA/LTC
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We Tend to Accept Mobility Impairment as Inevitable and Requiring Treatment with “Mobility Aids”

But Is It?

In One Survey, 62% of Older Persons Who Fell Owned an Assistive Device (cane, walker), and of Those 75% Were Not Using the Device When they Fell. Here Are the Reasons:

<table>
<thead>
<tr>
<th>Reason</th>
<th>n (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>I don’t always need it</td>
<td>66 (41)</td>
</tr>
<tr>
<td>I hold onto other things such as the furniture or walls</td>
<td>60 (37)</td>
</tr>
<tr>
<td>I forget to use it or forget where I left it</td>
<td>26 (16)</td>
</tr>
<tr>
<td>It makes me feel old</td>
<td>21 (13)</td>
</tr>
<tr>
<td>It is too big, heavy, or too bulky to put in car</td>
<td>17 (10)</td>
</tr>
<tr>
<td>I leave it where it is not handy</td>
<td>9 (6)</td>
</tr>
<tr>
<td>I just don't like it</td>
<td>9 (6)</td>
</tr>
</tbody>
</table>

Imbalance – A Multi-System Condition

Targets for PA-LTC Providers
- More physical therapy for pre-habilitation and maintenance of function
- Less emphasis on “if this doesn’t work, we can try surgery” and more on surgical risks
- Encourage group exercise
- Develop programs on balance
- If ambulatory aids are needed, provide the ones that most encourage muscle use and encourage regular use
- Minimize polypharmacy especially of medications that sedate, cause orthostatic hypotension, or affect balance

Targets for Society: Prevention in Youth and Middle Age
- More walking, less driving
- More weight control
- Reduce our love affair with contact sports
- Focus on low-impact exercise
Katherine Ford visited her father, Dean Piercy, a World War II veteran with dementia, at a nursing home in Roanoke, Va., for months before she noticed the dust on his electronic toothbrush … after he complained of a severe, unrelenting headache, she badgered the staff to make an appointment with the dentist. The dentist found that a tooth had broken in two … and part had lodged in the roof of her father’s mouth.

Why Isn’t Care Better?

Mouth Care is More than Hygiene… It’s Infection Control

Typical Nursing Home Resident Plaque and Gingivitis

Mouth Care and Pneumonia

- Poor oral health → bacterial pathogens
- Bacteria get inhaled → aspiration pneumonia

- Two-thirds of nursing home residents have bacterial pathogens in their dental plaque
Latest Approaches to Difficult Medical Issues in PA/LTC
Legs that Don’t Work and Teeth that Don’t Get Clean - Sloane

Mouth Care to Prevent Pneumonia

Pilot Studies
- Weekly dental hygienist → 42% reduction in pneumonia mortality
- Systematic mouth care after meals → 56% reduction in pneumonia

Up to 50% of pneumonias might be avoided by providing mouth care

Clinical Observation

Literature Review and Clinical Expertise

Pilot Study (CMS, Alzheimer's Assoc)

Standardized Training Program

Cluster Randomized Trial of System-Level Quality Improvement to Prevent Pneumonia (AHRQ R01)

Mouth Care to Prevent Pneumonia

Pilot Studies
- Weekly dental hygienist → 42% reduction in pneumonia mortality
- Systematic mouth care after meals → 56% reduction in pneumonia

Up to 50% of pneumonias might be avoided by providing mouth care

The Name Mouth Care “Without a Battle”

- Distributed to all nursing homes in the country
- Recognized as an indicator of culture change by the Commonwealth Fund
- Recognized by CMS in their interpretive guidelines

Field Test

- Three nursing homes
- Two CNAs in each trained as oral care aides
- Total of 97 residents

Results: Tooth Surface Cleaning

<table>
<thead>
<tr>
<th></th>
<th>Before training</th>
<th>After training</th>
</tr>
</thead>
<tbody>
<tr>
<td>Upper teeth</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Outer surface</td>
<td>96%</td>
<td>97%</td>
</tr>
<tr>
<td>Inner surface</td>
<td>44%</td>
<td>95%</td>
</tr>
<tr>
<td>Lower teeth</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Outer surface</td>
<td>97%</td>
<td>96%</td>
</tr>
<tr>
<td>Inner surface</td>
<td>83%</td>
<td>93%</td>
</tr>
</tbody>
</table>

Results: Interdental Cleaning

<table>
<thead>
<tr>
<th></th>
<th>Before training</th>
<th>After training</th>
</tr>
</thead>
<tbody>
<tr>
<td>Upper teeth</td>
<td></td>
<td></td>
</tr>
<tr>
<td>0%</td>
<td>88%</td>
<td></td>
</tr>
<tr>
<td>Lower teeth</td>
<td></td>
<td></td>
</tr>
<tr>
<td>0%</td>
<td>91%</td>
<td></td>
</tr>
</tbody>
</table>
Latest Approaches to Difficult Medical Issues in PA/LTC
Legs that Don’t Work and Teeth that Don’t Get Clean - Sloane

**System-Level Cluster Randomized Quality Improvement Trial**
- 14 nursing homes involved for two years
- 7 intervention, 7 control
- Provided standardized training and ongoing support to oral care aides and all aides
- Monitored fidelity, assessed pneumonia, hospitalization, costs

**Preliminary Results: Pneumonia Rate**

<table>
<thead>
<tr>
<th></th>
<th>One Year</th>
</tr>
</thead>
<tbody>
<tr>
<td>Control homes</td>
<td>0.331</td>
</tr>
<tr>
<td>Intervention homes</td>
<td>0.251</td>
</tr>
<tr>
<td>p value</td>
<td>0.106a</td>
</tr>
</tbody>
</table>

* Intervention was 24% less
Overview of the University of North Carolina Mouth Care Without a Battle Program

1. Remove Plaque
   Plaque removal reduces the risk of developing gingivitis and promotes gum health
   Mechanical action -- jiggle, sweep -- is most important to remove plaque; clean between teeth

2. Treat Gingivitis
   Inflammation of the gums largely due to bacteria-filled plaques on teeth
   Brushing with antimicrobial agents can restore gum health

3. Prevent Tooth Decay
   Tooth decay is associated with decreased oral intake and reduced quality of life
   Daily fluoride use can reduce tooth decay

4. Clean Dentures and Gums
   Scratched dentures harbor bacteria
   Remove dentures; soft brushes and water resist scratches

5. Meet Behavioral Challenges
   - Refusing to open mouth
   - Biting tooth brush
   - Refusing to let denture be removed/inserted
   - Hitting, yelling, grabbing
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6. Assess and Monitor Care

Mouth Care Without a Battle

www.mouthcarewithoutabattle.org