



VIEWS AND REVIEWS

Prehabilitation could save lives in a pandemic

Let's use best practice prehabilitation to improve patients' health before the upcoming "battle"

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Prehabilitation involves interventions aimed at improving patients' health before an anticipated upcoming physiologic stressor so that they are better able to withstand that stress. Prehabilitation emerged as a way to prepare soldiers for battle in the second world war. A study published in 1946 in *The BMJ*, entitled Prehabilitation, Rehabilitation, and Revocation in the Army, described an experiment in which "good food, lodging, hygiene, and recreation combined with controlled physical training and education" for a period of around two months was found to improve the health ratings of 85% of the 12 000 men who participated. The report stated that the participants' outlook on life also improved, and that these physical and psychological changes were "astonishingly easy" to accomplish. Modern day military training continues to use similar interventions.

Although the covid-19 pandemic is not a literal war, many people will have to "fight" a future infection, and what science has taught us since that study was published could be vital to helping affected patients to survive. Crucial to understanding why prehabilitation may be valuable during a pandemic is to recognise that strategies that might help slow the spread of disease and perhaps reduce its overall incidence—such as social distancing and sheltering in place—could have the unintentional effect of decreasing physical activity and contributing to cardiopulmonary deconditioning. In particular, the elderly, who are most vulnerable to pulmonary complications from coronavirus, may show a decrease in their baseline cardiac and pulmonary fitness that could increase morbidity and mortality.

Prehabilitation has not yet been evaluated in the setting of an infectious pandemic disease. There is currently a window of opportunity that exists, however, whereby physicians can recommend a best practice approach (based on the evidence from other diagnostic conditions) and advise patients and the public about how to maintain and optimise their baseline fitness and nutritional health in the midst of the covid-19 pandemic. Notably, these prehabilitation recommendations can be followed while also adhering to social distancing and sheltering in place; these are not mutually exclusive.

In presurgical protocols, prehabilitation involves a combination of exercise, nutrition, smoking cessation, and stress reduction. Regarding exercise, there is a large body of research showing that muscle wasting and cardiopulmonary deconditioning occur

rapidly during reduction in physical activity (such as bed rest). Thus, an important goal is to encourage people to maintain at least their baseline activity level.

Importantly, small changes in cardiopulmonary fitness may have a large impact on patients who are frail, including elderly patients with multiple comorbidities. As such, prehabilitation may have the greatest positive effect on those who are most vulnerable. A 2019 report in *Current Opinion in Anesthesiology* stated, "Identifying high risk patients at the earliest possible stage and increasing their physiological reserve prior to surgery is a promising approach that seems to result in remarkable improvements for older patients." All healthcare professionals should follow established exercise guidelines when giving advice about increasing activity levels. In older people or those who are frail, a cautious approach is warranted and exercise recommendations should be carefully tailored to ensure safety and efficacy.

Nutrition plays an essential, though often underappreciated, role in prehabilitation. Protein supplementation in prehabilitation has been studied, particularly in the context of increased exercise (in sports medicine, an increase in training and protein intake are routinely recommended together). Furthermore, there are many studies that show improved glycaemic control correlates with reduced postoperative infection rates in people with diabetes. Thus, glycaemic control has also been proposed as a key consideration in prehabilitation protocols. Finally, medical advice and education about smoking cessation and reducing stress can be useful, and benefits are easily appreciated in overall improvements in pulmonary capacity and function.

While the benefits of exercise and nutrition are readily appreciated and incorporated in generic prehabilitation protocols before surgery, their application during infectious pandemic disease are also relevant. Once someone becomes symptomatic or is diagnosed with coronavirus, however, then prehabilitation may no longer be appropriate. Since most people who develop pulmonary complications from coronavirus will survive, it is also worth while considering who will benefit from conventional rehabilitation interventions post-infection.

As telemedicine becomes widely adopted, prehabilitation interventions may be delivered using this technology. A recent study of patients who underwent total knee arthroplasty found

that a telemedicine prehabilitation intervention significantly decreased the length of hospital stay compared with the control group. In this study, the protocol included advice on exercise, nutrition, home safety, reducing medical risks, and pain management. Another recent report showed that at home prehabilitation is feasible. This small study (n=14) was published in the *American Journal of Physical Medicine and Rehabilitation* and found that most older, frail participants (median age 79 years) followed the exercises and prepared the recipes at home for around one month. Prehabilitation telemedicine strategies are even more applicable in settings where direct contact is undesirable. The combination of telemedicine with

prehabilitation may therefore prove to be symbiotic and beneficial in future medicine.

For people who remain at risk of coronavirus infection, now is a good time to consider prehabilitation. Knowledge is power, and there is no better time than a pandemic to empower our patients and the public with information that could decrease morbidity and mortality.

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