Fit for Surgery:

A study to explore the potential for a prehabilitation program for patients undergoing major surgery

A Patel, A Eddie, R Kennedy

Western Sussex Hospitals NHS Foundation Trust

Aim To determine if the need exists for a prehabilitation program at Western Sussex Hospitals Trust

Background

- Prehabilitation is the process of enhancing the functional capacity of an individual to enable them to withstand a stressful event [1] by means of[2]:
  - Medical optimisation
  - Improving cardiorespiratory fitness
  - Optimising nutritional status
  - Psychological support/expectation management/lifestyle changes
- Early data suggests a reduction in morbidity and length of stay and an improvement in quality of life[3]
- Hospital-run programmes demonstrate improved compliance thus

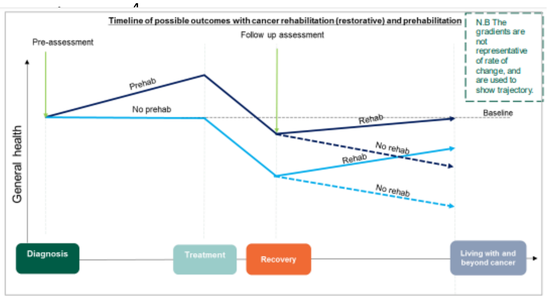

Figure 1: Existing models in oncology patients suggest an improved functional status post-intervention with prehabilitation compared to without[5]

Methods

- Review of 138 patients undergoing Cardiopulmonary Exercise Testing (CPET) at WSHT via a retrospective review of CPET reports and laboratory data

- Review of period between 08/01/2018-23/01/2020. Data collected:
  - Age
  - Height/weight/BMI
  - Hb/eGFR
  - Anaerobic threshold (AT)
  - Peak VO2 (pVO2)
  - VE/VCO2 at AT
- Relative risk of mortality stratification as determined by Wilson 2010[6]

VARIABLE	RELATIVE RISK OF NON-SURVIVAL (95 CI)
AT<10.9	6.8 (1.6-29.5)
VE/VCO2 > 34	4.6 (1.4-14.8)

Results

- 128 patients underwent CPET in the review period
- 10 patients (8%) underwent a second CPET testing in the same period

HEALTH INDICATORS:

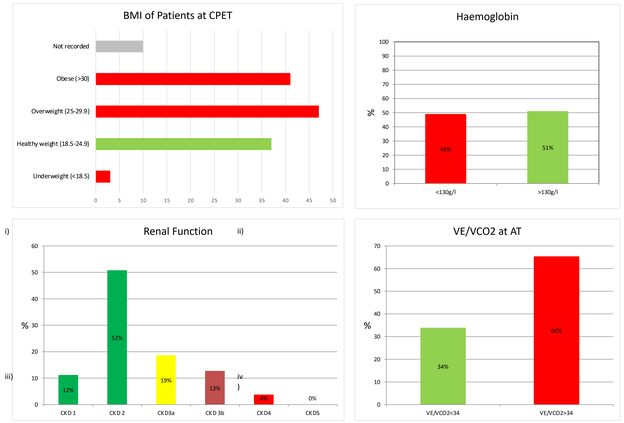

Figure 2:
i) 88/138 (64%) of patients are overweight/obese and 66% would benefit from nutritional optimisation [7]
ii) 67/138 (49%) of patients are anaemic (<130g/L)[8]
iii) approximately 40% of patients have moderate to severe CKD
iv) 66% of patients had a raised VE/VCO2 suggestive of increased dead space placing them in an intermediate or high risk group.

RISK STRATIFICATION AND MORTALITY PREDICTORS:

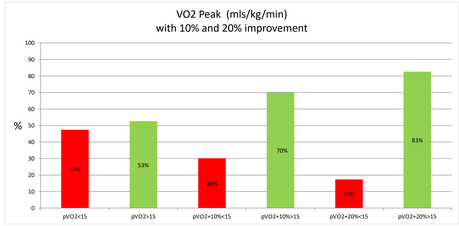

Figure 3: A VO2 Peak <15 suggests a higher relative risk of mortality with surgical intervention
- **our data demonstrates that a 10 % improvement in pVO2 would put 30% of the high risk patients into a low risk group**
- **a 20% improvement in pVO2 would put 60% of high risk patients into a low risk group.**

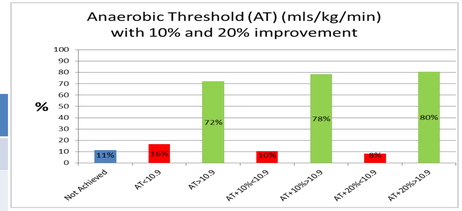

Figure 4: AT <10.9 suggests a higher relative risk of post-operative complications and mortality with surgical intervention .
- **A 20% improvement in AT would put 50% of high risk patients into a low risk group.**

Discussion

- Our data suggests that it is possible to significantly reduce the relative risk, morbidity and mortality in up to 60% of our patients by improving their VO2 Peak by 20%.
- A prescribed exercise programme has been demonstrated to achieve an improvement in pVO2/VO2max of 15-23%[9,10]
- Compliance is improved with hospital-based exercise programmes[4].
- Our data also highlights scope for medical and nutritional optimisation by means of investigating and treating anaemia, respiratory and renal disease and dietician input

RESOURCES REQUIRED:

- Exercise facility at WSHT where patients can follow a pre-set regime aiming to gradually improve their AT from a known baseline under supervision
- Dietician review and input
- Physician review and input for medical optimisation

RECOMMENDATIONS:

- A Prehabilitation Programme at WSHT for patients prior to major surgery involving a 6-8week in-hospital exercise scheme and optimisation from a multidisciplinary team.

Conclusions

The introduction of a prehabilitation program at WSHT has the potential to result in a significant improvement in the predicted outcomes of patients following major surgery- the time is NOW to translate this into real clinical differences in morbidity and length of stay.

References: [1] Jensen BT, et al. Efficacy of a multiprofessional rehabilitation programme in radical cystectomy pathways: A prospective randomized controlled trial. Scand J Urol. 2014; 49(2): 133-141. [2] Prehabilitation and Nutritional Support to Improve Perioperative Outcomes. Malcolm A. West, Paul E. Wischmeyer and Michael P. W. Grocott. Curr Anesthesiol Rep. 2017; 7(4): 340–349.[3]Le Roy B, Selvy M, Slim K. The concept of prehabilitation: What the surgeon needs to know? *J Vasc Surg* 2016; 153: 109–12. [4] Carli F, Charlebois P, Stein B et al. Randomized clinical trial of prehabilitation in colorectal surgery. *Br J Surg* 2010; 97: 1187–97. [5] E Bloom. Prehabilitation evidence and insight review. *Strategic insight*. 2017 ; 4-41. [6] Wilson RJT, Davies S, Yates D, Redman J, Stone M. Impaired functional capacity is associated with all-cause mortality after major elective intra-abdominal surgery. *Br J Anaes* 2010; 105(3), 297-303 [7]Obesity: preventing and managing the global epidemic. Report of a WHO consultation. World Health Organ Tech Rep Ser. 2000;894:i–xii. 1–253. [8] WHO, UNICEF, UNU. Iron deficiency anaemia: assessment, prevention and control, a guide for programme managers. Geneva, World Health Organization, 2001. [Online] http://www.who.int/nutrition/publications/micronutrients/anaemia_iron_deficiency/WHO_NHD_01.3/en/index.html [9]Anaerobic threshold alterations caused by endurance training in middle-aged men. Davis JA, Frank MH, Whipp BJ, Wasserman K. https://www.ncbi.nlm.nih.gov/pubmed/468620 [10]Exercise training in patients with chronic heart failure delays ventilatory anaerobic threshold and improves submaximal exercise performance. M J Sullivan, M B Higginbotham, and F R Cobb, Circulation.1989;79:324–329 https://www.ahajournals.org/doi/abs/10.1161/01.CIR.79.2.324111