Dementia and Cognitive Impairment

Background
Formal Definition: “Dementia denotes a state of memory impairment combined with disturbance in at least one other area of cognition, or a change in personality that is persistent and interferes with previously achieved levels of social or occupational function.”
- Progressive and disabling
- NOT an inherent aspect of aging
- Different from normal cognitive lapses
- 4 million in U.S. currently
- 14 million in U.S. by 2050
- 1 in 10 persons aged 65+ and nearly half of those aged 85+ have AD
- Life expectancy of 8-10 years after symptoms begin

Signs and Symptoms
- Memory impairment
- Gradual onset, progressive cognitive decline
- Behavior and mood changes
- Difficulty learning, retaining new information

Differential Diagnosis
- Alzheimer’s disease (AD)
- Vascular (multi-infarct) dementia
- Dementia associated with Lewy bodies
- Delirium
- Depression
- Other (alcohol, Parkinson’s disease [PD], Pick’s disease, frontal lobe dementia, neurosyphilis)

Physical Exam Findings (Assessment of Dementia)
Ask both the patient and a reliable informant about the patient’s:
- Current condition
- Medical history
- Current medications and medication history and compliance
- Patterns of alcohol use or abuse
- Living arrangements

Examine:
- Neurologic status, Mental status, Functional status

Include:
- Quantified screens for cognition: e.g., Folstein’s MMSE, Mini-Cog, GDS
- ADL’s and IADL’s

The Impact of Dementia:
- Economic
- $199 billion annually for care and lost productivity
- Medicare, Medicaid, private insurance provide only partial coverage
- Families bear greatest burden of expense
- Emotional
- Direct toll on patients
- Nearly half of caregivers suffer depression

Aphasia, apraxia, disorientation, visuospatial dysfunction
- Impaired executive function, judgment
- Delusions, hallucinations, aggression, wandering
Lab Tests to be ordered

• Complete blood cell count, blood chemistries, Liver function tests
• Serologic tests for: Syphilis, TSH, Vitamin B12 level
• Use imaging when:
  • Onset occurs at age < 65 years
  • Symptoms have occurred for < 2 years
  • Neurologic signs are asymmetric
  • Clinical picture suggests normal-pressure hydrocephalus
  • Consider: Noncontrast computed topography head scan
  • Magnetic resonance imaging
  • Positron emission tomography

Management

Pharmacologic

Acetylcholinesterase inhibitors: (AchEI) [For mild, moderate, & severe dementia]
  • Tacrine – Tetrahydroaminoacridine
  • Aricept – Donepezil
  • Exelon – Rivastigmine
  • Razadyne (Reminyl) – Galantamine
N-methyl-D-aspartase receptor antagonist: (NMDA agonist) [For moderate & severe dementia when MMSE <14.]
  • Namenda – Memantine
Antidepressants: SSRI’s, SSNRI’s
Antipsychotics: Typical and Atypical anti-psychotics

Non-pharmacologic

• Cognitive enhancement, Socialization
• Individual and group therapy
• Regular Doctor appointments
• Communication with family, caregivers
• Environmental modification
• Attention to safety
The Mini-Mental State Exam

Patient________________________________________
Examiner _____________________Date____________

Orientation
5 (  ) What is the (year) (season) (date) (day) (month)?
5 (  ) Where are we (state) (country) (town) (hospital) (floor)?

Registration
3 (  ) Name 3 objects: 1 second to say each. Then ask the patient all 3 after you have said them. Give 1 point for each correct answer. Then repeat them until he/she learns all 3. Count trials and record.
Trials ___________

Attention and Calculation
5 (  ) Serial 7’s. 1 point for each correct answer. Stop after 5 answers. Alternatively spell “world” backward.

Recall
3 (  ) Ask for the 3 objects repeated above. Give 1 point for each correct answer.

Language
2 (  ) Name a pencil and watch.
1 (  ) Repeat the following “No ifs, ands, or buts”
3 (  ) Follow a 3-stage command: “Take a paper in your hand, fold it in half, and give it to me.”
1 (  ) Read and obey the following: Close Your Eyes
1 (  ) Write a sentence.
1 (  ) Copy the design shown.

_________ Total Score

“MINI-MENTAL STATE.” A PRACTICAL METHOD FOR GRADING THE COGNITIVE STATE OF PATIENTS FOR THE CLINICIAN.

Activities of Daily Living
• Feeding
• Bathing
• Grooming
• Dressing
• Toileting
• Transfers

Instrumental Activities of Daily Living
• Shopping
• Taking medications
• Cooking
• Finances
• Housework
• Transportation
• Using the telephone

Geriatric Depression Scale (GDS) on reverse
Geriatric Depression Scale (GDS)

Choose the best answer for how you have felt over the past week:

1. Are you basically satisfied with your life? Yes / NO
2. Have you dropped many of your activities and interests? YES / No
3. Do you feel that your life is empty? YES / No
4. Do you often get bored? YES / No
5. Are you in good spirits most of the time? Yes / NO
6. Are you afraid that something bad is going to happen to you? YES / No
7. Do you feel happy most of the time? Yes / NO
8. Do you often feel helpless? YES / No
9. Do you prefer to stay at home, rather than going out and doing new things? YES / No
10. Do you feel you have more problems with memory than most? YES / No
11. Do you think it is wonderful to be alive now? Yes / NO
12. Do you feel pretty worthless the way you are now? YES / No
13. Do you feel full of energy? Yes / NO
14. Do you feel that your situation is hopeless? YES / No
15. Do you think that most people are better off than you are? YES / No

Answers in bold indicate depression. Although differing sensitivities and specificities have been obtained across studies, for clinical purposes a score > 5 points is suggestive of depression and should warrant a follow-up interview. Scores > 10 are almost always depression.
**Background**

Definition — The American Psychiatric Association’s Diagnostic and Statistical Manual, 4th edition (DSM-IV) lists four key features that characterize delirium:

- Disturbance of consciousness: reduced ability to focus, sustain, or shift attention.
- Change in cognition or development of a perceptual disturbance: not better accounted for by a preexisting, established, or evolving dementia.
- Disturbance develops over a short period of time and tends to fluctuate during the course of the day.
- There is evidence from the history, physical examination, or laboratory findings that the disturbance is caused by a medical condition, substance intoxication, or medication side effect.

- Older medical patients experience delirium during hospitalization (30 percent)
- In older surgical patients, the risk for delirium varies (15 to greater than 53 percent)
- higher figures are associated with frail patients
- high rates of delirium have been demonstrated in intensive care units (up to 87%), hospice units (42%), post acute care settings (60%)

Neurobiology of attention — Disorder of attention is a universal feature of delirium.

- Cortical versus subcortical mechanisms — Studies using electroencephalography (EEG) in acutely ill patients established that delirium was a disturbance of global cortical function.
- Neurotransmitter and humoral mechanisms — Acetylcholine plays a key role in the pathogenesis of delirium.
- Anticholinergic drugs cause delirium when given to healthy volunteers and are even more likely to lead to acute confusion in frail elderly persons.

**Signs and Symptoms**

- Psychomotor behavioral disturbances: Hypoactivity or hyperactivity, impairment in sleep duration and architecture.
- Variable emotional disturbances: Fear, depression, euphoria, perplexity
- Disturbance of consciousness: A change in the level of awareness and the ability to focus, sustain, or shift attention.
- Change in cognition: Delirious individuals have cognitive and perceptual problems, including memory loss, disorientation, and difficulty with language and speech.
- Temporal course: Delirium develops over hours to days and typically persists for days to months.
- Elderly patients: Patients with delirium are sick by definition. However, older patients with delirium often do not look sick apart from their behavioral change.
- Other features: A variety of other clinical manifestations that are not diagnostic features may be present, including psychomotor agitation, sleep-wake reversals, irritability, anxiety, emotional lability, and hypersensitivity to lights and sounds.
Delirium continued

Differential Diagnosis
Sundowning: Behavioral deterioration seen in the evening hours, typically in demented, institutionalized patients who may be suffering the effects of impaired circadian regulation in the institutional environment.

Focal syndromes: A number of lobar or focal neurologic syndromes may mimic delirium.
  - Temporal-parietal: Patients with Wernicke’s aphasia may appear delirious in that they do not comprehend or obey and seem confused.
  - Occipital: Anton’s blindness (Anton-Babinski syndrome) of cortical blindness and confabulation might be confused with delirium. However, the patient will betray his or her lack of vision, if one is observant.
  - Frontal: Patients with bifrontal lesions (eg, from tumor of trauma) often show akinetic mutism, lack of spontaneity, lack of judgment, problems with recent or working memory, blunted or labile emotional responses, and incontinence.

Nonconvulsive status epilepticus (NCSE) requires an EEG for detection and continuous EEG for management. No classical ictal features.

Dementia may sometimes be confused with delirium or confusion. Characteristic differences in progression and cognitive features distinguish these disorders.

Primary psychiatric illnesses:
  - Depression. Associated with poor sleep and difficulty with attention or concentration. Agitated depression may be especially problematic. Depression is associated with dysphoria, and there is less fluctuation than in delirium.
  - Mania. Can be confused with hyperactive delirium with agitation, delusions, and psychotic behavior. However, mania is usually associated with a history of previous episodes of mania or depression.
  - Schizophrenia. The delusions are usually highly systematized, the history is longer, and the sensorium is otherwise clear.

Physical Exam Findings
Variable, nonspecific.

Lab Tests to be ordered
- Serum electrolytes, creatinine, glucose, calcium, complete blood count, and urinalysis
- Drug levels should be ordered where appropriate. (digoxin, lithium, or quinidine)
- Toxin screen of blood and urine
- Blood gas determination is often helpful
- Thyroid function and vitamin B12 levels

Management
Pharmacologic
Psychotropic medications: Haloperidol, Risperadone, Olanzapine, Quetiapine, Clozaril

Non-pharmacologic
Physical restraints should be used only as a last resort.
Mild confusion and agitation may respond to interpersonal and environmental manipulations. Frequent reassurance, touch, and verbal orientation from familiar persons lessen disruptive behaviors.
Gait Abnormalities

**Background**
- At least 20% of community dwelling older adults have difficulty walking or need the assistance of a device or other person.
- In 85 years and older the limitations on walking can be as high as 54%.
- In 75 years and older adults the decrease in speed of walking is most apparent.
- The majority of changes in gait are related to underlying diseases, especially as disease severity increases.
- Neurologic and non-neurologic age associated diseases are the major contributors to gait abnormalities.
- Most common contributors to gait abnormalities are:
  - Pain, visual loss, numbness, dizziness, stiffness, weakness,
  - Degenerative joint disease, acquired musculoskeletal deformities,
  - Intermittent claudication, stroke, postural hypotension, and
  - Impairments following orthopedic surgeries.

**Signs and Symptoms**
- Falls, Stumbling, Slipping
- Light headedness, dizziness, loss of equilibrium
- Loss of consciousness
- Weakness in lower extremities
- Abnormal balance, abnormal gait, postural hypotension

**Differential Diagnosis**
- Syncope, arrhythmia, aortic stenosis, stroke
- Parkinson’s disease, vitamin B12 deficiency, myelopathy
- Neuropathy

**Physical Exam Findings**
- Loss of balance after sternal nudge
- Unsteady gait:
  - While on flat surfaces: Vestibular dysfunction
  - While on uneven surfaces: Proprioceptive dysfunction
  - While turning around: Proprioceptive, sensory, muscular problems
- Decreased step height, length, or festination
Gait Abnormalities

• Muscle weakness (difficulty getting up from or sitting down in a chair)
• Vision deficits, Hearing deficits
• Sensory deficits to touch on feet
• Foot problems: Calluses, bunions

Lab Tests to be ordered
• CBC, Electrolytes, Vitamin B-12, Blood glucose, HgA1c
• EKG, Holter monitor if indicated for syncope

Get up and go test: Rise from a chair unassisted with hands folded across the chest, walk 10 feet, turn and walk back, then sit back in the chair unassisted. Should be less than 14 seconds.

Management

Pharmacologic
• Reduction or discontinuation of medicines that can contribute to falls is essential.
  - Fludracortisone, trazodone

Non-pharmacologic
• Balance training, gait training, muscle strengthening, Correction of visual and auditory deficits, correction of foot problems
• Use of walkers and other assistive devices – Evaluate with Physical and Occupational therapists
• Elimination of environmental hazards:
  - Remove electrical cords
  - Remove loose throw rugs and loose items on the floor
  - Use shallow pile carpets, or non-skid wax on floors
  - Grab bars installed in shower and around toilet
  - Properly fitting shoes
  - Improve lighting in the home
  - Home safety evaluation by Occupational therapist
Falls and Falls Prevention

Background

Definition: “A fall is an event which results in a person coming to rest inadvertently on the ground or other lower level and other than as a consequence of sustaining a violent blow, loss of consciousness, sudden onset of paralysis as in stroke, or epileptic seizure.” (Gibson et al, 1987)

• Accidents are the leading cause of death in the Elderly– 10,273 deaths recorded in 2000 (National Vital Statistic Reports, 2002)
• Falls are the most reported accident
• 20%-30% in Community dwelling Older Adults (Tinetti et al, 1988)
• 30%-60% in Nursing Home Residents (Luukinen et al, 1994)
• Frequency of falls increases with age (Lord et al, 1993)
• Injuries: 95% Hip Fxs associated with falls (Nyberg 1996), Only 1% Falls result in Hip Fxs (Tinetti, 1998), Short and Long term rehabilitation, 2%-3% fxs other than Hip, 10% Soft tissue injury
• Death: 9500 deaths associated with falls per year, 20% of fatal falls occur in Nursing Homes
• 50% Older Adults hospitalized for Fall injuries are unable to return home (Sattin et al, 1990)
• Multiple Falls associated with decreased abilities of ADLs

Physical Exam Findings

• Vision
• Gait and Balance
• Lower Extremity Joint Function
• Neuro Exam – Strength, proprioception, reflexes
• Cognitive Screening – MMSE, GDS
• Cardiovascular exam (if indicated by history)
Lab Tests to be ordered

- CNS
  - CT Scan of head
  - MRI/MRA of head
- Cardiovascular
  - Carotid Ultrasound
  - Stress testing (exercise, pharmacologic)
  - Angiography
- Peripheral Nerves – Nerve conduction studies
- Muscular – EMG testing
- Functional Assessments:
  - Functional reach test
  - Berg balance test
  - Problem oriented mobility assessment
  - Timed get up and go test

Management

- Fall Related Education
- Environmental Assessment and Modification
- Medication Changes
- Exercise – Strength, Balance, Flexibility
  - Tai Chi exercise program reduced falls by 40% (Wolf et al, 1996)
  - Endurance and strength training reduced falls 42% (Buchner et al, 1997)
- Home modification – Occupational therapist assessment and recommendations
- Compliance with recommendations is key to successful home interventions
  - 20% reduced risks for fall in patients with prior fall hx (Cumming et al, 2002)
- Medications: Withdrawing psychotropic medications reduced risk of falls (Campbell et al, 1999)
Urinary Incontinence

Background
• Definition:
  – Urinary Incontinence is the involuntary loss of urine from the urethra that is sufficient to be a problem.
  – It is not a symptom or single entity but, a multifactorial syndrome involving by neurourinary pathology, age related factors, and comorbid conditions.
• Approx. 10% to 30% of Women and 1.5% to 5% of men under age 65 have UI.
• In those 65 and older:
  – 15% to 30% of all people living in the community are incontinent.
  – 50% of those in Long Term Care Facilities are incontinent.
  – Women to men 2-3:1 in ages 65-80, 1:1 in those over 80.
• Cost to Society is well over $20 billion per year! (Reflects management, not cure, i.e. Protective undergarments)
• Quality of Life Influences: Physical, Social, Role functions, Mental health, General health perception
  – Greatest impact is coping with embarrassment and interfering with activities

Signs and Symptoms
• Precipitant urgency - An overwhelming urge to void
• Leakage - May occur with stress maneuvers (Coughing, bending over, laughing, changing position)
• Continual Dripping - May indicate overflow incontinence
• Other Symptoms: Frequency, Nocturia, Slow urine stream, Hesitancy, Interrupted voiding, Straining, Terminal dribbling

Types of Urinary Incontinence
Urge Incontinence:
• Abrupt urgency with moderate to large leakage, Uninhibited bladder contractions or overactivity, Most Common cause in men and women
• Causes:
  - Age related changes - Detrusor overactivity, Decreased ability to postpone voiding,
    Urinary flow rates decrease, Post void residual increases (should not exceed 50 mL),
    Low estrogen leads to atrophy of epithelium, Prostate enlargement (obstruction),
    Diurnal pattern of fluid excretion shifts
  - CNS disruption (Stroke, Cervical Stenosis)
  - Bladder irritation (infection, stones, neoplasms)

Stress Incontinence:
• Leakage occurs with increased intra-abdominal pressure
• Second most common cause in women and rare in men
• Insufficient urethral support from pelvic floor muscles
• May occur after TURP in men

Overflow Incontinence:
• Leakage is due to detrusor weakness or bladder outlet obstruction
• Small volume of leakage but continual
• Postvoid residual is elevated >400 mL
• Often presents as postvoid dribbling
• Second most common in men (BPH, Prostate CA, Urethral stricture)
Urinary Incontinence

Functional Incontinence:
• Not able to transfer to the toilet
• Most Common in frail elderly and Nursing Home residents
• Compounded by other medical conditions

Physical Exam Findings
• Level of alertness (for functional abilities)
• Cervical and neurologic exam (impingement of detrusor efferents can cause overactivity)
• Cardiac exam (for evidence of volume overload)
• Abdomen exam (for bladder distention)
• Extremities (for edema, mobility, ROM)
• Genital exam (for atrophy, masses, abnormalities)
• Rectal exam (for masses or impaction)

Lab Tests to be ordered
• Lab tests - Renal function, glucose, Vit B12, UA, Culture, Renal ultrasound
• Clinical Testing - Postvoid residual – Use the bladder scanner
  • More than 50 mL can lead to frequency
  • More than 200 mL suggests detrusor weakness

Type of Incontinence | PVR
--- | ---
Detrusor Overactivity (Urge) | Normal
Stress Incontinence (Stress) | Normal
Functional Incontinence (Functional) | Normal
Urethral Obstruction | Increased
Detrusor Underactivity (Overflow) | Increased

Stress maneuvers: cough, valsala, lifting

Urodynamic Testing:
  • Demonstrates bladder proprioception, capacity, detrusor stability, and voiding efficacy.
  • Fluoroscopy, abdominal leak-point pressure, profilometry are needed to detect and quantify stress incontinence
  • Pressure flow studies detect outlet obstruction

Management

Pharmacologic
• Urge Incontinence: Anticholinergics, Oxybutynin(Ditropan), Tolterodine(Detrol)
• Stress Incontinence:  Estrogen (topical), Alpha adrenergics agonists (Pseudoephedrine)
• Overflow Incontinence:  Finesteride, Prazosin

Non-pharmacologic
• Urge Incontinence: Frequent scheduled voiding to keep bladder volume low
• Stress Incontinence: Pelvic muscle exercise(Kegel exercise), Pessary for uterine prolapse, Surgery(Bladder suspension, Sling procedures, needle vaginal suspensions)
• Overflow Incontinence: Augmented voiding maneuvers(Suprapubic pressure, Valsalva maneuver, Intermittent catheterization)
Constipation

**Background**

- **Definition:** Stool frequency of less than 3 times per week. Straining at stool, hard consistency, pain with defecation, or the need to assist digitally with evacuation. May also be based on colonic transit time measured by defacography.
- **Effects** 40% of adults over 65 years old
- **Categorized as:** Slow transit constipation, pelvic floor dysfunction, irritable bowel syndrome and functional constipation.
- **Annual expenditure on over the counter (OTC) laxatives is approximately $400 million in the United States.**

**Signs and Symptoms**

Straining at stool, hard stools, incomplete evacuation, abdominal bloating, distention, rectal pressure, back pain, Left lower quadrant pain, and generalized abdominal discomfort.

**Differential Diagnosis**

- **Medication Induced constipation:** opiates, anticholinergics, anti-depressants, CCB
- **Mechanical Obstruction:** Cancer, Rectocele, intussusception, anal fissure, volvulus, rectal prolapse
- **Neurologic disorder:** Parkinson’s, Multiple Sclerosis, Spinal cord injuries, Adheisions
- **Systemic disorders:** Hypothyroidism, Diabetes, CHF, Amyloidosis, Systemic inflammatory diseases
- **Metabolic disorders:** Hypokalemia, Hypophosphatemia, hypomagnesemia, Uremia, hypercalcemia
- **Other disorders:** Dehydration, immobility, autonomic neuropathy, diminished rectal sensation.

**Physical Exam Findings**

- Abdominal examination checking for tenderness, masses
- Rectal examination checking anal tone, trauma, hemorrhoids, fissures, stricture, rectocele, tumor, impaction, and occult blood.
- Thyroid for signs of hypothyroid.
- Neurologic examination
Lab Tests to be ordered

- Electrolytes, BUN/Creatinine, TSH, Calcium, ESR
- Colonoscopy for ruling out carcinoma
- Colonic transit studies (reserved for constipation unresponsive to treatments)

Imaging

- Abdominal x-ray may be helpful in ruling out impaction.
- CT Scan to ensure no obstruction or malignant lesions.

Management

**Pharmacologic**

- Bulk forming laxatives for long term treatment. Work better in ambulatory patients.
- Osmotic agents are preferred second line therapy.
- Stool softeners are used when hard stool or straining. No effect on stool frequency.
- Enemas can be used in refractory constipation.
- Prokenetic GI drugs can be useful in delayed transit time constipation.

**Non-pharmacologic**

- Ensure adequate fluid intake, avoiding dehydration.
- Ensure adequate dietary fiber intake. (Bran cereal, beans, vegetable, fruit)
- Physical activity
- Bowel retraining: Patient attempts to defecate at the same time each day within 10-15 minutes after a meal. (Utilizes the gastric-colic reflex)
Weight loss and Malnutrition

**Background**

- Aging is associated with changes in body composition.
- Decreases are seen in bone mass, lean muscle mass, and water content, while fat mass increases.
- The components of bone mass (10-15%), lean mass (35-50%), water content (20%), and fat (20-30%) make up the body.
- Body weight in men increases from age 30-60 then plateaus for approximately 10 years then slowly declines. In women this is similar but the change occurs 10 years later in life.
- Fat mass increases until age 60-70 then starts slowly declining.
- Bone mass declines in both older men and women. Older women have an accelerated bone loss in the years after menopause.
- Daily energy requirements, or caloric intake needs, decline with age. This occurs in healthy individuals too. The primary reason is the loss of lean muscle mass.
- Water requirements are often overlooked in the elderly. Most older adults need 30 mL/kg body weight. (A 70 kg older adult needs 2.1 Liters of water daily.)
- Decrease in thirst perception, elevated serum osmolality, and decreased ability to concentrate urine after fluid deprivation occur naturally as part of normal aging but they increase the risk of dehydration in the elderly.

**Dietary requirements**

- Protein – 1-1.25 g/kg/day
- Fat – 25-30% of total calories/day
- Carbohydrates – 55% of total calories/day
- Sodium – 2-3 g/day
- Fiber 25-35 g/day

**Signs and Symptoms**

Unintentional weight loss of 5% Total Body Weight (TBW) in one month or 10% TBW in 6 months
- Decreased appetite
- Decreased mobility and energy
- Clothes fitting looser
Differential Diagnosis

- Cancer
- AIDS
- CHF
- Rheumatoid arthritis
- Tuberculosis
- COPD
- Crohn’s disease
- Depression
- Dementia

Lab Tests to be ordered

CBC, Metabolic panel, Blood glucose, Liver function tests, Thyroid stimulating hormone level, urinalysis, lipid and cholesterol panel, albumin and pre-albumin, and a chest x-ray

Management

Pharmacologic

- Mirtazapine – An antidepressant that stimulates appetite via serotonin
- Cyproheptadine – Enhances appetite via serotonin and histamines
- Megestrol acetate – A progestin hormone that stimulates appetite, but weight gain is shown to be primarily fat. Clinical benefits have not been demonstrated.
- Dronabinol – a cannabinoid, stimulates appetite but is associated with dysphoria in older patients.

Non-pharmacologic

- Assisted feeding for functionally or cognitively impaired patients.
- Oral supplements are most effective when consumed in between meals.
- Increase physical activity prior to meals.
- Reduce distractions during meals, turn off televisions and radios.
- Offer several small meals throughout the day.
- Tube feedings – Associated with increased risk of aspiration and pneumonia. Continuous tube feeding is better than bolus feedings in bed bound patients. Over feeding a debilitated patient can cause a potentially fatal refeeding syndrome. This can cause fluid retention and pulmonary edema.
Osteoporosis

Background
• Osteoporosis is disease of the skeletal system marked by low bone mass and microarchitectural bone tissue deterioration.
• Increased bone fragility and fractures.
• Osteoporosis is a bone mineral density (BMD) > 2.5 standard deviations (SD) below the young adult mean value, the “T-score”.
• Osteopenia is a bone mineral density (BMD) > 1.0 to 2.5 standard deviations (SD) below the young adult mean value, the “T-score”.
• In the U.S. 32 million women and 12 million men older than 50 have osteoporosis.
• This number is expected to increase to 52 million by 2010.
• The prevalence of osteoporosis increases with age, 15% of women 50-59 years old to 70% of women older than 80.
• Lifetime risk of fracture due to osteoporosis for a 50 year old woman is 40-50%
• Osteoporotic fractures are typically seen after low trauma, such as a fall from standing height.
• Hip Fractures rates rise exponentially with age, peaking after age 85.

Risk Factors
• Female sex
• Increased age
• Caucasian race
• Body weight < 127 pounds
• Family history of Osteoporosis
• Previous fractures
• Cigarette smoking, alcohol abuse, calcium deficiency, and vitamin D deficiency.

Signs and Symptoms
• Hip fractures are relatively common and the incidence increases with age.
• Vertebral fractures are pathopneumonic for osteoporosis. Increase in the thoracic kyphosis and height loss resulting in the “Dowager’s Hump.”
• Pain in neck muscles due to extension of the neck to look forward.
• Dyspnea, early satiety, or constipation can be seen due to reduction in distance between the ribs and the iliac crest.
• Loss of functional abilities and imposed physical limitations may lead to anxiety and depression.

Differential Diagnosis
• Calcium and/or Vitamin D deficiency
• Malabsorption syndrome
• Hypogonadism (Men)
• Primary Hyperparathyroidism
• Multiple Myeloma
• Hyperthyroidism
• Osteomalacia

Physical Exam Findings
• Loss of height
• Thoracic kyphoscoliosis
• Loss of waist line (Due to crowding of internal organs)

Lab Tests to be ordered
Imaging Studies: Thoracic and Lumbar spine x-rays
Bone Mineral Density (Dual Energy X-ray Absorptiometry –  DEXA scan)
Blood test: Serum testosterone, prolactin (Men), ionized calcium, intact PTH, SPEP, Free T4, TSH, Alkaline phosphatase, 25(OH)-vitamin D.
Urine test: 24-hour urine calcium, UPEP
Other test: Fecal fat, xylose breath test (Malabsorption syndrome)

Management
Pharmacologic
  Bisphosphonates – Alendronate, Risedronate, Pamidronate Zoledronic acid
  Hormone therapy – Conjugated estrogens, Estrogen and Medroxyprogesterone.
  Raloxifene – Selective estrogen receptor modulator
  Calcitonin – Acts on osteoclasts, inhibits bone resorption

Non-pharmacologic
  Reducing modifiable risk factors.
  Alcohol and tobacco cessation, increased physical activity including weight bearing exercise and resistance training.
  Calcium and vitamin D supplementation. Recommended doses of Vitamin D are 400-800 IU daily. Calcium is 1500 mg daily.

Follow up: BMD is to be checked 2 years after treatment is initiated. If BMD is stable or improving than it need not be rechecked if the patient continues on the treatment.
Polypharmacy

Background

• A carefully detailed medication history and updated medication lists is needed for all elderly patients.
• 4 or more prescription medications increases the risk for falls in the elderly.
• 5 or more prescription medications increases the risk of adverse drug reactions.
• Metabolic pathways in the liver –
  - Phase 1: Catalyzed by Cytochrome p450 through oxidation and reduction
  - Phase 2: Conjugates drugs with acetylation, glucuronidation, sulfation and glycine conjugation
• There is a decline in Cytochrome P450 activity with aging.
• Excretion of medications is also changed in the elderly due to decreases in Glomerular Filtration Rate and tubular function in the kidney.
• Decreased creatinine clearance leads to increased half life and high serum levels of medications.
• Prevalence of inappropriate prescribing in the elderly is between 12-40%.
• A patient’s response to a drug may be affected by multiple chronic illnesses, renal and hepatic impairment, and drug-drug interactions.

Signs and Symptoms

• Dry mouth
• Tachycardia
• Confusion
• Diarrhea
• Constipation
• Peripheral edema
• Extra pyramidal Side effects
• Syncope

• Orthostatic hypotension
• Hypoglycemia
• Congestive heart failure/pulmonary edema
• Flatulence
• Bloating
• Somnolence
• Lethargy

Factors associated with polypharmacy or inappropriate prescribing:

• Patient factors:
  - Older age
  - Female
  - Low education level
  - Rural living
  - Multiple chronic illnesses
  - Use of multiple medications
  - Having multiple pharmacies dispense medications

• System Factors:
  - Many different prescribers
  - Poor patient record keeping
  - Failure to review patient’s medications at regular intervals and post hospitalization
Polypharmacy continued

Risk factors for Adverse Drug Reactions in the Elderly
• Age > 85
• Low body mass index or weight
• 6 or more chronic conditions
• Creatinine clearance < 50 mL/min
• 5 or more prescription medications
• Prior adverse drug reaction

Principles of prescribing in the elderly
• Is the medication necessary?
• Do the benefits outweigh the risks?
• What are the desired therapeutic effects and how will they be measured?
• What are potential drug-drug interactions?
• Try to start only one new medication at a time.
• Titrate the dose slowly as tolerated by the patient.
• Start with a low dose.
• Identify and explain the indications and the directions to the patient and the care-giver.
• Identify and stop any duplicate medications.

Management

Pharmacologic
• Medication review –
  - At every office visit
  - After every hospitalization
• Eliminate medications with duplicate effects
• Stop medications that are ineffective or have sub-optimal therapeutic effects
• Add new medications one at a time
• Use the advice “start low and go slow” for starting new medications
• Know all non-prescription medications, supplements, and herbal supplements.

Non-pharmacologic
• Write out schedules
• Write out indications for each medication
• Use pill boxes to track adherence
• Detailed explanations of each medication and the indication increase adherence
Medicare Benefits

Background

• Enacted into law in 1965, it was designed to improve access to acute health care for people who are old, disabled, or poor.
• Divided into three parts, the system covers health needs:
  Part A covering hospital, skilled nursing home, and home health and hospice services.
  Part B covers physicians, nurse practitioners, social workers, psychologists, therapists, laboratory tests, and durable medical equipment.
  Part D (optional) covers some of the cost of prescription medications.
• The Medicare benefit was designed to deal with acute illness rather than as an insurance plan to pay for long term care of chronic conditions.

In keeping with this model the home health care services provided must be tied to transition from an acute care setting as a skilled need.

Coverage

Part A
Cost of Hospitalization 100%  
( after a deductible of $912 paid by the beneficiary or supplemental insurance)

Cost of Post-Acute Care in SNF 100%  
( For the first 20 days of SNF care after a 3 day hospitalization)

Cost of Hospice Care 100%  
( Patient makes copayments of $5 per prescription, and 5% of respite care)

Cost of Home care (Medically necessary) 100%  
( When patient is receiving Medicare covered home care)

Cost of Durable medical equipment 80%  
( When patient is receiving Medicare covered home care)
Part B

Cost of Home care (Medically necessary) 100%
Cost of Durable medical equipment 80%
(When patient is receiving Medicare covered home care)
Cost of diagnostic laboratory tests 100%
Cost of diagnostic imaging tests 80%
Cost of Physicians, nurse practitioners 80%
Cost of Outpatient PT, OT, ST 80%
Cost of Outpatient services, supplies 80%
Cost of Emergency care 80%
Cost of Ambulance services 80%
Cost of Outpatient Mental Health care 50%

Part D

Annual premium = $420
Annual deductible = $250
25% of remaining medication expenses

Preventive tests covered 100%
Fecal Occult Blood tests
Pap smear interpretation
PSA test
Blood tests for Diabetes and Cardiovascular disease
Influenza and pneumococcal vaccines

Preventive tests covered 80%
• Mammograms
• Breasts and Pelvic exams
• Glaucoma screening
• Colonoscopy
• Digit rectal exam (men)
• Bone density Scan
• Hepatitis B vaccination
• Diabetic education and equipment