GERIATRIC TRAUMA
Frailty and Implications for Palliative Care

Cathy A. Maxwell, PhD, RN
Vanderbilt University School of Nursing

Photo: Getty Images
Lois Cawood & Cathy Maxwell (mother and daughter)
Objectives

► Define and summarize the concepts of frailty & intrinsic capacity
► Discuss associations of frailty, injury and outcomes in older adults.
► Explain the geriatric palliative care continuum
► Identify strategies to address frailty and palliative care

NO DISCLOSURES OR CONFLICTS OF INTEREST
Think of someone you know...

► Does this person get fatigued, tired, or exhausted easily?
► Does this person have difficulty walking up a flight of stairs or are they unable to do so?
► Does this person have difficulty walking a city block or the length of a football field (approximately ¼ of a mile)?
► Does this person have more than 5 medical problems (diabetes, heart disease, arthritis, high blood pressure, etc.)?
► Has this person lost weight unintentionally over the past 6 months to 1 year?
Death from Falls (CDC-2014)

Deaths from Falls (by age groups)

- <1 to 14: 53
- 15 to 24: 174
- 25 to 34: 285
- 35 to 44: 504
- 44 to 54: 1340
- 55 to 64: 2558
- 65 to 74: 3938
- 75 to 84: 8257
- 85+: 14849

GERIATRIC TRAUMA: Frailty and Implications for Palliative Care
Fatal and Non-fatal Falls (age 65+) 2014

United States population (65+)

27,000 Died

800,000+ Treated (ER) & hospitalized

2,800,000 Treated in ER and released

29 million FALLS among older adults (7 million injuries)

Centers for Disease Control (CDC), 2014
FRAILTY & INTRINSIC CAPACITY

Insert Photo/Illustration credits here
FRAILTY

► A state of vulnerability characterized by loss of physiologic reserve (the capacity to respond to physical needs and demands)

► Increases risk of functional deterioration, hospitalization and death

► Community-dwelling older adults
  — Frail: 10-14%
  — Pre-frail: 42%

  54%

► Hospitalized injured older adults
  — Frail: 40-50%
  — Pre-frail: 33%

  75%

GERIATRIC TRAUMA: Frailty and Implications for Palliative Care
Models of Frailty

► **Fried Phenotype** (physical)
  — Exhaustion
  — Muscle weakness
  — Slowness
  — Low levels of activity
  — Unintentional weight loss

► **Rockwood Frailty Index**
  — Accumulation of deficits
  — Physical, Psychological, Social

► **Intrinsic Capacity**
  — Composite of all the physical and mental capacities that an individual can draw on
  — Closely linked to frailty
INTRINSIC CAPACITY

Physical Functioning Across the Life Course
“Being mortal is about the struggle to cope with the constraints of our biology, with the limits set by genes and cells and flesh and bone.”

“Our job (as healthcare professionals) is to enable well-being in light of these limitations.”

Atul Gwande
Aging and Frailty
Possible Aging Paths

- **TYPICAL**: Slow decline over time and possibility of delay with physical activity.
- **BEST**: High ability until just before end-of-life.
- **UNEXPECTED EVENT**: Different levels of ability depending on recovery effort.
FRAILTY & INTRINSIC CAPACITY

► Slow loss of strength and energy over time
► Occurs in aging adults
► Leads to falls and other problems over time
Mechanisms/Processes of Physical Frailty

- Oxidative Stress
- Immune System
- Inflammation
- Metabolic
- Hormonal
- Changes in brain structure and physiology
Mitochondrial Biogenesis

- **Mitochondria**: Cellular respiration and energy production (ATP)
- **MB**: Process by which cells increase mitochondrial mass (size) & number
- Activated by cellular stress
  - Environmental toxins
  - Exercise
- Key regulator of metabolic activity in the cell
# Mitochondrial Biogenesis

<table>
<thead>
<tr>
<th>MECHANISM</th>
<th>MITOCHONDRIAL BIOGENESIS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Oxidative Stress</td>
<td>Signal to increase endogenous antioxidants (GLUTATHIONE)</td>
</tr>
<tr>
<td>Immune System</td>
<td>Regulates cellular response to infection</td>
</tr>
<tr>
<td>Inflammation</td>
<td>Dysfunction of MB increases the inflammatory response and cellular senescence</td>
</tr>
<tr>
<td>Metabolic</td>
<td>Alterations in neuronal control by CNS (autonomic balance) decreases mitochondrial function</td>
</tr>
<tr>
<td>Hormonal</td>
<td>Growth hormone increases skeletal muscle protein synthesis and MB pathways</td>
</tr>
<tr>
<td></td>
<td>MB pathways lower inhibitory factors</td>
</tr>
<tr>
<td>Brain structure &amp; function</td>
<td>- Increased gray matter volume- cerebellum, hippocampus, mid frontal gyri</td>
</tr>
<tr>
<td></td>
<td>- Increase in neurotropin (BDNF) – brain plasticity</td>
</tr>
</tbody>
</table>
Mitochondrial Biogenesis

Exercise

- PGC1-α
- Fusion > Fission
- Selective Mitophagy
- Mitochondrial Biogenesis
- Improved Quantity and Quality of Mitochondria

Disuse

- PGC1-α
- FOXO3A
- NF-κB
- Fusion < Fission
- Protein Degradation
- Fragmented and dysfunctional mitochondria
Distefano et al. (2018)
Relationship between Mitochondrial Energetics, Muscle Quality, and Physical Function
VO$_2$: Conversion of O$_2$ to Energy

Johannes H. G. M. van Beek et al. Interface Focus 2016;6:20150079
Aerobic Capacity & Age: Sedentary vs. Trained Women

Johannes H. G. M. van Beek et al. Interface Focus 2016;6:20150079
Sarcopenia & Frailty in Elderly Trauma Patients

- 252 older trauma patients who underwent abdominal CT prior to hospital admission
- Sarcopenia measures: cross-sectional area (CSA) from patients’ psoas major muscle
- Associated with discharge destination to home vs. SNF

Reduced Cerebellar Gray Matter is a Neural Signature of Physical Frailty

1. 456 community-dwelling elders age 50+
2. Assessed for frailty status (robust, prefrail, frail) based on 5 components (slowness, weakness, low PA, exhaustion, weight loss)
3. Results:
   - Prefrail and frail groups showed reduced GMV compared to the robust group
   - Reductions in the cerebellum, hippocampi and middle frontal gyri
   - Weakness, low activity and slowness

Chen, Chou, Liu et al. (2015). Hum Brain Mapp, 36(9), 3666-76.
Physical Function and Increasing Age

Begin physical activity

High functioning

Pre-clinically disabled

Disabled

Age

Disease

FRAILTY AND INJURY
A Vanderbilt Study of Injured Older Adults

1. 188 Adults – Age 65 and older
2. Admitted to Vanderbilt for an injury
3. Followed for one year after discharge from the hospital (2013-2014)
One-Year Outcomes of Geriatric Trauma Patients

Preinjury physical frailty and cognitive impairment among geriatric trauma patients determine postinjury functional recovery and survival

Cathy A. Maxwell, PhD, RN, Lorraine C. Mion, PhD, RN, Kaushik Mukherjee, MD, Mary S. Dietrich, PhD, Ann Minnick, PhD, RN, Addison May, MD, and Richard S. Miller, MD Nashville, Tennessee

BACKGROUND: Injury is an external stressor that often initiates a cycle of decline in many older adults. The influence of physical frailty and cognitive decline on 6-month and 1-year outcomes after injury is unreported. We hypothesized that physical frailty and cognitive impairment would be predictive of 6-month and 1-year postinjury function and overall mortality.

METHODS: The sample involved patients who are 65 years or older admitted to a Level I trauma center between October 2013 and March 2014 with a primary injury diagnosis. Survivors of 188 patients were interviewed within 48 hours of hospital admission to determine...
<table>
<thead>
<tr>
<th>CHARACTERISTIC</th>
<th>ALL PATIENTS (N=188)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age (Med, IQR)</td>
<td>77 (69-86)</td>
</tr>
<tr>
<td>Gender (N, %)</td>
<td></td>
</tr>
<tr>
<td>Female</td>
<td>106 (56%)</td>
</tr>
<tr>
<td>Mechanism of injury (N, %)</td>
<td></td>
</tr>
<tr>
<td>Fall from standing</td>
<td>101 (54%)</td>
</tr>
<tr>
<td>Fall from other</td>
<td>25 (13%)</td>
</tr>
<tr>
<td>MVC-driver</td>
<td>37 (20%)</td>
</tr>
<tr>
<td>MVC-passenger</td>
<td>10 (5%)</td>
</tr>
<tr>
<td>Pedestrian</td>
<td>3 (2%)</td>
</tr>
<tr>
<td>Other</td>
<td>12 (6%)</td>
</tr>
<tr>
<td>Hospital disposition (N, %)</td>
<td></td>
</tr>
<tr>
<td>Home</td>
<td>53 (28%)</td>
</tr>
<tr>
<td>Facility other than home</td>
<td>116 (62%)</td>
</tr>
<tr>
<td>Expired (inpatient)</td>
<td>18 (10%)</td>
</tr>
<tr>
<td>Mortality (6-months)</td>
<td>34 (18%)</td>
</tr>
<tr>
<td>Mortality (1-year)</td>
<td>47 (25%)</td>
</tr>
<tr>
<td>Comorbidity Index (Med, IQR)</td>
<td>3 (0-9)</td>
</tr>
<tr>
<td>Injury Severity (Med, IQR)</td>
<td>10 (9-17)</td>
</tr>
</tbody>
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Insert Photo/Illustration credits here
Patients with and without Cognitive Impairment

| PATIENTS WITH & WITHOUT COGNITIVE IMPAIRMENT (N=188) |
|---------------------------------|---------------------------------|---------------------------------|
|                                | Cognitively Impaired (AD8 ≥ 2) | No Cognitive impairment (AD8 < 2) | P-value |
| AGE (Med, IQR)                 | 81 (75-87)                      | 73 (67-79)                       | <0.001  |
| GENDER-Female (N, %)           | 53 (57%)                        | 53 (57%)                         | 0.868   |
| FALLS (from standing) (N, %)   | 62 (67%)                        | 39 (41%)                         | 0.005   |
| DISPOSITION (N, %)             | 0.225                           | 0.005                           |
| Home                           | 20 (22%)                        | 33 (35%)                         |
| SNF                            | 37 (40%)                        | 26 (27%)                         |
| Rehab                          | 21 (23%)                        | 26 (27%)                         |
| Expired                        | 10 (11%)                        | 8 (8%)                           |
| CM INDEX (Med, IQR)            | 5 (0-10)                        | 1 (0-6)                          | 0.002   |
| INJURY SEVERITY (Med, IQR)     | 9 (8-16)                        | 13 (9-19)                        | 0.025   |
| VES-13 (Med, IQR)              | 7 (4-9)                         | 2 (0-3)                          | <0.001  |
| BARTHEL INDEX (Med, IQR)       | 18 (16-20)                      | 20 (19-20)                       | <0.001  |
| LIFE SPACE ASSESSMENT (Med, IQR)| 40 (23-64)                      | 72 (49-84)                       | <0.001  |

Statistically significant different categories, Bonferroni-corrected p < 0.05
INJURED OLDER ADULTS ONE YEAR AFTER INJURY

One Year Outcomes: ALL Patients

- 3 out of 10 Returned to where they were before injury
- 5 out of 10 Worse than before injury
- 2 out of 10 Died

One Year Outcomes: Non-frail Patients

- 6.5 out of 10 Returned to where they were before injury
- 3 out of 10 Worse than before injury
- 0.5 out of 10 Died
INJURED OLDER ADULTS ONE YEAR AFTER INJURY

One Year Outcomes: Pre-frail Patients

4 out of 10
Returned to where they were before injury

5 out of 10
Worse than before injury

1 out of 10
Died
One Year Outcomes: Frail Patients

- 2 out of 10 returned to where they were before injury.
- 4 out of 10 worse than before injury.
- 4 out of 10 died.

Geriatric Trauma: Frailty and Implications for Palliative Care
PROBLEMATIC INTEGRATION THEORY

FUTURE EVENT

Probability & Valuation

GOOD

INTEGRATION

BAD

DILEMMA

MANIFESTATIONS
- Divergence
- Ambiguity
- Ambivalence
- Impossibility

FFC
Frailty-Focused Communication Intervention
Reframing
Adaptation
Readiness
Acceptance

INTEGRATION

Insert Photo/Illustration credits here
GERIATRIC PALLIATIVE CARE
A Need for New Strategies
THE PALLIATIVE CARE CONTINUUM

Palliative Care and End of Life Care – The Continuum

Continuum of Palliative Care

Diagnosis

Screening

Active
disease
directed
treatment

Minimal
disease
directed
treatment

No
disease
directed
treatment

Death

Bereavement

Palliative Care

Curative Care

EOLC

Course of illness

Insert Photo/Illustration credits here
THE PALLIATIVE CARE CONTINUUM

The continuum of palliative care

Therapies to modify disease (curative, restorative intent)

Life Closure

Actively Dying

Diagnosis

6m

Death

Therapies to relieve suffering, improve quality of life

Bereavement Care
Development of a Frailty Communication Aid for Older Adults

► Interviews with Older Adults and Family Caregiver
  — Determine readiness for prognostic information related to frailty
  — Identify themes related to delivery of prognostic information

► Group Meetings with Community-Dwelling Older Adults
  — Design elements of the FCA
  — Determine extent of understanding and interest regarding the FCA
  — Assess interest in delivery via health coaching approach
Frailty Communication Aid

► Booklet
  Aging and Injury (Prognostication data)
  Understanding FRAILTY
  Decisions to think about
  - Eight Key Areas
  - Incorporation of Anticipatory Care (Palliative Care)

► Video vignettes

► Health coaching (trained coaches)

► Follow-up phone calls
Making a Plan & Anticipatory Care

Decisions and actions to think about as we age
A Closer Look Towards the End

- Loss of abilities
- Dealing with emotions
A Closer Look & What to Expect

<table>
<thead>
<tr>
<th>COPING – STRUGGLING – FEELING OVERWHELMED</th>
<th>NEED FOR SYMPTOM MANAGEMENT</th>
</tr>
</thead>
<tbody>
<tr>
<td>“but I can’t do anything like the cooking I used to do and the baking, no I can’t. So, so much of my life’s changed.”</td>
<td>• Anorexia (65.4)</td>
</tr>
<tr>
<td>“Well, if it wasn’t for reading I don’t know what I would do – and television but I’m not all that interested I mean, I like things like tennis on the television.”</td>
<td>• Severe fatigue (63.7)</td>
</tr>
<tr>
<td>“She’s waiting for the next stage all the time when things are going to get better. I think she’s harping back to the past when she was much more able to manage.” (caregiver)</td>
<td>• Pain (60.8)</td>
</tr>
<tr>
<td>“No I don’t see many friends nowadays. I used to go regular to church, I used to travel all over but I don’t see anybody now.”</td>
<td>• Depression (57.0)</td>
</tr>
<tr>
<td>Lloyd, Kendall, Starr et al. (2016). BMC Geriatrics, 16(1)</td>
<td>• Dyspnea (54.8)</td>
</tr>
<tr>
<td></td>
<td>• Periodic Confusion (53.9)</td>
</tr>
<tr>
<td></td>
<td>• Incontinence (48.1)</td>
</tr>
</tbody>
</table>
Safety

► Home safety
► Driving safety
► Fall prevention

► Security and protection
Physical Activity & Movement

- Time spent sitting, standing and moving
- Reduced risk of chronic diseases (diabetes, heart disease, high blood pressure)
- 1 hour exercise = 2 hours in life expectancy
- 150 minutes/week of moderate activity
- 75 minutes/week of vigorous activity

New hobbies and activities
Relationships and Community

► Social connections and mortality
► Investment in relationships
► Autonomy and connection

► Maintaining a sense of self

Photo: Getty Images
Food and Nutrition

- Drinking water
- Add color to your plate
- Focus on fiber
- Mediterranean diet
- Protein

► Loss of appetite and interest in eating

Photo: Getty Images
Sleep and Rest

► How much is enough?
► Waking calm
► Benefits of sleep (thinking, immune system, memory, weight control)
► Ways to enhance sleep

Frailty:
Why am I sleeping so much?
Healthcare Decisions

► Early vs. late planning
► Goals of care
► Caring relationships
► Advance care planning

► Addressing FEAR
► My healthcare needs (pain, constipation, comfort)

Photo: Getty Images
Finances and Aging

► **Legal**: Estate planning, documents, wills, POA

► **Health care**: Insurance, assets

► **Income & Expenses**: Debt

► **Financial Records**: Accounts

► All aspects addressed and settled
Holistic Health

The Mind and Body

► Daily Balance: How do I spend time?
► Compassion for Self: Physical and emotional
► Mindfulness: Meditation & Prayer

► Legacy: Sharing Memories, Stories, Values
► Sense of Peace and Well-being
WHAT’S IMPORTANT TO YOU?
Meet Harold

▶ Video clip
Meet Sara

▶ Video clip
We have to somehow explain this better to a public who may not be ready for the message and don’t readily want to discuss dying or frailty— or the complaints will grow more quickly than the population ages.”

David Oliver - Consultant in Geriatrics and Acute General Medicine
President- British Geriatric Society
September 5, 2017