**Supplementary Data**

**Table 1:** Prospective studies evaluating associations between frailty and outcomes after general surgery.

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| **Author and location** | **Study population** | **Frailty Measure Used** | **Association of Frailty with Surgical Outcome** |
| \*Robinson et al, 2009(1)  USA | 110 patients undergoing major elective colorectal or cardiac surgery.  Age group: >65 years; 95% men | Novel point-based risk score combining frailty (cognition, albumin, falls, haematocrit), disability (Katz score) and co-morbidity (Charlson index) | A frailty score of >4 points was associated with higher 6-month mortality.  Each component also strongly associated with discharge to institutional care. |
| \*Robinson et al., 2011(2)  USA | 223 patients undergoing major elective colorectal or cardiac surgery.  Age group: >65 years; 96% men | Novel point-based risk score combining frailty (cognition, albumin, falls, haematocrit, timed-up-and-go), disability (Katz score) and co-morbidity (Charlson index) | A frailty score of >3 points was associated with discharge to institutional care. |
| \*Robinson et al., 2013(3)  USA | 201 patients admitted for elective colorectal or cardiac surgery.  Age group: >65 years; 98% men | Novel point-based risk score combining frailty (cognition, albumin, falls, haematocrit, timed-up-and-go), disability (Katz score) and co-morbidity (Charlson index) | A frailty score of >4 points was associated with higher incidence of at least 1 post-operative complication. |
| \*Robinson et al., 2013(4)  USA | 272 patients admitted for elective colorectal and cardiac surgery.  Age group: >65 years; 98% men | Timed-up-and-go test (seconds): fast: <10s, intermediate: 11-14s & slow: >15s | Slower performance was associated with higher incidence of post-operative complications.  For colorectal surgery the timed-up-and-go was more able to predict post-operative complications than a standard surgical risk calculator. |
| Hewitt et al., 2014(5)  UK | 325 patients admitted to acute surgical units in 3 centres.  Age group: >65 years; 43% men | 7-point clinical frailty scale (Rockwood) | Frailty was associated with longer hospital length of stay and higher 30 and 90 day mortality.  Re-admission rates did not differ. |
| Revenig et al., 2013(6)  USA | 189 patients undergoing elective inpatient abdominal surgery  Age group: >18 years; 59.8% men | Fried-Hopkins Physical Frailty Phenotype | Frailty and pre-frailty was associated with higher incidence of post-operative complications.  The ASA grade was not associated with post-operative complications. |
| Kim et al., 2014(7)  Republic of Korea | 275 patients undergoing elective intermediate-high risk elective surgery  Age group: >65 years; 54.9% men | New multi-dimensional frailty score (MFS) based on:  comprehensive geriatric assessment  patient characteristics  laboratory values | The MFS was associated with higher mortality at 1 year, higher post-operative complications and institutionalisation on discharge.  The MFS was superior to the ASA grade in terms of predicting these outcomes. |
| Joseph et al, 2014(8)  USA | 250 patients admitted to a trauma unit as an emergency.  Age group: >65 years; 69.2% men | Canadian Study of Health & Aging Frailty Index (FI; 50 item) | A FI of >0.25 was associated with a higher odds of in-hospital complications and death/ institutionalisation. |
| Pol et al., 2011(9)  The Netherlands | 142 patients admitted for elective vascular surgery.  Age group: >18 years; 70% men | The Groningen Frailty Indicator (a 15 item questionnaire assessing mobility, vision, hearing, nutrition, co-morbidity, cognition and physical fitness) | A frailty score of > 4 points was associated with higher odds of post-operative delirium. |
| Dale et al., 2014(10)  USA | 76 patients referred for elective pancreaticoduodenectomy  Age group: >18 years; 55.3% men | Grip strength, slow walking speed, self-reported exhaustion, weight loss, Vulnerable Elders Survey-13 (a function based frailty screening tool), and the Short Physical Performance Battery (a series of objective tests of lower extremity function) | Only self-reported exhaustion was consistently associated with adverse outcome after surgery, longer hospital stay and intensive care unit admission.  The ASA grade was not associated with any of the outcomes considered. |
| Odonkor et al., 2013(11)  USA | 602 patients admitted for elective ambulatory surgery.  Age group: >18 years; 46% men | 20ft gait speed test (meters/second) | Gait speed was associated with the probability of being ready for discharge home within 90 minutes of surgery. Those with fast (>1.0m/s) gait speed also had a lower probability of unplanned admission following surgery.  No association with post-operative complications. |
| Lasithiotakis et al., 2012(12)  Crete | 57 patients admitted for elective laparoscopic cholecystectomy.  Age group: >65 years; 49.1% men | Comprehensive geriatric assessment  (frailty was defined as being ‘unfit’ in 1 or more domains of the assessment). | The probability of post-operative complication was higher in those who were frail vs non-frail (OR 6.0 95% CI 1.2, 30.4). Frail patients also had longer in-patient stay (OR 4.2, 95% CI 1.3, 13.5).  The ASA grade was not associated with either outcome measure. |
| Leung et al., 2011(13)  USA | 63 patients undergoing non-cardiac surgery with an anticipated length of stay >48 hours.  Age group: >65 years; 46% men | Fried physical frailty phenotype (but used as a continuous score: 0-5) | Higher frailty score was associated with higher odds of post-operative delirium |

ASA: American Society of Anaesthesiologists classification system; \*same study population

**References**

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**Search Strategy**

PubMed was last searched on 21st November 2014 using the following search strategy:

(((((frailty OR frail OR sarcopenia))) OR (((((walking speed OR gait speed)) OR ((grip strength OR hand strength OR chair rise\* OR chair stand OR postural control OR standing balance))))))) AND (surgery OR peri-operative)