Long term impact of surgery on the elderly

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Rising number of elderly in Australia and NZ

The “Silver Tsunami”

According to Forbes by 2020 the number of older people will outnumber children under 5 years

Rising demand for surgery
OECD Data: Elderly defined as ≥65 years

14% of Australasian population currently aged ≥65 years

https://data.oecd.org/pop/elderly-population.htm
Percentage of elderly rising over time

https://data.oecd.org/pop/elderly-population.htm
Surgery in Australia

2.4 million operations in Australia 2010/2011
1 million public episodes
1.4 million private episodes

Age distribution of Australian surgery

Surgery in Australian hospitals 2010-11
**Surgery in NZ**

**Ministry of Health Data**

326,000 surgical discharges July 2015-Jun 2016

**POMRC data**

240,000 procedures requiring a GA annually

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**Table 7: Hospital Admissions with One or More General Anaesthetics by Admission Type, New Zealand 2009–2013**

<table>
<thead>
<tr>
<th>ADMISSION TYPE</th>
<th>Total Admission Events 2009–2013</th>
<th>Annual Average</th>
<th>Admissions (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>One or More General Anaesthetics</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Acute</td>
<td>293,750</td>
<td>58,750</td>
<td>24.2</td>
</tr>
<tr>
<td>Arranged in Public</td>
<td>98,520</td>
<td>17,704</td>
<td>7.3</td>
</tr>
<tr>
<td>Elective/Waiting List</td>
<td>829,089</td>
<td>165,818</td>
<td>68.4</td>
</tr>
<tr>
<td>Total Admissions</td>
<td>1,211,359</td>
<td>242,272</td>
<td>100.0</td>
</tr>
</tbody>
</table>

*Data source: NHDS: Hospital admissions with one or more general anaesthetics listed in the first 90 procedures.*
Hospital admissions requiring a GA in NZ

Figure 3: Hospital Admissions with One or More General Anaesthetics by Age and Admission Type, New Zealand 2009–2013

Numeration: NADS: Hospital admissions with one or more general anaesthetics listed in any of the first 90 procedures.
Denominator: Statistics New Zealand: Estimated Resident Population (projected from 2009)

POMRC 5th Annual Report June 2016
Effects of surgery in the elderly

Surgery can have a significant impact on the older person.

Mortality/survival trajectories

The mortality “hangover effect”
Impact of complications

Functional recovery

Impact of frailty

The rising need in the elderly population has impacts for both the person and for society at large
Mortality after surgery

Most perioperative studies have a very short time frame of follow-up
  Inpatient mortality
  30 day mortality

Often do not look specifically at the elderly

Evidence has emerged that the mortality impact of surgery can persist months-years.

Landmark Study: Khuri et al 2005
105, 951 patients undergoing 8 types of operations

- Non-ruptured AAA
- Intra-inguinal vascular reconstruction
- Carotid Endarterectomy
- Colectomy
- Open cholecystectomy
- Laparoscopic cholecystectomy
- Lobectomy/pneumonectomy
- THJR

Calculated 30 day, 1 and 3 year mortality with and without complications
Surgery “hangover effect”

Risk factors for long term mortality:
Age, ASA, Smoking, Diabetes, Albumin, Blood Urea Nitrogen (BUN) >40, COPD

OVERALL MORTALITY

EFFECT OF COMPLICATIONS

The “inflection point”

The survival curves showed a trend of early mortality with an inflection point where the mortality slowed. 

*Varied with operation*

What does this mean?

Surgery appears to have a prolonged effect on mortality

Worse with complications

What about specifically in the elderly?

Is there evidence of this effect in elderly cohorts?
Are all the elderly the same?

*Influence of frailty*
Older injured adults

The Optimum Follow-Up Period for Assessing Mortality Outcomes in Injured Older Adults

Ross J. Fleischman, MD, MCR,* Annette L. Adams, PhD, MPH,* Jerris R. Hedges, MD, MS, MMM,† O. John Ma, MD, * Richard J. Mullins, MD, † and Craig D. Newgard, MD, MPH*


Retrospective Medicare claims analysis across Washington and Oregon (171 facilities)

Patients >67 years of age admitted for injury

32,135 patients

Median age 82 (IQR 77 -88)

83.3% orthopaedic injuries including hip fractures (36.5%)

Mortality at 30, 60, 90, 180, 365 days
Increasing mortality in
  Co-morbid patients
  Nursing home residents
  Seriously injured

Mortality rates stabilised at 6 months post injury.

Figure 1. Kaplan-Meier curves for postinjury survival in hospitalized Medicare patients (N = 32,135). *Seriously injured subgroup, defined according to an International Classification of Diseases, Ninth Revision–based Injury Severity Score (ICISS) of 0.9 or less (n = 1,607). †High comorbidity subgroup, defined according to a Charlson comorbidity score of 3 or greater (n = 4,414). ‡Skilled nursing facility (SNF) residents before injury (n = 1,421). §Hip fracture (n = 11,738).
Returning to premorbid function

Usually reported as patient reported outcome measures (PROMS)

Some of the tests used
    ADLs (Katz and other measures)
    SF-12
    SF-36
    EQ-5D
    WHODAS 2.0
    Quality of Recovery (QoR) scores

Studies suggest it takes at least 3-6 months to return to premorbid function
    Has impact on social supports & older peoples health services
    Physical components lag behind mental components
QoL Tools: EQ5D

5 dimensions ranked on a 3 point scale as well as a 100 point VAS scale where participants can rank their health from 0-100

- Mobility
- Self-care
- Usual activities
- Pain/discomfort
- Anxiety/depression
QoL Tools: SF12 & SF36

8 domains of health

- Physical functioning
- Role-physical
- Bodily pain
- General health
- Vitality
- Social functioning
- Role-emotional
- Mental health

Get 8 scaled scores which are a sum of the weighted questions in the domain 0-100 scale with the lower the score the better (0 = no disability)
Qol Tools: WHODAS

48 questions based on 6 Domains of Function:

- Cognition – understanding & communicating
- Mobility – moving & getting around
- Self-care – hygiene, dressing, eating & staying alone
- Getting along – interacting with other people
- Life activities – domestic responsibilities, leisure, work & school
- Participation – joining in community activities

5 point Likert scale. 0-4.

- 0 = no difficulty
- 4 = extreme difficulty or can not do

The total from 0-48 is divided by 48 and x by 100 to convert to a percentage of the maximum disability score.
Japanese multicentre study. 223 patients >75yr

92.1% 1 year survival
28.3% suffered postoperative complications
24% had ADL decline at 1 month
3% had ADL decline at 6 months

Quality of life as measured by EQ-5D recovered by 3-6 months
372 patients >60 years of age under going major abdominal surgery in San Antonio, Texas

Measured
  ADL (modified Katz)
  IADL (modified Lawton and Brody scale)
  SF-36
  Geriatric Depression Scale
  MMSE

Performance based measures
  Timed up and go test
  Functional reach
  Hand grip strength
Fail to return to baseline

6-12 months to recover to baseline

Figure 2. Functional recovery after major abdominal operation. Recovery is shown as mean individual change from preoperative baseline and 95% CIs, with worsened function below a zero line representing preoperative status; a score of −1 indicates a one-point worsening relative to the preoperative baseline. An additional "shadow" Y-axis is shown for orientation to mean summary or total scores. Asterisks indicate statistically significant differences from preoperative baseline, adjusted for multiple comparisons. MMSE, Mini-Mental State Exam; SF36, Medical Outcomes Study Short Form-36.

All surgery is not the same

Life preserving surgery
To prolong a patient's life e.g.
- Abdominal aortic aneurysm repairs
- Cancer

Quality of life surgery
Improving symptoms; pain, mobility e.g.
- Joint replacements
- Spine surgery
The surgery matters

Study comparing QoL via SF-36 for THJR, thoracic surgery for NSCLC, AAA

**Health-Related Quality of Life After Elective Surgery**

Measurement of Longitudinal Changes

Carol M. Mangione, MD, MSPH, Lee Goldman, MD, MPH, E. John Orav, PhD, Edward R. Marcantonio, MD, Alex Pedan, MS, Lynn E. Ludwig, RNC, ANP, Magruder C. Donaldson, MD, David J. Sugarbaker, MD, Robert Poss, MD, Thomas H. Lee, MD, MSc

Showed changes in both physical and mental components of SF-36

THJR exhibited early improvement in pain

All returned to baseline within 6-12 months

Evidence of improved QoL in lumbar spine surgery

Lumbar Surgery in the Elderly Provides Significant Health Benefit in the US Health Care System: Patient-Reported Outcomes in 4370 Patients From the N²QOD Registry

Compared elderly (>70 year) and non elderly in a National US Neurosurgery Outcomes Database.

4730 total patients
1030 (23%) elderly

Improvement in PROMs at 1 year

FIGURE 2. Significant and equivalent improvements in pain, disability, and quality of life at 1 year were reported by both elderly and nonelderly patients undergoing lumbar surgery for all included diagnosis types. Preoperative (Baseline) back pain visual analog scale (VAS), leg pain VAS, Oswestry Disability Index (ODI), and quality-adjusted life year (EQ-5D) were similar between elderly and nonelderly cohorts.

Frailty: Is age but a number?

All elderly patients are not the same

Frailty is a significant risk factor for surgery

Frail patients undergoing surgery have

- Increased postoperative complications
- Increased mortality
- Increased institutionalisation rate
## Increased risks of frailty in surgical settings

<table>
<thead>
<tr>
<th>Study</th>
<th>Surgical group</th>
<th>Patients</th>
<th>Frailty test</th>
<th>Risk of frailty</th>
</tr>
</thead>
</table>
| Afilalo et al 2010     | Cardiac ≥70 yr CABG and/or valve     | 131      | 5m gait speed  
Slow ≥6 seconds                                      | Mortality or morbidity  
**OR 3.05 (1.23-7.54)** |
| Afilalo et al 2012     | Cardiac ≥70yr CABG and/or valve      | 152      | Multiple  
Slow gait speed most predictive                       | Mortality and morbidity  
**OR 2.63 (1.17-5.90)**  
Discharge to health care facility  
**OR 3.19 (1.40-8.41)** |
| Dasgupta et al 2009    | Mixed ≥70 yr 82% orthopaedic         | 125      | Edmonton Frail scale  
(EFS >7 = frail)                                    | Complications  
**OR 5.02 (1.55-16.25)**  
Discharge to health care facility  **60%** |
| Makary et al 2010      | Mixed ≥65 yr                         | 594      | Hopkins Frailty Score                             | Complications  
**OR 2.54 (1.12-5.77)**  
Discharge to skilled/assisted care  
**OR 20.48 (5.54-75.68)** |
| Revenig et al 2013     | Major intra-abdominal ≥18yr          | 189      | Hopkins Frailty Score                             | Complications intermediate frail or frail  
**OR 2.07 (1.05-4.08)** |
| Robinson et al 2009    | Mixed major surgery ≥65yr requiring  | 110 (95% | Multiple markers of comorbidity and functional     | 6 month mortality  
Falls ≥1  **OR 5.1 (1.7-22.4)**  
ADLs <6  **OR 13.9 (3.0-65.5)** |
| Robinson et al 2013    | Colorectal or Cardiac ≥65 yr         | 201 (98% | 7 frailty traits                                   | Complications  
**OR 13.4 (2.6-69.8) colorectal**  
**OR 6.7 (3.6-17.5) cardiac** |
| Sundermann et al 2011  | Cardiac ≥74 yr                       | 213      | Composite frailty score                           | 1 yr mortality  **OR 1.097 (1.038-1.360)** |
272 colorectal and cardiac surgical patients aged ≥65 years of age stratified by performance in Timed Up and Go Test
The picture so far

We have an aging population which will increasingly need/want surgery.

The mortality impact of surgery persists for months-years.

Function
- At least 6 months to recover from major surgery
- Evidence of improved PROMs after “quality of life surgery”

All older people are not the same
- Frailty is a significant risk factor
Where to from here?

As a perioperative group we need to explore models of working together
  Anaesthetists
  Surgeons
  Geriatricians

Key issues to address
  Long term outcomes in the elderly
  Functional recovery
  Social and economic impacts
  Frailty
  Stratification of patients
  Best tests in the perioperative population
  Role of geriatric input in surgical process outside of orthopaedics
  Developing integrated process models of patient preparation for surgery
Do not go gentle into that good night
Old age should burn and rage at the close of day
Rage, rage against the dying of the light

Excerpt from the poem

Do not go gentle into that good night
by Dylan Thomas