OBJECTIVES

Be able to identify:
• Components of a geriatric assessment for surgical patients
• Common complications seen in elderly surgical patients
• Patients at high risk of geriatric syndromes
GROWING PROPORTION OF ELDERLY IN THE U.S. POPULATION

Number of people age 65 and over, by age group, selected years 1900–2006 and projected 2010–2050

Note: Data for 2010–2050 are projections of the population.
Reference population: These data refer to the resident population.
COMORBIDITIES IN THE ELDERLY

Percentage of people age 65 and over who reported having selected chronic conditions, by sex, 2005–2006

- Heart disease: Men 37, Women 26
- Hypertension: Men 52, Women 54
- Stroke: Men 10, Women 8
- Asthma: Men 10, Women 12
- Chronic bronchitis or Emphysema: Men 11, Women 10
- Any cancer: Men 24, Women 19
- Diabetes: Men 19, Women 17
- Arthritis: Men 43, Women 54

Note: Data are based on a 2-year average from 2005–2006.
Reference population: These data refer to the civilian noninstitutionalized population.
Source: Centers for Disease Control and Prevention, National Center for Health Statistics, National Health Interview Survey.
CHRONIC DISEASE BURDEN

- 82% of elderly have at least 1 chronic disease
  - 65% have 2 or more chronic diseases
- Chronic disease burden increases with increasing age
- Medicare expense increases exponentially with increasing disease burden
  - Disease
  - Hospitalizations

Wolff Arch Intern Med 2002
# Impact of the Aging Population on the Surgery Workforce

<table>
<thead>
<tr>
<th>Proportion of work within surgical specialty by age group</th>
<th>&lt;15 y</th>
<th>15–44 yr</th>
<th>45–64 yr</th>
<th>65+ yr</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cardiothoracica</td>
<td>0%</td>
<td>0.3%</td>
<td>29.4%</td>
<td>70.3%</td>
</tr>
<tr>
<td>General surgeryb</td>
<td>2.6%</td>
<td>12.3%</td>
<td>25.5%</td>
<td>59.6%</td>
</tr>
<tr>
<td>Neurosurgery</td>
<td>2.8%</td>
<td>12.9%</td>
<td>39.1%</td>
<td>45.2%</td>
</tr>
<tr>
<td>Ophthalmology</td>
<td>0.6%</td>
<td>0.7%</td>
<td>10.8%</td>
<td>88.0%</td>
</tr>
<tr>
<td>Orthopedic surgery</td>
<td>0.6%</td>
<td>16.1%</td>
<td>31.8%</td>
<td>51.4%</td>
</tr>
<tr>
<td>Otolaryngology</td>
<td>39.6%</td>
<td>22.1%</td>
<td>29.9%</td>
<td>8.4%</td>
</tr>
<tr>
<td>Urology</td>
<td>4.0%</td>
<td>6.3%</td>
<td>24.9%</td>
<td>64.8%</td>
</tr>
</tbody>
</table>

Source: NHDS and NSAS 1996

*a* In the 1996 NHDS sample, the incidence rate for specific cardiothoracic procedures in pediatric patients was too small to allow an accurate incidence rate

*b* Category includes vascular, breast, hernia, abdominal, gastrointestinal, and pediatric procedures

Etzioni Ann Surg 2003
An 83-year-old man presented to Montefiore’s ER in April 2009 with abdominal pain.

X-rays revealed dilated loops of small bowel.

The patient was evaluated by a surgical resident and admitted for possible small-bowel obstruction.

A medical consult was called for preoperative clearance for possible laparotomy.
CASE STUDY (continued)

Medical issues:

• Precipitating factors for hospitalization

• Assess medical comorbidities

• Preoperative assessment
CASE STUDY (continued)

• Past medical history
  ➢ Hypertension, 2 strokes, no surgical history

• Social
  ➢ Lives alone; has a private aide

• Medications
  ➢ Lisinopril 20 mg/day, multivitamin, metoprolol 25 mg BID, Aggrenox 1 capsule BID, Zocor 80 mg/day, Ativan 1 mg PRN
CASE STUDY (continued)

• Physical exam
  - BP 157/87, pulse 101, temperature 97.9 °F
  - General – awake and alert, lungs clear, CV tachycardia, S1, S2 normal
  - Abdomen distended, bowel sounds tinkling, hyperactive, mild tenderness with deep palpation.
  - Extremities without edema

• Labs
  - Creatinine 1.1, WBC 16, hmg 12.5, urinalysis rare WBCs
  - EKG sinus tachycardia, normal axis, normal intervals, no Q-waves
ACC/AHA PREOPERATIVE RISK ASSESSMENT

- Determine patient’s risk factors
- Assess functional level
- Surgical risk of procedure

Fleisher Circulation 2007
## CLINICAL PREDICTORS OF PERIOPERATIVE CARDIAC RISK

<table>
<thead>
<tr>
<th>Major</th>
<th>Intermediate</th>
<th>Low</th>
</tr>
</thead>
<tbody>
<tr>
<td>Acute MI &lt;7 days</td>
<td>Mild angina</td>
<td>Advanced age*</td>
</tr>
<tr>
<td>Recent MI (&gt;7 days but &lt;1 month)</td>
<td>Remote prior MI</td>
<td>Abnormal ECG</td>
</tr>
<tr>
<td>Unstable or severe angina</td>
<td>Compensated heart failure</td>
<td>Rhythm other than sinus</td>
</tr>
<tr>
<td>Large ischemic burden by symptoms or noninvasive testing</td>
<td>Creatinine &gt; 2.0 mg/dL</td>
<td>Low functional capacity*</td>
</tr>
<tr>
<td>Decompensated CHF</td>
<td>Diabetes mellitus</td>
<td>History of stroke*</td>
</tr>
<tr>
<td>Significant arrhythmias (high-grade AV block, SVT)</td>
<td></td>
<td>Uncontrolled systemic hypertension</td>
</tr>
<tr>
<td>Severe valvular disease</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*Our patient
FUNCTIONAL STATUS

• 1–4 METs — standard light home activities, walk around the house, walk 1–2 blocks on level ground

• 5–9 METs — climb a flight of stairs, walk uphill, walk on level ground briskly, run a short distance

• >10 METs — strenuous sports, heavy professional work

Fleisher Circulation 2007
ACC/AHA PREOPERATIVE RISK ASSESSMENT

• Age and hx of strokes are minor risk factors
  ➢ Chronic kidney disease is an intermediate risk factor, so calculate creatinine clearance

• Exercise tolerance is important in risk stratification

• Intra-abdominal surgery is an intermediate risk factor
  ➢ 1%–5% risk of cardiovascular events

Fleisher Circulation 2007
CASE STUDY (continued)

Medical Consult Note

• No contraindication to exploratory laparotomy
• Optimize blood pressure
• Increase metoprolol to achieve target heart rate of 60–70 beats/min
• Continue lisinopril
• Hold Aggrenox until cleared by general surgery to resume
• Optimize pain control
• Initiate DVT prophylaxis postoperatively
CASE STUDY (continued)

• The patient undergoes exploratory laparotomy and is found to have stricture in the distal cecal area from an adenocarcinomatous mass

• He has a resection of the lesion and has a colostomy bag placed

• On post-op day 1, he is hypertensive, tachycardic, and more confused, according to the nursing staff

• Urgent medical follow-up is requested
PERIOPERATIVE COMPLICATIONS

- Older (>80 years) surgical patients 20% more likely to suffer at least one or more complications
  - Pneumonia (5.6% vs 2.3%)
  - UTI (5.6% vs 2.2%)
  - Require intubation (2.8% vs 1.6%)
  - Progressive renal failure (1.0% vs 0.4%)
  - MI (1.0% vs 0.4%)
  - Cardiac arrest (2.1% vs 0.9%)

Hamel JAGS 2005
COMPREHENSIVE GERIATRIC ASSESSMENT

• Functional assessment
  ➢ Gait and mobility
  ➢ Sensory assessment
  ➢ Activities of daily living
  ➢ Instrumental activities of daily living

• Cognitive assessment
  ➢ Decision-making capacity

• Medication review

McGory Annals of Surgery 2009
FUNCTIONAL ASSESSMENT: GAIT AND MOBILITY

- Ambulatory status
- Assistive device
- Any falls?
- Timed “Get up and go” test

Mathias Arch Phys Med Rehab 1986
McGory Annals of Surgery 2009
TIMED “GET UP AND GO” TEST

• Have the patient sit in a straightback chair
  ➢ Get up (without the use of armrests)
  ➢ Stand still momentarily
  ➢ Walk forward 10 feet (3 meters)
  ➢ Turn around and walk back to chair
  ➢ Turn and be seated

• <20 seconds: patient is independently mobile
• >30 seconds: patient needs the assistance of others and is probably at high risk of falls
FUNCTIONAL ASSESSMENT: SENSORY DEFICITS

Figure 1. The prevalence of sensory impairments among persons aged 70 years and over. United States, 1999–2006

- Visual impairment: 15.4%
- Hearing impairment: 26.3%
- Balance impairment: 75.3%
- Loss of feeling in feet: 27.2%

SOURCE: CDC/NCHS, National Health and Nutrition Examination Survey.

Mathias Arch Phys Med Rehab 1986
McGory Annals of Surgery 2009
FUNCTIONAL ASSESSMENT: ACTIVITIES OF DAILY LIVING

- Bathing
- Dressing
- Toileting
- Transfer
- Continence
- Eating

Katz JAMA 1963
Lawton Gerontologist 1969
PREVALENCE OF ADL LIMITATION BY AGE GROUP

Type of ADL by Residence
- All persons: Bathing/Showering
- All persons: Dressing
- All persons: Eating
- All persons: Getting in/out of bed/chairs
- All persons: Walking
- All persons: Using toilet

Percent with Limitation

Type of Limitation

65-74  75-84  85 years and over
FUNCTIONAL ASSESSMENT: INSTRUMENTAL ADLS

• Using the telephone
• Traveling
• Shopping
• Preparing meals
• Housework
• Taking medication
• Handling money

Katz JAMA 1963
Lawton Gerontologist 1969
Percentage of Medicare enrollees age 65 and over who have limitations in activities of daily living (ADLs) or instrumental activities of daily living (IADLs), or who are in a facility, selected years 1992–2005

Note: The Medicare Current Beneficiary Survey has replaced the National Long Term Care Survey as the data source for this indicator. Consequently, the measurement of functional limitations (previously called disability) has changed from previous editions of Older Americans. A residence (or unit) is considered a long-term care facility if it is certified by Medicare or Medicaid; has 3 or more beds and is licensed as a nursing home or other long-term care facility and provides at least one personal care service, or provides 24-hour, 7-day-a-week supervision by a non-family, paid caregiver. ADL limitations refer to difficulty performing (or inability to perform for a health reason) one or more of the following tasks: bathing, dressing, eating, getting in/out of chairs, walking, or using the toilet. IADL limitations refer to difficulty performing (or inability to perform for a health reason) one or more of the following tasks: using the telephone, light housework, heavy housework, meal preparation, shopping, or managing money. Rates are age adjusted using the 2000 standard population. Data for 1992 and 2001 do not sum to the totals because of rounding.

Reference: These data refer to Medicare enrollees.

Source: Centers for Medicare and Medicaid Services, Medicare Current Beneficiary Survey.
COGNITIVE ASSESSMENT

Screening tools for dementia
• Mini-Cog Assessment (Mini-Cog)
• Short Portable Mental Status Questionnaire (SPMSQ)

Borson Int J Geri Psych 2000
Folstein J Psych Res 1975
Pfeiffer JAGS 1975
MINI-COG

• 3-Item recall
  ➢ Apple, penny, table

• Clock drawing
10 item verbal questionnaire

- orientation
- current events – presidents
- serial 3

SCORING:

0–2 errors: Normal
3–4 errors: Mild impairment
5–7 errors: Moderate impairment
8 or more errors: Severe impairment

*Allow 1 more error if the patient has had a grade school education or less

Allow 1 less error if the patient has had education beyond high school
PREVALENCE OF COGNITIVE IMPAIRMENT

Percentage of people age 65 and over with moderate or severe memory impairment, by age group and sex, 2008

<table>
<thead>
<tr>
<th>Age Group</th>
<th>Male</th>
<th>Female</th>
</tr>
</thead>
<tbody>
<tr>
<td>65+</td>
<td>13.5</td>
<td>13.1</td>
</tr>
<tr>
<td>65-69</td>
<td>6.3</td>
<td>4.4</td>
</tr>
<tr>
<td>70-74</td>
<td>9.3</td>
<td>7.8</td>
</tr>
<tr>
<td>75-79</td>
<td>14.6</td>
<td>10.3</td>
</tr>
<tr>
<td>80-84</td>
<td>20.6</td>
<td>19.5</td>
</tr>
<tr>
<td>85+</td>
<td>31.6</td>
<td>33.3</td>
</tr>
</tbody>
</table>

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DECISION-MAKING CAPACITY

• If patient is able to give informed consent:
  - Describe the surgery
  - Identify potential complications
  - Explain alternatives to surgery
  - Elicit patient priorities and preferences
  - Discuss advance directives

• Otherwise, identify surrogate or proxy who can:
  - State patient’s priorities and preferences
  - Identify the goals/preferred aggressiveness of care
IMPACT OF COGNITIVE AND FUNCTIONAL IMPAIRMENT

- Increased mortality
- Increased length of stay
- Increased risk of medical complications
- Difficulty with rehab programs
- Increased risk of nursing home placement

Givens JAGS 2008
Gruber-Baldini JAGS 2003
MEDICATION REVIEW

- Reconcile medications at home and in hospital
- Confirm that there is an indication for every medication
- Adjust dose for renal function
  - Calculate creatinine clearance
- Adjust for NPO status
- Identify potentially inappropriate medications
  - Beers list

Potter Clin Ortho Relat Res 2004
Rothberg 2008 J Hosp Med
Steinman 2009 Arch Intern Med
Beers Arch Intern Med 1997
CASE STUDY (continued)

Additional history from the patient’s daughter:

• Past medical history

Patient has had several falls due to an unsteady gait. Wears glasses but still has poor vision. Needs a hearing aid but was unable to afford it.

• Social history

Lives alone. Used a walker because of unsteady gait. Daughter came every week to pre-pour his medications and manage his finances. The private aide came daily to do the cooking, shopping, household cleaning, and watch over while he bathed. Impaired in 5/7 IADLs, 1/6 ADLs.

• Medications

Took Ativan most nights because of difficulty sleeping and hallucinations at night.
Findings from post-op physical exam

• BP 190/100, pulse 110, temperature 100.3 °F, pain 6–7
• Lungs clear, CV tachycardia, S1, S2 normal
• Abdomen flat, no bowel sounds
• Colostomy bag had small amount of serosanguineous fluid
  surgical incision was intact
• Extremities were without edema
• The patient was awake, alert, and coherent but not oriented to
  place or time. He could relate what happened to him but was
  unable to recite current events in the world. Attention span
  was poor—he could not repeat 3 words and had waxing and
  waning mental status.
• Labs and EKG: no change from pre-op findings
IN-HOSPITAL DELIRIUM

- 40%-60% prevalence
- Persisted in 32% at 1 month post-op
- Associated with worse outcomes
  - Falls
  - Incontinence
  - Delayed recovery
  - Prolonged length of stay

Givens JAGS 2008
Mercantonio JAGS 2000
McGory Annals of Surgery 2009
DIAGNOSING DELIRIUM: CONFUSION ASSESSMENT METHOD (CAM)

- Hallmark findings are:
  1. Acute onset and fluctuating course
  2. Inattention
  3. Disorganized thinking
  4. Altered level of consciousness

- The diagnosis of delirium by CAM requires the presence of features 1 and 2 and either 3 or 4

- Sensitivity 94%–100%, specificity 90%–95%

- Conduct daily screening for the first 5 inpatient days after surgery

Inouye Ann Intern Med 1990
DELIRIUM: A GERIATRIC SYNDROME

RISK FACTORS
- >80 years of age
- Dementia
- Functional impairments
- Sensory deficits
- Multiple comorbidities
- Meperidine

INTERVENTIONS
- Electrolytes/fluid
- Oxygen
- Treat infections
- Treat urinary retention
- Treat constipation
- Manage pain
- Geriatric consultation

Inouye Ann Intern Med 1993
Siddiqi Cochrane Database Sys Rev 2007
McGory Annals of Surgery 2009
IMPACT OF GERIATRICS CONSULTATION ON DELIRIUM (1 of 3)

- 126 patients randomized after hip fracture
- Proactive geriatrics consultation was compared with usual care
- Geriatrics consultation occurred within 24 hours of admission and daily thereafter
  - Structured protocol with 10 modules
- Primary outcome measure: incidence of delirium

Marcantonio et. al. JAGS. 2001; 49: 516-522
IMPACT OF GERIATRICS CONSULTATION ON DELIRIUM (2 OF 3)

• Cumulative incidence of delirium reduced by 1/3 (50% to 32% intervention arm)
  ➢ NNT = 5.6

• Incidence of severe delirium reduced by 50% (29% to 12% intervention arm)

Marcantonio et. al. JAGS. 2001; 49: 516-522
Geriatric components of the protocol

- Pain assessment
- Medication reconciliation
- Bowel and bladder function
- Nutrition
- Mobilization
- Environmental stimuli
- Agitation
PAIN MANAGEMENT

• Pain is undertreated in cognitively impaired elders

• Poorly controlled perioperative pain can result in:
  ➢ Increased length of stay
  ➢ Delayed ambulation and function
  ➢ More complications

Morrison Pain 2003
PAIN PROTOCOL

• 249 hip fracture patients in a rehab setting
• A novel interdisciplinary analgesic program was compared with usual care
  ➢ Fixed regimen of acetaminophen and opioids (oxycodone 3 mg q4h in pts > 70 years of age)
  ➢ Bowel regimen
• Pain reassessed frequently, rescue drug added PRN
• Primary outcome measures: pain scores, performance
• Novel protocol resulted in:
  ➢ Reduced pain at rest and with physical therapy
  ➢ Better performance on activities

Morrison Pain 2003
URINARY PROBLEMS AFTER HIP FRACTURE

- **Incontinence**
  - 21% of 6,500 women were incontinent at discharge

- **Retention**
  - Of 244 women who had post-voiding residual volume measured:
    - 37% had retention before surgery
    - 56% had retention at 24 hours post-op
    - 22% had retention at 5 to 7 days post-op
  - Retention was a risk factor for mortality in first year

Palmer J Geront Bio Sci 2002
Halm Arch Intern Med 2003
Smith, Age Aging, 1996
**CONSTIPATION**

- **Clinical trial after hip fracture**
  - 46 patients
  - Most were on bowel regimens with opioids
  - 70% developed newly diagnosed constipation postoperatively
  - Advanced age and poor nutritional status were significant predictors

- **Risk factors for constipation:** older age, hospitalization, immobility, narcotics, anesthesia

Spinzi Dig Dis 2007

Davies J Clin Pharm Ther 2008
Randomized, placebo-controlled study of haloperidol prophylaxis for elderly hip surgery patients at risk of delirium

- 430 patients randomized
- 0.5 mg haloperidol TID versus placebo
- Everyone received proactive geriatric consultation
- Primary outcome measure, incidence of delirium, did not differ between groups

Kalisvaart JAGS 2005
CASE STUDY (continued)

- The patient had cognitive and functional impairments and was deemed to be at high risk of delirium as well as falls.
- He had CAM performed daily.
- The following recommendations were made:
  - He was given his eyeglasses.
  - Because he had cognitive impairment with sundowning, his daughter came to the hospital daily to attend to her father’s needs and to orient him.
  - He had a urinary tract infection and was treated for it.
  - Pain management was optimized with a standing order for Tylenol, and oxycodone prior to rehab.
  - A bowel regimen was added once the patient was able to tolerate oral intake.
SUMMARY

• “Age in and of itself is never a criterion for medical decision making: function is”

• Obtain baseline cognitive and functional status

• Identify common geriatric syndromes

• Recognize that multiple postoperative geriatric problems are the norm

• Use a proactive approach to identify causes of common geriatric syndromes
Acknowledgments

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Amy Ehrlich, MD

Geriatric Academic Career Award
THANK YOU FOR YOUR TIME!

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