A Physician led high risk pre-operative assessment clinic

Katy Gibb

*Patients should have rest, food, fresh air and exercise-the quadrangle of health*
*Sir William Osler 1909*
Outline

• Why me?
• Rationale
• Personal experience
• What domains to consider
• Business case
Audience poll 1: Assumption: you are here because you work in a high risk clinic or want to set one up

• What is your specialty
  – Physician
  – Anaesthetic
  – Surgical
  – Nursing
  – Allied health
Evolution
‘Tell me I forget, show me I remember, involve me I understand’

Evolution

Belief is optional
Participation is not
Communication, palliative surgery and frailty: complex decision making
The clinical story

• 86 year old woman
• Terminal cancer: estimated life expectancy three to six months
• Severe pain from hip osteoarthritis leading to painful, limited mobility, narcotic use for analgesia and facing institutionalisation
Audience poll: 2

• To operate or not: that is the question
• Three options
  – Operate
  – Don’t operate
  – Would not normally make this decision
More complexity
Vote now

• Proceed
• Don’t proceed
• Would not normally make this decision
More complexity

- Madelyn Dunham: grandmother of Barack Obama
- Had hip replacement surgery two weeks before her death
- Was this the right decision?
- NO GOOD PATH FORWARD
Teamwork: an imperative in complex decision making
Referral pathway

• Surgical referral from OPD
• Ad hoc
• Pre-anaesthetic referrals
Briefly

• Yeah but
• No but
• Yeah but no but
Does the clinic make a difference?
Methodology

• Calculate weighted means for clinic & control patients, such that difference between them is the ‘average treatment effect on the treated’ (ATT).
• This is because we are interested in the effect of the clinic generalised only to patients like those who are typically referred to the clinic.
• Weights constructed from propensity scores, which incorporate information from about 25 covariates. Propensity score is the probability that a patient is assigned to the clinic rather than the control group, given the covariates.
• Propensity scores calculated using Generalised Boosted Modeling, using combinations of regression trees.
No clear difference between clinic and controls
Higher mortality and LOS in referred patients

Unable to measure frailty
Did not measure end of life conversations
Subgroup analysis suggested some benefit in malignancy
Standard consult

• Holistic assessment
• Organ based
• Functional assessment
• Lifestyle modification
• Nutrition
  – WHAT WORRIES YOU??
Options for surgery consult

• Surgery vs
  – Smaller surgery
  – Chemotherapy
  – Radiotherapy
  – Palliation

Endometrial cancer
  – Mirena insertion
  – TAH+BSO
  – Radiotherapy
    » With or without brachytherapy
Geriatric consult

- Dementia
- Delirium
- Frailty
- Need for community geriatric services
End of life counselling

• Surgery for palliation
  – Advance care directives
  – Time limited trials of care
  – Setting expectations
Infrastructure

- 3 rooms
- Co-located with anaesthesia ....
- 1 corridor
- 1 spirometer
- 1 hand dynanometer
- 1 sphygmomanometer
- 1 oxygen saturation probe
- 2 nurses
- 1 registrar
Nursing assessment

• Biometric data including spirometry
• Functional testing
  – Exercise
  – Nutrition
  – Epworth
  – Minimental
• Social situation
• Medications
Physician assessment

• Social background
• Past history
• Medications
• Function
  – How far and why stops
• Shortness of breath
  – Cardiac vs respiratory vs deconditioning
• Chest pain
  – Ischaemic vs non-ischaemic
Function: audience poll 3

• Options for Assessment
• What is readily available to you?
  – CPET
  – Clinic testing (6 minute walk/ TUG/ hand dynanometry)
  – None of the above
Why test function?

• How does risk prediction help??
• What does it change??
• Is risk ‘static’ or can it be improved??
  – Skill set of physicians in optimising protoplasm
Why test function?

• Determine why function is limited to allow targeted investigation and optimisation

• Determine need for prehabilitation
  – ‘mandate’ to proceed
    • Not always an option

• Determine need for ICU/HDU
  – Would you proceed if no bed available?

• Consider if alternatives to proposed surgery
CPET

<table>
<thead>
<tr>
<th>Pros</th>
<th>Cons</th>
</tr>
</thead>
<tbody>
<tr>
<td>Reproducible</td>
<td>Resource intense</td>
</tr>
<tr>
<td>+ve predictive value for poor surgical outcomes</td>
<td>Not compared with field tests</td>
</tr>
<tr>
<td>Can help effective with ICU/HDU utilisation</td>
<td>Not compared with lesser level field testing</td>
</tr>
<tr>
<td>Can guide prehabilitation</td>
<td></td>
</tr>
</tbody>
</table>

Quark CPET

![Quark CPET equipment](image-url)
<table>
<thead>
<tr>
<th>Name of test</th>
<th>Equipment needed with one assessor</th>
<th>Areas of use with evidence</th>
</tr>
</thead>
<tbody>
<tr>
<td>Self paced walk test</td>
<td>Stopwatch and measured distance</td>
<td>Lower limb strength</td>
</tr>
<tr>
<td>-usually less than 50 m</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Stair climb test</td>
<td>Stopwatch</td>
<td>Lower limb strength</td>
</tr>
<tr>
<td>-6-12 stairs and timing</td>
<td>Stairs</td>
<td></td>
</tr>
<tr>
<td>6 minute walk test</td>
<td>30m corridor stopwatch</td>
<td>Lower limb strength</td>
</tr>
<tr>
<td>Chair stand test</td>
<td>Chair stopwatch</td>
<td>Lower limb strength</td>
</tr>
<tr>
<td>Timed get up and go</td>
<td>Chair, 3m and stopwatch</td>
<td>Lower limb strength</td>
</tr>
<tr>
<td>Sock test</td>
<td>Sock, Bench</td>
<td>Lower limb strength</td>
</tr>
<tr>
<td>Lift and carry test</td>
<td>4.5 kg weight</td>
<td>Upper and lower limb strength</td>
</tr>
<tr>
<td></td>
<td>Shoulder height shelf</td>
<td></td>
</tr>
<tr>
<td></td>
<td>2.7 m to shelf and cone to circle in way back</td>
<td></td>
</tr>
<tr>
<td>Walkie Talkie test</td>
<td>Stopwatch</td>
<td>Cognitive dysfunction</td>
</tr>
</tbody>
</table>
How I test: objective and subjective

- Modified 6 minute walk test
  - Pre and post PR and O2
- Hand dynanometry
  - Age matched
- History
Frailty:

**Phenotype**
- unintentional weight loss
- exhaustion
- muscle weakness
- slowness while walking
- low levels of activity

**Measurement in clinic**
- MUST score
- 6 minute walk
- Grip strength
- History
Organ function

• Cardiac
  – History of chest pain on exertion
  – Orthopnoea/PND
  – ECG
  – Pulse rate pre and post exercise

• Pulmonary
  – Cough
  – Ankle oedema
  – Snoring and observed apnoea
  – Epworth
  – Spirometry
  – Oxygen pre and post exercise
Elizabeth B

- 55 year old woman
- Progression of endometrial cancer despite Mirena insertion
- Considered for TAH+BSO
- BMI 63
- AICD for DCM
- Diabetes
- OSA intolerant CPAP
- Walks 50-100m then SOB
Audience poll

- Stop
- Go
- Uncertain
Elizabeth B

- Proceeded to radiotherapy
- Had brachytherapy with anaesthesia after discussion
- Did not have hysterectomy
- Linked in with prehabilitation co-ordinator
Prehabilitation

- Senior nurse
- Sits in primary care setting
- Refers to allied health
- Monitors progress
- Reports to GPs
- Reports to POHR
Barbara: 70 year old lady

• MEDICALLY
  • Angina 3x week
  • Previous CVA
  • Morbid obesity
  • Poorly controlled diabetes
  • Previous BMS with EF 35% and residual disease in LAD 2 years ago
  • Creat .10

• SURGICALLY
  • Mandibular malignancy T2N0M0
  • Mandibulectomy, neck dissection
Assessment

• Developed angina 3 minutes into 6 minute walk test
• Examination showed displaced apex beat and mod+MR
• ECG
Gupta perioperative cardiac risk

- Risk MI or cardiac arrest
  - Age
  - Creatinine
  - ASA
  - Functional status
  - Procedure site

Gupta risk 0.62%
Audience poll

• Proceed with maximal medical therapy
• Delay surgery for functional cardiac testing
• Delay surgery for angiography
Assessment

- Proceeded to urgent coronary angiography
- BMS inserted into 95% LAD
- LV aneurysm with EF 30%
Decision making

- Did not have primary surgery because of need for dual antiplatelet therapy for 6 weeks
- Proceeded to primary chemoradiotherapy
- Had recurrence 3 years later with salvage surgery
- Died after 5 years.
Cardiac Management

• Plumbing/pumping/wiring/pacing
• Antiplatelets
• Anticoagulation
• Stent type
Coronary Revascularization Management

• **Class I:**
  1. Revascularization before noncardiac surgery is recommended in circumstances in which revascularization is indicated according to existing AHA guidelines
    • Unprotected Left Main Disease
    • 3 Vessel CAD with or without proximal LAD Disease
    • 2 Vessel Disease with Proximal LAD Disease
    • 1 Vessel Disease with Proximal LAD disease

• **Class III: No Benefit/Harm**
  1. It is not recommended that routine coronary revascularization be performed before noncardiac surgery to reduce perioperative cardiac events
Antiplatelet Management Perioperatively

Patient With Coronary Stent

- Stent implantation ≤4-6 wk
  - Yes: Elective surgery
  - No: Risk of surgical delay is greater than risk of DES thrombosis

Risk of surgical delay is greater than risk of DES thrombosis

- Yes: Proceed to surgery after 180 d (Class IIb)
- No: DES ≥30 d, but ≤365 d

DES ≥30 d, but ≤365 d

- Yes: Delay surgery until after optimal period (BMS: 30 d and DES: 365 d) (Class I)
- No: Continue DAPT unless risk of bleeding is greater than risk of stent thrombosis (Class I)

Does surgery demand discontinuation of P2Y₁₂ inhibitors?

- No: Continue current DAPT regimen
- Yes: Continue ASA and restart P2Y₁₂ ASAP (Class I)
Greatest in first 30 days
Elevated for 12 months

Although guidelines recommend delaying surgery until at least 6 months after treatment with a drug-eluting stent by percutaneous coronary intervention (DES-PCI), it is unknown whether associated risk is higher in these patients compared with those with ischemic heart disease (IHD). In this study, highest all-cause mortality risk was seen in DES-PCI-treated patients undergoing surgery within the first month after stent implantation; this finding was greater than mortality in matched patients without IHD. However, beyond the first month after stent implantation, DES-PCI-treated patients had the same mortality as matched patients without IHD.

Pulmonary: Assessment

• Assessment: in order of personal usefulness
  – BMI
  – Epworth
  – 6 min walk test desaturation
  – ABG
  – FEV1
Pulmonary: Interventions

• Pre-operative Intervention
  – Optimise bronchospasm
  – Sleep study for CPAP if time
    • Warn anaesthetic colleagues
  – Post op ICU bed mandated
  – Prehabilitation
    • Weight loss
    • Fitness
    • Smoking cessation
Have YOU iCOUGH™ today?
Prevent Post-operative Pneumonia!

Incentive spirometry: Use 5 times per hour

Coughing & deep breathing: Do 5 times per hour

Oral care: Do twice per day

Understand: Ask questions about prevention

Get moving: Ask your health care provider for suggestions about your activity level

Head of bed elevated: 30 degrees

Don’t give pneumonia a chance!
Geriatric syndromes

- Cognition
- Nutrition
- Frailty
- Balance
Karoly

- 83 year old man
- Critical cervical spinal stenosis with evidence of muscle wasting and weakness
- Living at home with wife with no supports
- No home safety equipment
- No obvious major cardiopulmonary or renal disease
Testing

• Walked 50 metres and stopped with ‘fatigue’
• MMSE 18
• Lost 10 kg in last 6 months
• Fallen only once...SO FAR
Audience poll: what to do

- Proceed: critical cervical spinal stenosis and will only get worse
- Delay for home safety assessment to make it safe for discharge then proceed
- Cancel: not a good candidate for surgery
Where to get guidance?
### NSQIP risk assessment

<table>
<thead>
<tr>
<th>Age Group</th>
<th>75-84 years</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sex</td>
<td>Male</td>
</tr>
<tr>
<td>Functional Status</td>
<td>Partially Dependent</td>
</tr>
<tr>
<td>Emergency Case</td>
<td>No</td>
</tr>
<tr>
<td>ASA Class</td>
<td>Mild systemic disease</td>
</tr>
<tr>
<td>Steroid use for chronic condition</td>
<td>No</td>
</tr>
<tr>
<td>Ascites within 30 days prior to surgery</td>
<td>No</td>
</tr>
<tr>
<td>Systemic Sepsis within 48 hours prior to surgery</td>
<td>None</td>
</tr>
<tr>
<td>Ventilator Dependent</td>
<td>No</td>
</tr>
<tr>
<td>Disseminated Cancer</td>
<td>No</td>
</tr>
<tr>
<td>Diabetes</td>
<td>No</td>
</tr>
<tr>
<td>Hypertension requiring medication</td>
<td>No</td>
</tr>
<tr>
<td>Congestive Heart Failure in 30 days prior to surgery</td>
<td>No</td>
</tr>
<tr>
<td>Dyspnea</td>
<td>No</td>
</tr>
<tr>
<td>Current Smoker within 1 Year</td>
<td>No</td>
</tr>
<tr>
<td>History of Severe COPD</td>
<td>No</td>
</tr>
<tr>
<td>Dialysis</td>
<td>No</td>
</tr>
<tr>
<td>Acute Renal Failure</td>
<td>No</td>
</tr>
<tr>
<td>BMI Calculation:</td>
<td></td>
</tr>
<tr>
<td>Height:</td>
<td>67 in / 170 cm</td>
</tr>
<tr>
<td>Weight:</td>
<td>189 lb / 85 kg</td>
</tr>
</tbody>
</table>
### NSQIP risks

#### Risk Factors: 75-84 years, Partially dependent functional status, Mild systemic disease, Over Weight

<table>
<thead>
<tr>
<th>Outcomes</th>
<th>Your Risk</th>
<th>Average Risk</th>
<th>Chance of Outcome</th>
</tr>
</thead>
<tbody>
<tr>
<td>Serious Complication</td>
<td>10%</td>
<td>20%</td>
<td>30%</td>
</tr>
<tr>
<td>Any Complication</td>
<td>40%</td>
<td>60%</td>
<td>80%</td>
</tr>
<tr>
<td>Pneumonia</td>
<td>70%</td>
<td>80%</td>
<td>100%</td>
</tr>
<tr>
<td>Cardiac Complication</td>
<td>0.2%</td>
<td>0.1%</td>
<td>Above Average</td>
</tr>
<tr>
<td>Surgical Site Infection</td>
<td>0.3%</td>
<td>0.4%</td>
<td>Below Average</td>
</tr>
<tr>
<td>Urinary Tract Infection</td>
<td>0.6%</td>
<td>0.4%</td>
<td>Above Average</td>
</tr>
<tr>
<td>Venous Thromboembolism</td>
<td>0.6%</td>
<td>0.3%</td>
<td>Above Average</td>
</tr>
<tr>
<td>Renal Failure</td>
<td>0.0%</td>
<td>0.1%</td>
<td>Below Average</td>
</tr>
<tr>
<td>Readmission</td>
<td>3.0%</td>
<td>2.5%</td>
<td>Above Average</td>
</tr>
<tr>
<td>Return to OR</td>
<td>1.2%</td>
<td>1.1%</td>
<td>Average</td>
</tr>
<tr>
<td>Death</td>
<td>0.3%</td>
<td>0.1%</td>
<td>Above Average</td>
</tr>
<tr>
<td>Discharge to Nursing or Rehab Facility</td>
<td>15.2%</td>
<td>2.3%</td>
<td>Above Average</td>
</tr>
</tbody>
</table>

*Note: Your Risk has been rounded to one decimal point.*
Use of NSQIP

• Clear
• Evidence based
• Visual
• Guide for collaborative decision making
• Not helpful in cognitive dysfunction
• Limited use in frailty
Delirium is killing our patients

- Accelerated cognitive decline
- Accelerated functional loss
- Increased risk of death
Outcomes with delirium

1 year survival rates after ICU admission Pisani MA Am J Respir Crit Care 2009
Acute brain failure
Outcome

• Community home safety review
• Second opinion from geriatrician
• Further review with neurosurgeons
• Benefit from surgery unlikely to outweigh risk of significant delirium and loss on independence
• Need for substitute decision maker and end of life decisions discussed with wife and daughter
ICU bundle of care to reduce morbidity and mortality

**Assess, prevent & manage pain**
- CPOT or BPS to assess pain, insure adequate pain control
- Use of regional anesthesia and nonopioid adjuncts
- Analgesia-based sedation techniques with fentanyl

**Both SAT & SBT**
- Daily linked SAT and SBT
- Multidisciplinary coordination of care
- Faster liberation from MV

**Choice of sedation**
- Targeted light sedation when sedation necessary
- Avoidance of benzodiazepines
- Dexmedetomidine if high delirium risk, cardiac surgery, MV weaning

**Delirium monitoring & management**
- Routine CAM-ICU or ICDSC assessments
- Nonpharmacologic intervention, including sleep hygiene
- Dexmedetomidine or antipsychotic if hyperactive symptoms

**Early mobility & exercise**
- Physical and occupational therapy assessment
- Coordinate activity with SAT or periods of no sedation
- Progress through range of motion, sitting, standing, walking, ADLs

**Family engagement & empowerment**
- Reorientation, provision of emotional and verbal support
- Cognitive stimulation, participation in mobilization
- Participation in multidisciplinary rounds
Communication

• Patient
• Surgeon
• Anaesthetist
• GENERAL PRACTITIONER
Talking about death

Where is thy sting?
Ratings of states of functional debility relative to death by patients in hospital with serious illnesses*, %

Compared with death

<table>
<thead>
<tr>
<th>Condition</th>
<th>WORSE</th>
<th>SIMILAR</th>
<th>LITTLE BETTER</th>
<th>SOMewhat BETTER</th>
<th>Much BETTER</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bowel and bladder incontinence</td>
<td>60</td>
<td>50</td>
<td>40</td>
<td>30</td>
<td>20</td>
</tr>
<tr>
<td>Rely on breathing machine to live</td>
<td>50</td>
<td>40</td>
<td>30</td>
<td>20</td>
<td>10</td>
</tr>
<tr>
<td>Cannot get out of bed</td>
<td>40</td>
<td>30</td>
<td>20</td>
<td>10</td>
<td>0</td>
</tr>
<tr>
<td>Confused all the time</td>
<td>30</td>
<td>20</td>
<td>10</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Need care all the time</td>
<td>20</td>
<td>10</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Rely on feeding tube to live</td>
<td>10</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Live in a nursing home</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>At home all day</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Moderate pain all the time</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>In a wheelchair</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
</tbody>
</table>

Source: JAMA Internal Medicine

*Survey conducted July 1st 2015 to March 7th 2016, Philadelphia, United States
Audience poll

• Will you change your practice?
  – Yes
  – No
Things I want to improve for 2018

• Better processes around de-escalation of narcotics before surgery
• Clearer pathways for SDM
BUSINESS CASE

• A high risk clinic may allow appropriate use of resources (ICU/HDU/theatre resources)
• A high risk clinic arranges appropriate, targeted investigations
• A high risk clinic arranges optimisation of organ based and geriatric domain concerns
• A high risk clinic can make for better informed consent (SDM)
Key abbreviated references

• Delirium
  – The ABCDEF Bundle in Critical Care Annachiara Marra, MD, PhD(a), E. Wesley Ely, MD, MPH(b), Pratik P. Pandharipande, MD, MSCI, FCCM(c), Mayur B. Patel, MD, MPH Crit Care Clin 33 (2017) 225–243
  – Delirium in Elderly Patients and the Risk of Postdischarge Mortality, Institutionalization, and Dementia A Meta-analysis Joost Witlox, MSc et al JAMA, July 28, 2010—Vol 304, No. 4
  – Cognitive Trajectories after Postoperative Delirium Szczynski, Jane S, PhD ; Marcantonio, Edward R, MD ; Quach, Lien, MPH, MS; Fong, Tamara G, MD, PhD; Gross, Alden, PhD, MPH N Engl J Med 2012;367:30-9

• Poor Performance on a Preoperative Cognitive Screening Test Predicts Postoperative Complications in Older Orthopedic Surgical Patients Deborah J. Culley, M.D., Devon Flaherty, M.D., M.P.H., Margaret C. Fahey, M.A., James L. Rudolph, M.D., Houman Javedan, M.D., Chuan-Chin Huang, Ph.D., John Wright, M.D., Angela M. Bader, M.D., M.P.H., Bradley T. Hyman, M.D., Ph.D., Deborah Blacker, M.D., Sc.D., Gregory Crosby, M.D. ANESTHESIOLOGY 2017; 127:765-74
Exercise and risk

- Measures of Physical Performance Assessments Self-Paced Walk Test (SPWT), Stair Climb Test (SCT), Six-Minute Walk Test (6MWT), Chair Stand Test (CST), Timed Up & Go (TUG), Sock Test, Lift and Carry Test (LCT), and Car Task KIM BENNELL, FIONA DOBSON, AND RANA HINMAN *Arthritis Care & Research* Vol. 63, No. S11, November 2011, pp S350–S370
End of life References


• States worse than death among Hospitalized patients with serious illnesses Rubin E. Beuhler A, Halpern S JAMA Int Med August 2016 E1-E2

• Quill T Holloway R Time limited trials near the end of life JAMA Oct 5,2011:306(13)1483-1484
Frailty and sarcopena references

- Stefan Buettner, BS, Doris Wagner, MD, Yuhree Kim, MD, MPH, Georgios A Margonis, MD, PhD, Martin A Makary, MD, MPH, Ana Wilson, DO, Kazunari Sasaki, MD, Neda Amini, MD, Faiz Gani, MBBS, Timothy M Pawlik, MD, MPH, PhD, FACS Inclusion of Sarcopenia Outperforms the Modified Frailty Index in Predicting 1-Year Mortality among 1,326 Patients Undergoing Gastrointestinal Surgery for a Malignant Indication J Am Coll Surg 2016;222:397e409
- Sarcopenia in older people Solomon Yu FRACP, MBBS,1,2 Kandiah Umapathysivam PhD3 and Renuka Visvanathan PhD, FANZSGM, FRACP, MBBS1,2 Int J Evid Based Healthc 2014; 12:227-24
- Sarcopenia Impacts on Short- and Long-term Results of Hepatectomy for Hepatocellular Carcinoma Thibault Voron, MD,∗† Lambros Tselikas, MD,∗‡ Daniel Pietrasz, MD,∗‡ Frederic Pigner, MD,∗‡ Alexis Laurent, MD, PhD,∗‡ Philippe Compagnon, MD, PhD,∗‡ Chady Salloum, MD,∗‡ Alain Luciani, MD, PhD,†‡§ and Daniel Azoulay, MD, PhD Ann Surg 2015;261:1173-1183
- Functional Compromise Reflected by Sarcopenia, Frailty, and Nutritional Depletion Predicts Adverse Postoperative Outcome After Colorectal Cancer Surgery Kostan W. Reisinger, MD,∗‡ Jeroen L. A. van Vugt, MD,∗‡ Juul J. W. Tegels, MD,∗‡ Claire Snijders,‡ Karel W. E. Hulsee, MD, PhD,‡ Anton G. M. Hoofwijk, MD, PhD,‡ Jan H. Stoot, MD, PhD,‡ Maarten F. Von Meyenfeldt, MD, PhD,* Geerard L. Beets, MD, PhD,*‡ Joep P. M. Derikx, MD, PhD,*‡ and Martijn Poeze, MD, PhD Ann Surg 2015;261:345–352
- Feasibility of using head and neck CT imaging to assess skeletal muscle mass in head and neck cancer patients Justin E. Swartz MD a,⇑, Ajit J. Pothen MD b, Inge Wegner MD a,c, Ernst J. Smid MD d, Karin M.A. Swart MSc a,c, Remco de Bree b, Loek P.H. Leenen MD, PhD e, Wilko Grolman MD, PhD Oral Oncology 62 (2016) 28–33
- Partridge JS, Harari D, Dhesi JK Frailty in the older surgical patient: a review Age Ageing 2012 Mar;41(2):142-7