Injury Amongst Our Elders:  
*Death & Disability in the “Prime” of Life*

C. William Schwab, M.D.
Athletic feats, senior style

Seniors from throughout the city spent the blustery day in competition as they took to the track and the field for the Philadelphia Senior Games. The games were held yesterday at Temple University’s Rec Hall and at various outdoor facilities at 16th Street and North Avenue.

Joe Granatzer crosses the finish line to win the 10K-road race. From left are Joseph Silver, Donato Pompino and Ted Kahrs.

Manuel Long conducts the official mile walk race.

Bart Nuss displays his medals for the 100-, 200- and 400-meter walks.

George Roza shows the firm foot that has made him the horizontal competition winner at his age being seven years in a row.

Photography by Gerald S. Williams
DEMographics

- Trauma -- 5th Leading Cause of Death
- Disproportionate
  - USA
    - 11% of Population
    - 25% of ALL Trauma Deaths
  - Sweden
    - 17% of Population
    - 55% of Fatalities
OVERVIEW

- Demographics
- Mechanism of Injury
- Physiology
- Clinical Perspectives
- Outcomes...??
<table>
<thead>
<tr>
<th>Year</th>
<th>Population</th>
<th>Percentage Change</th>
</tr>
</thead>
<tbody>
<tr>
<td>1980</td>
<td>26.5 Million</td>
<td>11.3%</td>
</tr>
<tr>
<td>1990</td>
<td>30.9 Million</td>
<td>16.6%</td>
</tr>
<tr>
<td>2000</td>
<td>52 Million</td>
<td>68%</td>
</tr>
<tr>
<td>2040</td>
<td>68 Million</td>
<td>30%</td>
</tr>
</tbody>
</table>
DEMOGRAPHICS

“Elderly” Elderly
- > 85 Years Old
- Highest Growth Rate
  - 1960 -- .9 Million
  - 1980 -- 2.2 Million
  - 2000 -- 6.7 Million
  - 2040 -- 12.2 Million
DEMOGRAPHICS

- Aging
  - No Set Age
  - "Normal" Biologic Process
  - Statistically Impacts > 55 Years Old
  - 65 Years Old is a Social Parameter
  - 75 Years Old is a Geriatrician’s View
DEMOGRAPHICS

Subgroups
- "Young" Old -- 55-64 Years
- "Old" Old -- 65-74 Years
- Greater than 75 Years
FIGURE 471-1. Percentage of Caucasian women in five counties in North Carolina who reported that they were able to complete three tasks (walking across a room, walking 0.5 mile, and climbing one flight of stairs) without assistance, by age group. (National Institute on Aging. Established populations for epidemiologic studies of the elderly. Vol. II: Resource data book. Publication 90-495. Bethesda, MD: National Institutes of Health, 1987.)
MECHANISMS OF INJURY

- Falls
- Motor Vehicle Accident
- Pedestrian- Vehicular Trauma
- Burns
- Violence
MECHANISMS OF ELDERLY INJURY

65-74 Years
- 33% MVA
- 25% Falls
- 8% Burns

75 Years
- 20% MVA
- 50% Falls
- 8% Burns
falls
FALLS

Epidemiology

- 40% Fall/Year
  - 17% Serious Injury
- Most Common Injury > 75 Years
- Most Common Injury Resulting in Death
- 3,650 Deaths in 1990 (81%)
- Fatality Rate 23/100,000 (1.8%)
**Car accidents and age**

A total of 33 million drivers were in car accidents last year with drivers 20-24 most likely to be involved.

<table>
<thead>
<tr>
<th>Driver's age</th>
<th>Percentage involved in accident</th>
</tr>
</thead>
<tbody>
<tr>
<td>Under 20</td>
<td>31</td>
</tr>
<tr>
<td>20-24</td>
<td>34</td>
</tr>
<tr>
<td>25-34</td>
<td>22</td>
</tr>
<tr>
<td>35-44</td>
<td>18</td>
</tr>
<tr>
<td>45-54</td>
<td>14</td>
</tr>
<tr>
<td>55-64</td>
<td>15</td>
</tr>
<tr>
<td>65-74</td>
<td>13</td>
</tr>
<tr>
<td>75 and older</td>
<td>33</td>
</tr>
</tbody>
</table>

**MOTOR VEHICLE ACCIDENTS**

- 21.8 Million Drivers >65 Years
  - (12.9% of All Drivers)
- 2nd Highest Collision Rate
- 18-36% of Injury Related Fatalities
PEDESTRIAN-VEHICULAR TRAUMA

- 1990 -- 1,800 Deaths (24%)
- Highest Pedestrian Fatality Rate
  - 6/100,000 (3)
- 30-50% of Injury Related Deaths
PEDESTRIAN-VEHICULAR TRAUMA

- Causes
  - Slow Pace
  - Gait/Balance
  - Posture
  - Strength/Coordination
  - Neurosensory Impairment
  - Judgement/Cognition
PHYSIOLOGY

- Cardiovascular
- Renal
- Respiratory
- Nervous System
- Musculoskeletal

MARKED PHYSIOLOGIC VARIABILITY
CARDIOVASCULAR

- Less Effective Pump
- Minimal Reserve
- Medication Effects
- “Misleading” Response to Hypovolemia
- Superimposed Ischemia/Hypoxia
CLINICAL PERSPECTIVES
Cardiovascular

History
- MI/Arrhythmia/Surgery
- Drugs:
  - COUMADIN
  - Beta Blockers

Baseline Studies
- ECG/Rhythm Strip

Fluids
- Judicious
  - Too Much May be Worse Than Too Little
RESPIRATORY CHANGES

Lungs
- Decreased Elasticity
- Decreased Alveolar Number and Function
- Decreased Baseline pO2

Musculoskeletal
- Increased AP Diameter
- Kyphosis
- Decreased Chest Wall Strength
- Increased Chest Wall Rigidity
RENAL SYSTEM

RENAL

Functional Changes
- Loss of Surface Area
- Diminished Real Blood Flow
- Progressive Decline in Filtration Function
- Decline in Creatine Clearance (30-50%)
CNS
- Hearing 73% > 65yrs.
- Visual Acuity
- Balance
- Cerebral Degeneration \(10^5\) Cells A Day
- Altered Cognitive Function
- Intelligence (spared)
NERVOUS SYSTEM

- Confounding Factors
  - Brain/Skull Relationship
    - Delayed Diagnosis Intracranial Hemorage
  - Cervical Spine
    - Narrow Canal
    - Degenerative Changes
  - Altered “Baseline” Mental Status
CO-MORBIDITY IN THE AGED
PED

Common:
Hypertension, Cardiac, Psychoses, Diabetes, ETOH/drug, Pulmonary

More Mortal:
Cirrhosis, Renal, Malignancy, Coagulopathy, Cardiac, Pulmonary(COPD)
PEC’s... EFFECT ON MORTALITY

- LIVER
- RENAL
- CANCER
- CHF
- COAD
- IMMUNOSUPPRESSIVE

Grossman, JTR 2001
APPROACH
TREATMENT AXIOMS
65-74 Years

- Alteration in Mental Status or Cognition Indicative of Brain Injury
  - CT Mandatory

- Standard Management/Early OR

- Expect Poor Outcome
  - Sever CNS Injury/Physiologic Deterioration
  - Check for Advanced Directives
TREATMENT AXIOMS
65-74 Years

- Presence of Acquired Physiologic Alterations
- Presence of Age-Related Disease/Medication
  - Review Medical History
- Aggressive Monitoring to Optimize Cardiac Performance and O₂ Delivery
INVASIE MONITORING
OPTIMIZE DYNAMICS
AGGRESSIVE SURGERY

\———\n
INVASIE MONITORING
CARDIAC SUPPORT
AGGRESSIVE NUTRITION
CLINICAL PERSPECTIVES
Social Issues

- Living Situation
- Family Support
- Living Well

Depression...
OUTCOME

- 1983 -- Oreskovitch
  - 12% Independent

- 1987 -- De Maria
  - 57% Independent
  - 89% Home

- 1994 -- Johnson
  - Age Per Se not Reliable Predictor of SICU Death

- 1994 -- Shapiro
  - Aggressive ICU Care is Justified

Difficult to predict and the literature does not help...
Overall, Pre-Existing Disease, Along with Aging and Injury Severity, have a Profound Effect on Outcome after Trauma to the Elderly
TERMINATION OF LIFE SUPPORT AFTER MAJOR TRAUMA

Dennis J. Sullivan, MD, and John Hansen-Flaschen, MD
"Your grandfather... has left you... his bicycle!"
A Modern Version of the Hippocratic Oath...

As I enter into the profession of medicine, I swear by whatever I hold most sacred, to keep according to my ability the following oath:

...I hold the beauty and mystery of life as well as death in deepest reverence and will do all in my power to provide comfort, relieve suffering, and preserve human dignity in each of my patients.
Futility...

serving no useful purpose: completely ineffective

Webster's Dictionary, 1994
Heroic measures...

invasive procedures to halt or reverse the process of death
Outcome...

physiologic: immediate response
holistic: long term, quality of life
WITH:
- Judgement
- Humanity
- DIGNITY