University of BRISTOL

Elizabeth Blackwell Institute for Health Research

Research for Health Scheme

Stage 1 - Call for Challenges Application Form

- **This call is open to doctors, nurses and allied health professionals employed by the NHS.**
- **Please use this form to describe a specific issue or challenge which you are currently facing in your area of healthcare delivery.**
- **The deadline for submission is 25 Feb 2014. Please email this application form to Lisa.Wheatley@University Hospitals Bristol Trust stol.ac.uk**
- **If your challenge is selected, University of University Hospitals Bristol Trust stol researchers have the opportunity to bid for funds to help them develop a solution. They will work in partnership with you to make sure the new technology, device or innovation will really work for you, your colleagues and your patients.**

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Challenge Title (max 20 Words)
A multi-modal approach to prehabilitation in patients undergoing major surgery for cancer

Please describe the specific problem which needs addressing
Patient's pre-existing physical fitness has a significant impact on the outcome from major surgery for cancer i.e. poor pre-existing fitness is associated with a poor surgical and healthcare related quality of life outcomes. This included increased post-op morbidity, increased length of ITU and hospital length of stay and slower return to a normal quality of life up until 12 months after surgery independent of

nature of the surgery.

Whilst the contrary should hold true, there is a paucity of data studying the impact of prehabilitation/ improvement in levels of physical fitness, from the time of diagnosis to definitive treatment including major surgery.

Prehabilitation is a strategy to counter surgical stress, hasten physical recovery and reduce morbidity by pre-operative exercise training and physiological optimisation. Prehabilitation involves a period of exercise training during the waiting period for surgery. It can increase fitness and thus potentially impact post-operative recovery. Though prehabilitation has its enthusiasts in the cancer care continuum, various aspects of prehabilitation still need to be assessed and tested.

These include:

1. Assessing accurately and reliably pre-op fitness in patients undergoing major surgery with special emphasis on the elderly and those with multiple co-morbidities.

   There is a wealth of data on pre-operative fitness with respect to age, cardiac and respiratory status and laboratory parameters and its impact on major surgery especially in the emergency setting. However, information on the impact of physical fitness and measures taken to improve physical fitness before major cancer surgery is sparse.

   The literature is poor on how to best assess and modify physical fitness and quality of life measures especially in elderly and those with multiple co-morbidities diagnosed with cancer and undergoing major curative surgery.

   The current assessments aren't fit for purpose i.e. POSSUM score (developed of emergency surgery) or CPET (cardiopulmonary exercise testing, is time consuming and laborious, difficult to interpret and not universally available across the NHS), Frailty score (more suited for orthopaedic interventions).

2. Type of intervention:
   a. single or package of care

      The current interventions are usually based around an exercise regime i.e.to improve aerobic threshold or lung capacity (breathing exercises). The studies using these interventions are small and with variable results.

      There isn't any information on a whether a package of care would produce better outcomes for example a combination of dietary advice, smoking cessation, better control of blood sugar and an exercise programme.

   b. timeliness of the intervention with emphasis on the urgency of surgical intervention

      A large number of studies on pre-operative fitness or prehabilitation have involved patients undergoing major non-cancer surgery i.e. hip & knee replacements, elective vascular surgery where there is luxury of time wrt the exercise programmes. However, time is at a premium in patients diagnosed with cancer and undergoing curative surgery.

   c. how and where these interventions should be performed

      A majority of the studies on prehabilitation have involved University Hospitals Bristol Trust ng the patients back to hospital 5 days a week for 3-4 weeks, which is both very labour intense and costly.

3. Impact of prehabilitation on:

a. morbidity and mortality associated with major cancer surgery including length of stay on ITU, hospital, post-operative complication i.e. chest infections, acute coronary symptoms

Majority of the outcomes measured to assess the impact of prehabilitation are based on nuisance parameters i.e. improvement in specific muscle groups or improvement on VO2 max or oxygen consumption or are healthcare centre matrix i.e. complication rates, length of ITU and hospital stay.

Patient centred outcome i.e. healthcare related quality of life outcome at 3/6/12 months are poorly studied.

4. Appropriateness of these outcome measures

It isn't clear that the above measures are the best or the right measures in patients undergoing major curative surgery of cancer.

We would like to:

i) Develop a pragmatic method of assessing pre-operative fitness in surgical patients undergoing curative cancer surgery.

ii) Determine a package / set of multi--modal interventions prehabilitation programme.

iii) Assess the impact of these interventions on both short and long term, patient & healthcare centred, clinical and economic benefit of such a programme.

To do this, we would like to:

1. Perform a systematic review of the pre-operative parameters including physiological parameters, levels of physical fitness that affect outcomes in surgical patients undergoing curative cancer surgery (clinical and epidemiology teams).
2. Develop a package of interventions that would potentially favourably impact pre-operative physiological parameters including levels of physical fitness (clinical, nutrition and sports physiology teams).
3. Develop a novel methods using information technology to:
    a. educate and motivate patients and their next of kin about the proposed interventions i.e. secure social media platforms.
    b. monitor compliance with intervention using GPS enabled devices
    c. provide feedback about compliance i.e. using secure social media platforms, text messaging
4. Study the impact of these on outcomes in surgical patients undergoing curative cancer surgery.

How does this issue impact on you, your colleagues and your patients?

Impact of a multi-modal prehabilitation programme on users and providers of healthcare in the NHS:

A. Personally:
As practising consultant in Intensive Care Medicine and Pre-operative assessment, I see patients through the cancer care continuum, be it in an out-patient clinic, in the operating theatre or post-operatively on ITU.
I see the benefits of a good pre-operative physical and physiological fitness on surgical outcomes. Likewise, I also see the complications and poor short and long term due to poor

physical and physiological fitness.
I would like to scientifically assess the usefulness and benefits to a prehabilitation programme on patient outcome.

B. Colleagues:
The department of anaesthesia, at University Hospitals Bristol Trust, conducted an audit of 90 consecutive patients awaiting major surgery for cancer. This showed, patients who exercised to nationally recommended levels had lower pre-operative risk scores, and were more likely to achieve their length of stay prediction.
Surgical colleagues at University Hospitals Bristol Trust, have amongst the lowest morbidity and mortality for cancer surgery nationally. In, out their endeavour to improve pre-operative fitness and post-operative surgical outcomes, we are getting up two working parties looking at the practicality of setting up an exercise/ prehabilitation programme at University Hospitals Bristol Trust.

C. Patients:
25% and 60% of patients undergoing major surgery for cancer develop post-operative complications, which can lengthen hospital stay and in some cases cause death. This morbidity is more likely to occur in older individuals and those with poor pre-operative physical fitness. However, even patients without complications are subject to a 20-40% reduction in physiologic and functional capacity, and thereby have potential for a protracted period of functional impairment.
Surgical cure for cancer depends upon, resectibility of the tumour and operative fitness of a patient. Patients with a good pre-operative fitness level, are more likely to be offered a surgical intervention for higher stage cancer with as compared to those with poor physical fitness.

Healthcare provision:

University Hospitals University Hospitals Bristol Trust :

University Hospitals University Hospitals Bristol Trust is a tertiary referral centre, and performs up to 2000 major surgical cases for cancer annually. Optimising physical and physiological fitness through a well-designed prehabilitation programme would improve patient outcome, reduce hospital acquired complications and reduce length of hospital stay.

Societal:

There is an overall societal benefit, as improved pre-operative fitness could potentially improve both short and long term healthcare related quality of life outcome measures direct and indirect healthcare costs.

Can you estimate how many patients or staff are affected by this problem?
Can you describe any associated financial implications for the NHS or patients?
(Don't worry if you are not able to answer this question at this stage – it is not compulsory)