Fitness for Surgery NEW Devon CCG's experience

Adam Carrick

adam.carrick@nhs.net

Fitness for Surgery

- Rationale
- Collaboration & supporting process
- Fitness for surgery criteria
 - Consensus on medical fitness & smoking cessation
 - Obesity, rationale
 - Obesity, emerging themes
- Successes & limitations

Rationale



Clinical consensus on surgical risk factors

Criteria	Threshold for intervention				
Haemoglobin level	<u>Untreated</u> anaemia:				
	• Hb < 130 g/L male				
	• Hb < 120 g/L female				
HbA1c	HbA1c > 69 mmol/mol				
• In known diabetics <u>and</u>					
• In those at risk of diabetes					
Pulse (ECG if pulse rate > 100 or	AF rate > 100				
irregular)					
Blood pressure	BP > 160/100 mmHg				
Auscultate for heart murmur	Un-investigated heart murmur				
Smoking status	***				
Weight	***				
Alcohol consumption	Alcohol excess				

Avoidable cancellations, a common theme for more than twenty years

Wildner et al (1991).

"The number of cancellations on medical grounds would be reduced by closer liaison with general practitioners."

Dufek et al (1993).

"...improvement of protocol for preoperative patient evaluation improving the timeliness response by physician."

Karnalker et al (2015).

"...major cause of cancellation...one or more comorbidity which gets diagnosed on admission or medical condition that is not revealed to the surgeon."

Categories	Cancellation reasons	No. (%)
	Abnormal blood investigations	2.1
Anaesthetist	Medical consultation needed	24.8
related issues	Medical condition not optimized	12.0
	Subtotal	38.9
Surgeon related	The patient needs further evaluation	2.8
issues	Surgery no longer needed	0.6
	Subtotal	3.4
	No ICU bed	0.6
	No blood for the patient	0.4
	No electricity in O.T.	0.4
Administrative issues	No water supply	0.6
	Inadequate linen	1.6
	Surgery running late	5.4
	Emergency operation inserted	21.0
	Subtotal	30.0
	The patient has an infection	0.4
	The family requested to postpone surgery	1.2
	The patient refused the surgery	2.0
Patient related	Relatives of patient not available	4.0
issues	The patient was not admitted	5.0
	Inadequate starvation	6.0
	Anticoagulants were not stopped before surgery	8.1
	Subtotal	27.7
	Total	494

Avoidable cancellations

89	Mean weekly clinic activity = 260 patients	5%							
prob	Morbidity identified by pre-assessment practitioners								
No.	Diagnosis	Surgery deferred?							
3	Anaemia	1/3							
3	Hypertension	3/3							
1	New AF	1/1							
3	Incomplete medical information 1/3								
2	Uncontrolled diabetes 1/2								
2	Warfarin bridging therapy	0/2							
1	Symptoms resolved	1/1							
7	Other medical (DVT, unstable angina, hyperthyroid, heart block, cardiomyopathy, heart failure, metastatic disease	5/7							
TOTAL		Total deferred							
22		13							

*SOURCE: Matt Grayling, Hayley Peters, RD&EFT, May 2010. Unpublished audit.

Cost of complications

Findings of the American National Surgical Quality Improvement Programme:

- On average, a single complication can increase costs by 50% compared to uncomplicated patients undergoing the same procedure.
- This increase can be up to 5 times in the most complicated patients.

Vonlanthen et al (2011). Hall et al (2009).

Experience of complications

- patients who suffered surgical complications had significantly worse postoperative psychosocial outcomes.
- adverse effects of complications endure for psychosocial outcomes at 12 months or more post surgery.
- Statistically significant lower physical and mental quality of life (p<0.001).
- Severe events and minor complications contribute to lower well-being.
 - "...this finding potentially implies that the severity of complications as judged by healthcare professionals does not always correspond with patients experience of complications.
- Complications from major surgery and from minor procedures are negatively correlated with post-op psychosocial outcomes.
 - "...there is a potential independence of the magnitude of initial surgery with the effect of complications on patient's well-being."

Pinto et al. (synthesis of 50 studies. 2016)

Opportunity for behaviour change

- 60% quit rate with pre-op counselling and support vs 6.6% 'usual care'.
- Pre-operative smokers are more likely to be in 'preparation to change' than smokers in the general population:
 - Men (26% vs 3%)
 - Females (19% vs 5%)

Furlong (systematic review 2005)

 "Preoperative smoking interventions are effective for changing smoking behaviour preoperatively."

Møller et al. (Cochrane Review 2005)

 Question: is the pre-op opportunity generalisable to other behaviour change?

Burden of disease attributable to 20 leading risk factors for both sexes in 2010, expressed as percentage of Disability Adjusted Life Years.



Factors contributing to premature death in England



Conditions contributing to life-expectancy gap, by area of Devon, 2013



Mortality rates from conditions considered amenable to healthcare by Index of Multiple Deprivation, Devon 2001-2013



Socioeconomic deprivation and health state before before operation: English Hospitals April, November 2010



Clinical consensus on improvements to pre-op fitness

Criteria	Threshold for intervention				
Haemoglobin level	<u>Untreated</u> anaemia:				
	• Hb < 130 g/L male				
	• Hb < 120 g/L female				
HbA1c	HbA1c > 69 mmol/mol				
• In known diabetics <u>and</u>					
• In those at risk of diabetes					
Pulse (ECG if pulse rate > 100 or	AF rate > 100				
irregular)					
Blood pressure	BP > 160/100 mmHg				
Auscultate for heart murmur	Un-investigated heart murmur				
Smoking status	8 weeks pre-op cessation. Max attempt				
	6 months.				
Weight	***				
Alcohol consumption	Alcohol excess				

Collaboration and process

- A consensus guideline, not a CCG policy.
- Devised by primary care, secondary care and public health.
- Reviewed and supported within the STP Clinical Cabinet (obesity decision deferred; see later).
- Undergoing sign-off within each constituent organisation:
 - NEW Devon CCG
 - South Devon & Torbay CCG
 - Northern Devon Healthcare Trust
 - Royal Devon & Exeter Foundation Trust
 - South Devon Healthcare Foundation Trust
 - Plymouth Hospitals Trust
- Engagement with clinical forums and the LMC.

Obesity: rationale



"Obesity paradox"



Mullen et al, 2009. 118,707 patients, non-bariatric general surgery.

See also, Dindo, 2003; Valentijn, 2013.

p < 0.05 for Odds ratio different than 1.0.

Metabolic Syndrome and surgical risk

(obesity, hypertension, hyperglycemia, dyslipidemia, prothrombiotic & inflammatory states),



Glance et al. 2010.

351,572 patients undergoing orthopaedic, vascular or general surgery.

Metabolic syndrome and surgical risk



Metabolic syndrome and surgical risk



Metabolic syndrom and surgical risk



Experience of delay

- Waiting had a statistically significant impact on health gain but with extremely small magnitude. 0.1% per additional week waited.
- Note that this concerned patients simply on a waiting list and not cohorts systematically engaged in a health improvement pathway.

(Nikolova et al. 2015. UK study on PROMS for hip, knee & hernia)

Experience of delay

- Validation of the 'disconfirmation model', ie that **satisfaction is a function of a perceived discrepancy from an initial expectation, for hip and knee patients**.
- For patients still waiting and post-op patients, there were greater odds of dissatisfaction where waiting times were not as expected, controlling for other variables.

Cohort	Odds Ratio of dissatisfaction with waiting time when expectation not met (95% C.I.)
Still waiting	5.77 (3.57 – 9.32)
Post-op	6.57 (4.21 – 10.26)

- Patients who thought they were treated unfairly had greater odds of being dissatisfied.
- Conclusion: "Measures to modify expectations and increase perceived fairness, such as informing patients of a realistic waiting time and communication during the waiting period, may increase satisfaction with waiting times."

(Conner-Spady et al. 2011.)

TKR & THR EQ-5D Patient Reported Outcomes: NEW Devon CCG

Post op improvements for patients who report severe pre-op Pain/discomfort.

Hips from 35.5% to 2.4%; Knees from 34.0% to 5.1%

Table 1: CCG of GP-Practice - NHS NORTHERN, EASTERN AND WESTERN DEVON CCG (99P)										
	Mobility		Self-care		Usual Activities		Pain/Discomfort		Anxiety/Depression	
	Pre-operative	Post-operative	Pre-operative	Post-operative	Pre-operative	Post-operative	Pre-operative	Post-operative	Pre-operative	Post-operative
Knee Replacement										
No problems	55 (6.2%)	498 (55.9%)	637 (71.5%)	730 (81.9%)	80 (9.0%)	425 (47.7%)	14 (1.6%)	353 (39.6%)	585 (65.7%)	700 (78.6%)
Some problems	834 (93.6%)	392 (44.0%)	253 (28.4%)	157 (17.6%)	690 (77.4%)	432 (48.5%)	574 (64.4%)	493 (55.3%)	275 (30.9%)	173 (19.4%)
Severe problems	2 (0.2%)	1 (0.1%)	1 (0.1%)	4 (0.4%)	121 (13.6%)	34 (3.8%)	303 (34.0%)	45 (5.1%)	31 (3.5%)	18 (2.0%)
Table 1: CCG of GP Pr	ractice - NHS NC	DRTHERN, EAST	ERN AND WEST	ERN DEVON CC	G (99P)					

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	Mobility		Self-care		Usual Activities		Pain/Discomfort		Anxiety/Depression	
	Pre-operative	Post-operative	Pre-operative	Post-operative	Pre-operative	Post-operative	Pre-operative	Post-operative	Pre-operative	Post-operative
Hip Replacement										
No problems	73 (6.7%)	671 (61.3%)	510 (46.6%)	879 (80.3%)	80 (7.3%)	612 (55.9%)	17 (1.6%)	633 (57.9%)	644 (58.9%)	914 (83.5%)
Some problems	1,019 (93.1%)	423 (38.7%)	580 (53.0%)	207 (18.9%)	811 (74.1%)	444 (40.6%)	689 (63.0%)	435 (39.8%)	400 (36.6%)	161 (14.7%)
Severe problems	2 (0.2%)	(0.0%)	4 (0.4%)	8 (0.7%)	203 (18.6%)	38 (3.5%)	388 (35.5%)	26 (2.4%)	50 (4.6%)	19 (1.7%)



PROMs special topic – EQ-5D[™] Index

April 2011 to March 2012 (published 8th May 2014)

TKR & THR EQ-5D Patient Reported Outcomes: South Devon & Torbay CCG

Post op improvements for patients who report severe pre-op Pain/discomfort. Hips from 30.3% to 4.6%; Hips from 28.1% to 5.6%

Table 1: CCG of GP Practice - NHS SOUTH DEVON AND TORBAY CCG (990)										
	Mot	oility	Self-care		Usual Activities		Pain/Discomfort		Anxiety/Depression	
	Pre-operative	Post-operative	Pre-operative	Post-operative	Pre-operative	Post-operative	Pre-operative	Post-operative	Pre-operative	Post-operative
Knoo Donlacomont										
No problems	19 (5 0%)	166 (54, 9%)	227 (74 204)	246 (90 4%)	29 (0 204)	142 (46 4%)	2 (1 0%)	106 (24 6%)	170 (59 5%)	220 (74 9%)
Some problems	287 (93.8%)	140 (45.8%)	79 (25.8%)	60 (10 6%)	244 (70 7%)	142 (40.4%)	217 (70.9%)	183 (59.8%)	117 (38.2%)	66 (21.6%)
Severe problems	1(0.3%)	(0.0%)	(0.0%)	(0.0%)	34 (11 1%)	11(36%)	86 (28 1%)	17 (5 6%)	10 (3 3%)	11 (3.6%)
Table 1: CCG of GP F	Practice - NHS S Mo	OUTH DEVON A bility	ND TORBAY CCC	G (99Q) -care	Usual 4	Activities	Pain/Dis	scomfort	Anxiety/D	epression
	Pre-operative	Post-operative	Pre-operative	Post-operative	Pre-operative	Post-operative	Pre-operative	Post-operative	Pre-operative	Post-operative
Hip Replacement										
No problems	38 (11.0%)	201 (58.1%)	164 (47.4%)	267 (77.2%)	15 (4.3%)	176 (50.9%)	8 (2.3%)	176 (50.9%)	190 (54.9%)	281 (81.2%)
Some problems	307 (88.7%)) 145 (41.9%)	178 (51.4%)	77 (22.3%)	267 (77.2%)) 166 (48.0%)	233 (67.3%)	154 (44.5%)	142 (41.0%)	60 (17.3%)
Severe problems	1 (0.3%)	(0.0%)	4 (1.2%)	2 (0.6%)	64 (18.5%)) 4 (1.2%)	105 (30.3%)	16 (4.6%)	14 (4.0%)	5 (1.4%)



PROMs special topic – EQ-5D[™] Index

April 2011 to March 2012 (published 8th May 2014)

Ahern et al. Extended standard duration weight-loss programme referrals for adults primary care (WRAP): a randomised controlled trail. *The Lancet*, 2017.



Ahern et al. Extended standard duration weight-loss programme referrals for adults primary care (WRAP): a randomised controlled trail. *The Lancet*, 2017.



Odds ratio of receiving hip or knee arthroplasty compared to most deprived population quintile, 15/16 – 16/17



BMI & smoking status of elective orthopaedic patients, 2014/15



Note UK prevalence of obesity (>30kg/m²) in general population was 25% in UK (up from 15% in 1993). Men and women with no qualifications, 30% and 33%. Men and women with qualifications, 20.5% and 18%.

Obesity, emerging themes

- Consider obesity in the context of metabolically unhealthy patients prior to surgery and link explicitly to those risks.
- Provide weight loss as part of treatment for metabolic syndrome.
- Ensure availability of weight loss interventions, and with a realistic weight loss target.
- Make health improvement interventions a positive offer on the treatment pathway leading to surgery. Integrate within or run in parallel to surgical assessment.

Referral to Treatment position

"...there are no pauses allowable within the RTT rules, not even for these sorts of cases. If treatment cannot proceed, for whatever reason, including the need for optimisation, then this is recorded as a clock stop when this decision is communicated to the patient (i.e. it isn't a stop unless the patient is made aware of the fact). You then have two further choices – the patient can be discharged back to the GP until such time as they are fit for treatment, or the secondary care clinician can keep them under review (i.e. active monitoring). It all depends on who its thought is best placed to monitor the patient's condition, and could vary from case to case, or specialty to specialty."

Nigel Coomber, Director of Elective Care Improvement, NHSI. 7 March 2017

Influence of BMI on functional improvements at 3 years following total knee replacement: a retrospective cohort study, *PLOS one*, 2013



Cost per Quality Adjusted Life Year

Knee replacement: average £2,101 per QALY.

Hip replacement: average £1,372 per QALY.

Jenkins et al. Predicting the cost-effectiveness of total hip and knee replacement: a health economic analysis. *Bone & Joint Journal* Jan, 95-B(1):115-21. Cited in British Orthopaedic Association, *BOA Response to atlas of variation*, 2015.

Kununtsor et al. Patient-related risk factors for periprosthetic joint infection after total joint arthroplasty: a systematic review and metaanalysis. *PLOS one*, 2016.



Fig 4. Body mass index comparisons and risk of periprosthetic joint infection. Cl, confidence interval (bars); RR, relative risk; †, are number of participants or arthroplasties.

Kununtsor et al. Patient-related risk factors for periprosthetic joint infection after total joint arthroplasty: a systematic review and metaanalysis. *PLOS one*, 2016.

Key findings:

"For BMI, consistently statistically significant positive associations were demonstrated for BMI comparisons that involved cut-offs of > 30kg/m² or higher."

"Our findings show that **multiple potential modifiable patientrelated factors** such as smoking, **BMI > 30 kg/m²**, diabetes, depression, steroid use, and frailty are significantly associated with long-term risk of PJI. **Identifying patients with these risk factors who are due to have arthroplasty surgery and providing interventions to modify these risk factors might form the basis of PJI prevention strategies**."

Chen et al. Risk factors for deep infection after total knee arthroplasty: a meta-analysis. *Archives of Orthopaedic & Trauma Surgery*, May 2013, 133(5).

- 12 cohort and case-control studies; n = 57,223
- Main factors associated with deep infection:

Risk Factors	Odds Ratio (95% C.I.)
$BMI > 30 kg/m^2$	2.53 (1.25, 5.13)
$BMI > 40 kg/m^2$	4.00 (1.23, 12.98)
Diabetes mellitus	3.72 (2.30, 6.01)
Hypertension	2.53 (1.07, 5.99)
Steroid therapy	2.04 (1.11, 3.74)
Rheumatoid arthritis	1.83 (1.42, 2.36)

"There is positive evidence for some certain factors which could be targeted for prevention of onset of infection."

Liu et al. The influence of obesity on primary total hip arthroplasty outcomes: a meta-analysis of prospective cohort studies. *Ortho & Trauma: Surgery & Research*, 2015, 101(13)

• Synthesis of 15 studies. n=11,271

Risks for obese versus non-obese patients	Risk Ratio (95% C.I.)
Higher complication rate	1.68 (1.23, 2.30; p=0.0004)
Risk of dislocation	2.08 (1.54, 2.81; p< 0.0001)
Deep infection	2.92 (0.74, 11.49; p=0.13)

- Additionally, found lower Harris Hip Score and increased operating time.
- Conclusion: Obesity negatively influences the overall complication rate, dislocation rate, functional outcome and operative time.

Busato et al. Influence of high BMI on functional outcome after total hip arthroplasty, *Obesity Surgery*, 2008, 18(5).

- Multicentre study. n=20,553
- Analysis categories of:
 - Normal weight (<25kg/m²)
 - Overweight (25kg/m² to 30kg/m²)
 - Obese (>30kg/m²)
- "High pre-operative BMI has almost a perfect dose-effect relationship with decreased ambulation during a follow-up period of 15 years, but pain relief is equally effective for all BMI groups."
- "Overweight and obesity are modifiable risk factors that may warrant physicians giving recommendations to patients before or after THA to improve post-operative functional outcome quality."

If risk reduction can be maintained, can we improve for the longer term...

- EPIC-Norfolk cohort study (Luben et al, 2016). 11,228 men and 13,786 women, 1993-1997. BMI >30kg/m² and smoking strongest and similar magnitude predictors of future hospital use. Each a strong risk factor for greater than 7 hospital admissions (OR 1.41; 95% CI 1.28, 1.54; p<001) and for high bed usage > 20 days (OR 1.54; 95% CI 1.41 to 1.68).
- Reeves et al (2014). 1,215,619 UK women and their 2,834,016 hospital admissions over 9 years. Increased risk of admission and rising LoS from BMI 25kg/m² upwards:
- Ibid. 19 of 25 categories of disease/procedure increase from normal to morbidly obese groups. Including diabetes admission (RR =11.62), knee replacment (RR=7.45), venous thromboembolism (RR=3.05), gall bladder disease (RR=2.39), carpal tunnel (RR=2.44), hip replacement (2.05).
- Ibid. 1 in 8 UK hospital admissions for women 50 to 84 attributable to overweight and obesity. Estimated trend in incidence ratio of 1.12 per 5kg/m².

If risk reduction can be maintained, can we improve for the longer term...

- Korda et al. (2015). 224,254 Australian adults and their 459,346 hospital admissions. 1 in 8 admissions and 1 in 6 bed days independently attributable to overweight (2%) and obesity (11%).
- Yan et al. (2006). 17,643 men and women followed up over 32 years. Adjusted for cardiovascular risk factors, patients who remain obese in middle age have a significantly higher risk of mortality from CHD, cardiovascular disease, diabetes in older age than those of normal weight.
- Lenz et al (2009). Systematic review. Association of morbidity and mortality with overweight and obesity. An increase in almost all diseases studied in the presence of obesity. 20% mortality increase, rising to up to 200% in morbid obesity.
- Syddall et al (2015). Demonstrates a risk profile for patients with 0 to 4 poor health behaviours (smoking, low activity, high weekly alcohol, poor diet). Higher odds of complex admissions (emergencies, readmissions, LoS > 7 days) with increasing number of poor health behaviours. Reduction to two poor health behaviours predicted to reduce emergency admissions by 18% in men and 21% in women.

Successes & limitations

Greater chance of clinical support

Greater chance of public acceptance

Greater chance of successful implementation.

More clinically meaningful than a pure BMI and smoking focus; more aligned to the evidence base.

So far lack a substantial patient perspective (....local and general election purdah!).

Consensus so far is built largely on 30 day mortality and morbidity; not yet formed a position on procedure specific outcomes.

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- 7. Furlong
- 8. Møller, A. & Villebro, N. Interventions for preoperative smoking cessation. Cochrane Tobacco Addiction Group, Cochrane Database of Systematic Reviews, 20 July 2005.

- 9. Appleby, Devlin & Parkin. *Using patient reported outcomes to improved healthcare*. Wiley & Sons, 2016.
- 10. Mullen et al. The obesity paradox: body mass index and outcomes in patients undergoing non-bariatric general surgery. *Annals of Surgery*, 2009; 250(1);166-172.
- 11. Dindo et al. Obesity in general elective surgery. *The Lancet*, 2003;361(9374).
- 12. Valentijn et al. The obesity paradox in the general population. *The Surgeon, Journal of the Royal Colleges of Surgeons of Edinburgh and Ireland*, 2013;11; 169-176.
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- 14. Nikolova et al. The impact of waiting times on health gains from surgery: evidence from a national patient-reported outcomes dataset. *Health Economics*, 2015; 2(8).
- 15. Conner-Spady et al. The importance of patient expectations as a determinant of satisfaction with waiting times for hip and knee replacement. *Health Policy*, 2011;101(3).
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- 17. Baker et al. Influence of BMI on functional improvements at 3 years following total knee replacement: a retrospective cohort study, *PLOS one*, 2013.
- 18. Kununtsor et al. Patient-related risk factors for periprosthetic joint infection after total joint arthroplasty: a systematic review and meta-analysis. *PLOS one*, 2016.

- 19. Appleby, Devlin & Parkin. *Using patient reported outcomes to improved healthcare*. Wiley & Sons, 2016.
- 20. Chen et al. Risk factors for deep infection after total knee arthroplasty: a metaanalysis. Archives of Orthopaedic & Trauma Surgery, May 2013, 133(5).
- 21. Liu et al. The influence of obesity on primary total hip arthroplasty outcomes: a meta-analysis of prospective cohort studies. *Ortho & Trauma: Surgery & Research*, 2015, 101(13).
- 22. Busato et al. Influence of high BMI on functional outcome after total hip arthroplasty, *Obesity Surgery*, 2008, 18(5).
- 23. Luben et al. Predicting admissions and time spent in hospital over a decade in a population-based records linkage study: the EPIC-Norfolk cohort. *BMJOpen*, 2016:6.
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