Preoperative Assessment of the Geriatric Patient

Kelsey Walker, MD
Geriatric Grand Rounds
May 21, 2015

Objectives

- Introduction: why does it matter?
- Review traditional tools to assess preoperative risk: value and limitations
- Identify geriatric specific risk predictors for adverse surgical outcomes
- Describe options for proactive perioperative management strategies
Objectives

- **Introduction: why does it matter?**
- Review traditional tools to assess preoperative risk: value and limitations
- Identify geriatric specific risk predictors for adverse surgical outcomes
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**Why does it matter?**

*Image showing population aged 65 and over from 1900 to 2050.*
Why does it matter?

- Normal age-related physiologic changes limit physiologic reserve of older patients
- Increased vulnerability to postoperative stress, stress, and illness

### 30-Day Mortality by Type of Operation

<table>
<thead>
<tr>
<th></th>
<th>&lt;80 years old</th>
<th>&gt;80 years old</th>
</tr>
</thead>
<tbody>
<tr>
<td>All operations</td>
<td>2.8%</td>
<td>8.2%</td>
</tr>
<tr>
<td>General surgery</td>
<td>4.3%</td>
<td>11.4%</td>
</tr>
<tr>
<td>Vascular surgery</td>
<td>4.1%</td>
<td>9.4%</td>
</tr>
<tr>
<td>Thoracic surgery</td>
<td>6.3%</td>
<td>13.5%</td>
</tr>
<tr>
<td>Orthopedic surgery</td>
<td>1.2%</td>
<td>8.3%</td>
</tr>
</tbody>
</table>

### Surgical Morbidity

<table>
<thead>
<tr>
<th></th>
<th>&lt;80 years old</th>
<th>&gt;80 years old</th>
</tr>
</thead>
<tbody>
<tr>
<td>≥1 complication</td>
<td>12.1%</td>
<td>20%</td>
</tr>
<tr>
<td>Pneumonia</td>
<td>2.3%</td>
<td>5.6%</td>
</tr>
<tr>
<td>UTI</td>
<td>2.2%</td>
<td>5.6%</td>
</tr>
<tr>
<td>Required intubation</td>
<td>1.6%</td>
<td>2.0%</td>
</tr>
<tr>
<td>Progressive renal failure</td>
<td>0.4%</td>
<td>1.0%</td>
</tr>
<tr>
<td>Myocardial infarction</td>
<td>0.4%</td>
<td>1.0%</td>
</tr>
<tr>
<td>Cardiac arrest</td>
<td>0.9%</td>
<td>2.1%</td>
</tr>
</tbody>
</table>

Hamel JAGS 2005
Significance of discharge to institutional care facility

Components of a Preoperative Assessment

- Assessment of health status
- Risk determination
- Clearance vs Optimization
- Development of perioperative care plan
- Patient education
Harvey

76 y/o male presenting for preoperative evaluation for total knee arthroplasty (TKA)

Medical history:
- Hypertension
- Atrial fibrillation
- Diabetes
- Hyperlipidemia
- Osteoarthritis

Social History:
- Nonsmoker, social etoh
- Widowed, lives alone in 2 story home

Medications:
- Metoprolol 25mg BID
- Atorvastatin 40mg daily
- Warfarin 5mg daily
- Insulin glargine 15 units QHS
- Metformin 500mg BID
- Acetaminophen 1000mg q8 hours PRN pain
Physical Exam

- Vitals: temp 97.9 F, pulse 88, BP 152/84, O2 96% RA, BMI 20
- General – well-groomed. Ambulates with slow antalgic gait with the use of a cane.
- CV- irregularly irregular; no murmur
- Pulm- lungs clear
- Abdomen soft, nt/nd
- Extremities without edema, brace on right knee

Ancillary tests

Labs
- H/H: 11.5/35.5; INR 2.3
- Creatinine 1.1, fasting blood glucose 115, A1C 7.2%
- Albumin 2.9

EKG- atrial fibrillation, normal axis, normal intervals, no q waves
Objectives

- Introduction: why does it matter?
- **Review traditional tools to assess preoperative risk**
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- Describe options for proactive perioperative management strategies

ASA Classification of Physical Status

<table>
<thead>
<tr>
<th>ASA</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Healthy</td>
</tr>
<tr>
<td>2</td>
<td>Mild systemic disease only without substantive functional limitations</td>
</tr>
<tr>
<td>3</td>
<td>Severe systemic disease, substantive functional limitations; one or more moderate to severe diseases</td>
</tr>
<tr>
<td>4</td>
<td>Severe systemic disease that is a constant threat to life</td>
</tr>
<tr>
<td>5</td>
<td>Moribound patient not expected to survive without operation</td>
</tr>
</tbody>
</table>

http://www.asahq.org/resources/clinical-information/asa-physical-status-classification-system
Assessing cardiovascular risk

- Most developed and investigated
- Incidence
  - perioperative cardiac complication rates: 2% in unselected patients
  - >5% in high-risk patients
  - 25-30% postoperative deaths are from cardiac causes

Revised Cardiac Risk Index (RCRI)

- Published in 1999
- Derived from 2893 patients undergoing elective major noncardiac procedures
- Validated in cohort of 1422 similar individuals
- Outcome: risk of cardiac complications

Lee et al. Circulation: 1999
Cardiac risk: RCRI

<table>
<thead>
<tr>
<th>Risk Factor</th>
</tr>
</thead>
<tbody>
<tr>
<td>History of myocardial infarction</td>
</tr>
<tr>
<td>History of or current angina</td>
</tr>
<tr>
<td>Use of sublingual nitroglycerine</td>
</tr>
<tr>
<td>Positive exercise test results</td>
</tr>
<tr>
<td>Q waves on electrocardiogram</td>
</tr>
<tr>
<td>Patients who have undergone percutaneous transluminal coronary angioplasty</td>
</tr>
<tr>
<td>Patients who have undergone coronary artery bypass graft surgery and who</td>
</tr>
<tr>
<td>have chest pain presumed to be of ischemic origin</td>
</tr>
<tr>
<td>History of transient ischemic attack</td>
</tr>
<tr>
<td>History of cerebrovascular accident</td>
</tr>
<tr>
<td>Diabetes mellitus requiring insulin therapy</td>
</tr>
<tr>
<td>Chronic renal insufficiency, defines as a baseline creatinine level of at</td>
</tr>
<tr>
<td>least 2.0 mg/dL</td>
</tr>
</tbody>
</table>

Lee et al. Circulation. 1999

Cardiac risk: RCRI

- **Risk of cardiac complications**
  - No risk factors: 0.4%
  - One risk factor: 1%
  - 2 risk factors: 2.4%
  - Three or more: 5.4%
Assessing CV risk: Harvey

- History of myocardial infarction
- History of or current angina
- Use of sublingual nitroglycerine
- Positive exercise test results
- Q waves on electrocardiogram
- Patients who have undergone percutaneous transluminal coronary angioplasty or coronary artery bypass graft surgery and who have chest pain presumed to be of ischemic origin
- History of transient ischemic attack
- History of cerebrovascular accident
- Diabetes mellitus requiring insulin therapy
- Chronic renal insufficiency, defined as a baseline creatinine level of at least 2.0 mg/dl

Risk of cardiac complication: 1%

Gupta MICA NSQIP database risk tool

- 2011
  - Developed from >200,000 patients undergoing surgery
  - Validated in 2008 on >250,000 patients
- Outcomes
  - Intraoperative/postoperative myocardial infarction
  - Cardiac arrest

Gupta et al. Circulation. 2011
Cardiac risk: NSQIP tool

Risk factors:
- Type of surgery
- Dependant functional status
- Abnormal creatinine
- ASA class
- Increased age

Assessing CV risk: Harvey

Estimate risk of perioperative myocardial infarction or cardiac arrest.

Age: 70
Creatinine: <1.5 mg/dL / 135 μmol/L
ASA Class: ASA 3

- ASA 1 = Normal healthy patient
- ASA 2 = Patients with mild systemic disease
- ASA 3 = Patients with severe systemic disease that is a constant threat to life
- ASA 4 = Patients with severe systemic disease that is not a constant threat to life
- ASA 5 = Moribund patients who are not expected to survive without the operation

Preoperative Function: Totally independent
Procedure: Orthopedic and non-vascular extremity

• Risk of MICA: 0.76%
Comparison of RCRI and NSQIP

<table>
<thead>
<tr>
<th>Methodology</th>
<th>RCRI</th>
<th>NSQIP-gupta</th>
</tr>
</thead>
<tbody>
<tr>
<td>Patient Population</td>
<td>4315, &gt;= 50 yrs, one hospital</td>
<td>468,795, &gt;16 yrs, 200 hospitals</td>
</tr>
<tr>
<td>Date of development</td>
<td>1989-1994</td>
<td>2007-2008</td>
</tr>
<tr>
<td>Outcomes</td>
<td>In-hospital MI (CK), pulmonary edema, complete heart block, cardiac arrest, cardiac death</td>
<td>MI (troponin) and cardiac arrest</td>
</tr>
<tr>
<td>Surgery specific</td>
<td>No</td>
<td>yes</td>
</tr>
</tbody>
</table>

Cardiac risk based on procedure

<table>
<thead>
<tr>
<th>Risk Stratification</th>
<th>Procedure Example</th>
</tr>
</thead>
<tbody>
<tr>
<td>Vascular</td>
<td>• Aortic and other major vascular surgery&lt;br&gt;• Peripheral vascular surgery</td>
</tr>
<tr>
<td>Intermediate</td>
<td>• Intraperitoneal and intrathoracic surgery&lt;br&gt;• Carotid endarterectomy&lt;br&gt;• Head and neck surgery&lt;br&gt;• Orthopedic surgery</td>
</tr>
<tr>
<td>Low</td>
<td>• Endoscopic procedures&lt;br&gt;• Superficial procedure&lt;br&gt;• Cataract surgery&lt;br&gt;• Breast surgery&lt;br&gt;• Ambulatory surgery</td>
</tr>
</tbody>
</table>

Fleisher. Circulation. 2007
Assessing CV risk: Harvey

Patient scheduled for surgery with known or risk factors for CAD\(^*\) (Step 1)

Emergency: Yes → Clinical risk stratification and proceed to surgery

No → ACS\(^+\) (Step 2)

Yes → Evaluate and treat according to GDMT\(^++\)

No → Estimated perioperative risk of MACCE based on common cardiovascular risk (Step 3)

Low risk (<1%) (Step 4) → No further testing (Class IIa)

High risk (≥1%) (Step 5) → Moderate based on functional capacity

Evaluate in low risk patients with symptoms if high risk patients (Class IIa)

No further testing (Class IIa)

Proceed to surgery

No further testing (Class IIa)

Proceed to surgery

No further testing (Class IIa)

Pharmacological stress testing (Class IIa)

If normal or abnormal

No further testing (Class IIa)

Psychological stress testing (Class IIa)

If normal or abnormal

No further testing (Class IIa)

Psychological stress testing (Class IIa)

If normal or abnormal

No further testing (Class IIa)

Psychological stress testing (Class IIa)

If normal or abnormal

No further testing (Class IIa)
Assessing CV risk: Harvey

Functional capacity

- 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
Assessing Pulmonary Risk

- Postoperative pulmonary complication rate: 6.8%
- 15% in age >70
- Associated with long-term mortality in elderly patients undergoing noncardiac surgery
Assessing pulmonary risk

- Multiple calculators
  - ARISCAT—overall risk
  - Gupta risk calculator for postoperative pneumonia
  - Gupta risk calculator for postoperative respiratory failure
  - Arozullah index—primarily research oriented

### ARISCAT Risk Index

<table>
<thead>
<tr>
<th>Factor</th>
<th>Adjusted odds ratio (95% CI)</th>
<th>Risk score</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age, years</td>
<td></td>
<td></td>
</tr>
<tr>
<td>≤18</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>19–60</td>
<td>1.4 (1.6–3.3)</td>
<td>3</td>
</tr>
<tr>
<td>&gt;60</td>
<td>5.1 (3.9–6.3)</td>
<td>16</td>
</tr>
<tr>
<td>Preoperative O2 saturation</td>
<td></td>
<td></td>
</tr>
<tr>
<td>≤20%</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>21–95%</td>
<td>2.2 (1.2–4.2)</td>
<td>9</td>
</tr>
<tr>
<td>&gt;95%</td>
<td>10.7 (4.3–28.1)</td>
<td>24</td>
</tr>
<tr>
<td>Respiratory infection in the last month</td>
<td>5.5 (2.6–11.5)</td>
<td>17</td>
</tr>
<tr>
<td>Preoperative anemia · hemoglobin ≤10 g/dL</td>
<td>3.0 (1.4–6.8)</td>
<td>11</td>
</tr>
<tr>
<td>Surgical incision</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Upper abdominal</td>
<td>4.4 (3.0–6.8)</td>
<td>15</td>
</tr>
<tr>
<td>Intrathoracic</td>
<td>12.4 (8.9–16.5)</td>
<td>24</td>
</tr>
<tr>
<td>Duration of surgery</td>
<td></td>
<td></td>
</tr>
<tr>
<td>≤2 hours</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>2–3 hours</td>
<td>4.9 (2.4–10.1)</td>
<td>16</td>
</tr>
<tr>
<td>&gt;3 hours</td>
<td>9.7 (4.9–19.9)</td>
<td>23</td>
</tr>
<tr>
<td>Emergency surgery</td>
<td>2.2 (1.3–4.5)</td>
<td>8</td>
</tr>
<tr>
<td>Risk class</td>
<td>Number of points in risk score</td>
<td>Pulmonary complication rate (validation sample)</td>
</tr>
<tr>
<td>Low</td>
<td>&lt;20 points</td>
<td>16.9 percent</td>
</tr>
<tr>
<td>Intermediate</td>
<td>20–44 points</td>
<td>13.3 percent</td>
</tr>
<tr>
<td>High risk</td>
<td>≥45 points</td>
<td>9.2 percent</td>
</tr>
</tbody>
</table>

### Assessing Pulmonary Risk: Harvey

<table>
<thead>
<tr>
<th>Factor</th>
<th>Adjusted odds ratio (95% CI)</th>
<th>Risk score</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age, years</td>
<td></td>
<td></td>
</tr>
<tr>
<td>&lt;50</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>51-65</td>
<td>1.4 (0.6-3.2)</td>
<td>3</td>
</tr>
<tr>
<td>&gt;65</td>
<td>5.1 (1.9-13.3)</td>
<td>16</td>
</tr>
<tr>
<td>Preoperative O₂ saturation</td>
<td></td>
<td></td>
</tr>
<tr>
<td>≥77% percent</td>
<td>2.2 (1.2-4.2)</td>
<td>6</td>
</tr>
<tr>
<td>≤76% percent</td>
<td>10.7 (4.3-28.1)</td>
<td>24</td>
</tr>
<tr>
<td>Respiratory infection in the last month</td>
<td>5.5 (2.0-11.5)</td>
<td>17</td>
</tr>
<tr>
<td>Preoperative anemia - hemoglobin ≤50 g/dL</td>
<td>3.0 (1.1-8.0)</td>
<td>11</td>
</tr>
<tr>
<td>Surgical incision</td>
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<td></td>
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<tr>
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<td>4.4 (1.3-14.3)</td>
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<td>Intrathoracic</td>
<td>12.4 (1.2-123.3)</td>
<td>24</td>
</tr>
<tr>
<td>Duration of surgery</td>
<td></td>
<td></td>
</tr>
<tr>
<td>≤2 hours</td>
<td>4.9 (1.4-16.5)</td>
<td>16</td>
</tr>
<tr>
<td>2.1 hours</td>
<td>9.7 (4.1-21.9)</td>
<td>23</td>
</tr>
<tr>
<td>≥3 hours</td>
<td>2.2 (1.0-5.0)</td>
<td>8</td>
</tr>
<tr>
<td>Emergency surgery</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Risk class</td>
<td>Number of points in risk score</td>
<td>Pulmonary complication rate (validation sample)</td>
</tr>
<tr>
<td>Low</td>
<td>0-35 points</td>
<td>1.6%</td>
</tr>
<tr>
<td>Medium</td>
<td>36-44 points</td>
<td>13.3%</td>
</tr>
<tr>
<td>High</td>
<td>45+ points</td>
<td>41.3%</td>
</tr>
</tbody>
</table>

Pulmonary risk

- Interventions
  - Optimization of asthma and COPD
  - Smoking cessation
  - Preoperative inspiratory muscle training

Harvey goes to the OR

- Harvey discontinued his warfarin 5 days prior to surgery and is bridged with LMWH
- Beta-blocker and statin continued
- Insulin and metformin held on the day of surgery

- Harvey is taken to the OR, uncomplicated TKA
Harvey—postop

- Post-operative course is complicated by poorly controlled pain and constipation
- POD #2 Harvey becomes delirious...
- ... sitter, haloperidol, urinary retention, catheter, pulled out catheter, hematuria, reinserted, UTI/sepsis and slow rehab
- Discharged to sub-acute rehab on POD #10 still confused

Could this have been anticipated?

- Traditional preoperative evaluation strategies risk-stratify patients primarily based on a single-organ system
- Outcomes: cardiac and pulmonary complications, organ specific mortality
But what about ...
- Other complications—delirium, wound infections, etc?
- Functional recovery?
- Need for institutionalization?
- Length of stay?
- Mortality?

Objectives
- Introduction: why does it matter?
- Review traditional tools to assess preoperative risk: value and limitations
  - Identify *geriatric specific risk predictors for adverse surgical outcomes*
- Describe options for proactive perioperative management strategies
Geriatric risk measures

- Frailty
- Functional status/mobility
- Cognition
- Nutritional status
- Depression

Frailty

- State of decreased physiologic reserve and resistance to stressors → increased vulnerability
Defining frailty

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>Criteria for Frailty</th>
</tr>
</thead>
<tbody>
<tr>
<td>Weight loss</td>
<td>Lost &gt;10 pounds unintentionally last year</td>
</tr>
<tr>
<td>Exhaustion</td>
<td>Felt last week that &quot;everything I did was an effort&quot; or &quot;I could not get going&quot;</td>
</tr>
<tr>
<td>Slowness</td>
<td>Time to walk 15 feet (cutoff depends on sex and height)</td>
</tr>
<tr>
<td>Low activity level</td>
<td>Expends &lt;270 kcal week (calculated from activity scale incorporating episodes of walking, household chores, yard work, etc)</td>
</tr>
<tr>
<td>Weakness</td>
<td>Grip strength measured using hand dynamometer (cutoff depends on sex and body mass index)</td>
</tr>
</tbody>
</table>

Score

<table>
<thead>
<tr>
<th>Score</th>
<th>Status</th>
</tr>
</thead>
<tbody>
<tr>
<td>0-1</td>
<td>Robust</td>
</tr>
<tr>
<td>2-3</td>
<td>Pre-frail</td>
</tr>
<tr>
<td>4-5</td>
<td>Frail</td>
</tr>
</tbody>
</table>

Frailty as a predictor of surgical outcomes

- Increased risk of surgical complications (OR 2.54)
- Increased length of stay
  - Incidence rate ratio of 1.69
- Increased risk of discharge to assisted-living facility after previously living at home
  - Pre-frail: OR 3.15; frail OR 20.48

### Functional status and mobility

- Poor functional status has been associated with:
  - Postoperative delirium
  - Postoperative pulmonary complications
  - Surgical site infections with MRSA
  - Postoperative nursing home placement
  - Mortality


### Prognosis related to functional status

<table>
<thead>
<tr>
<th>Mobility</th>
<th>No difficulty</th>
<th>With an aid</th>
<th>With help from another person</th>
<th>Not at all</th>
</tr>
</thead>
<tbody>
<tr>
<td>Able to get about the house</td>
<td>3</td>
<td>2</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>Able to get out of the house</td>
<td>3</td>
<td>2</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>Able to go shopping</td>
<td>3</td>
<td>2</td>
<td>1</td>
<td>0</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Score</th>
<th>1-year mortality</th>
</tr>
</thead>
<tbody>
<tr>
<td>0-2</td>
<td>62%</td>
</tr>
<tr>
<td>3-5</td>
<td>42%</td>
</tr>
<tr>
<td>6-8</td>
<td>26%</td>
</tr>
<tr>
<td>9</td>
<td>11%</td>
</tr>
</tbody>
</table>

Parker and Palmer JBI, 1993
Mobility and risk of adverse outcomes

<table>
<thead>
<tr>
<th>Exercise Tolerance</th>
<th>Good (n = 262)</th>
<th>Poor* (n = 324)</th>
<th>P Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nursing home placement</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>10 (4%)</td>
<td>40 (12%)</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>No</td>
<td>252 (96%)</td>
<td>284 (88%)</td>
<td></td>
</tr>
<tr>
<td>Serious postoperative complications</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>26 (10%)</td>
<td>67 (21%)</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>No</td>
<td>236 (90%)</td>
<td>257 (79%)</td>
<td></td>
</tr>
<tr>
<td>Length of hospital stay (days)</td>
<td>5.5 ± 4.6</td>
<td>7.2 ± 7.6</td>
<td>0.001</td>
</tr>
</tbody>
</table>

* Defined as unable to walk four blocks and climb two flights of stairs without symptomatic limitation.

Assessing cognition

- **Common** –
  - Cognitive impairment 22%
  - Dementia 13%
- **Increased risk for:**
  - Postoperative delirium
  - Postoperative pulmonary complications
  - Longer hospital stays
  - Perioperative mortality
  - Postoperative functional decline

Assessing cognition

- Consider screening all patients with the Mini-Cog
- Careful documentation of preoperative cognitive status may help with assessment of postoperative cognitive changes

Assessing Nutritional Status

- Malnutrition is common:
  - 5.8% community dwellers
  - 13.8% in nursing homes
  - 38.7% hospitals
  - 50.5% in rehabilitation
- Increased risk of morbidity (particulary infections) OR 2.30-3.47
Assessing Nutritional Status

- Severe nutritional risk based on
  - BMI <18.5
  - Serum albumin <3.0
  - Unintentional weight loss
- If possible, consider preoperative nutritional assessment by dietician

Depression

- Prevalence in US geriatric population (>70) 11%
- Preoperative depression has been associated with
  - Increased mortality
  - Increased length of stay
  - Higher pain perception and increased analgesic use
Harvey

- Further history reveals that Harvey was previously able to walk 2-3 blocks with a cane and climb 1 flight of stairs; ambulation was slow and limited by knee pain. Had 12 lbs of unintentional weight loss over the last year; son expresses concern about depression as Harvey frequently complains of fatigue and weakness. He is still driving though requires assistance from family members with grocery shopping. Son had been managing all finances due to errors made on his 2014 tax return.
Further history reveals that Harvey was previously able to walk 2-3 blocks with a cane and climb 1 flight of stairs; ambulation was slow and limited by knee pain. Had 12 lbs of unintentional weight loss over the last year; family notes he frequently endorses a feeling of general fatigue and weakness. Is still driving though requires assistance from family members with grocery shopping. Son had been managing all finances due to errors made on his 2014 tax return.
Harvey

- Harvey’s son calls. He notifies you that given Harvey’s poor progress with therapy the recommendation has been made for discharge to a nursing home for 24 hour care.

- “Could this have been prevented?”

Objectives

- Introduction: why does it matter?
- Review traditional tools to assess preoperative risk: value and limitations
- Identify geriatric specific risk predictors for adverse surgical outcomes
- **Describe options for proactive perioperative management strategies**
Prehabilitation

| Pre-Op Visit | Prehabilitation | Operation | Hospital Outcomes | 30-Day Outcomes | One-Year Outcomes |

The concept of prehabilitation

Operation

Reserve Capacity

Critical Zone

Time
Putting it all together

Geriatric Surgical Assessment Predicts:

- Increased complications
- Longer length of stay
- Higher rate of discharge institutionalization
- Increased thirty day re-admission
- Higher hospital costs
- Higher six-month healthcare costs

My take-home points

- The preoperative assessment is BIG!
- Geriatric assessment markers predict risk for adverse outcomes
- This is key in anticipatory guidance and in counselling patients who are considering undergoing an elective procedure
- Prehabilitation may improve post-operative outcomes

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