Working with cancer patients during prehabilitation, rehabilitation and with specific cancer treatment related side effects

PROFESSOR ANNA CAMPBELL MBE

Advances in cancer detection and treatment have resulted in a steady increase in the number of people surviving cancer in the UK. By 2040, more than five million people may be living with acute, chronic or late-appearing consequences of cancer and its treatments. There is a high prevalence of unmet rehabilitation needs in the cancer population, yet many of these side effects, e.g. pain, fatigue, limited range of movement, lymphoedema and peripheral neuropathy, can be effectively treated with physiotherapy. The development of skilled rehabilitation physiotherapists in private practice is essential for providing high-quality cancer rehabilitation.

LEARNING OUTCOMES
TO SUPPORT PHYSIO FIRST QAP

1 Highlight the rationale for physiotherapy-led cancer prehabilitation and rehabilitation.
2 Provide an overview of the evidence and guidelines of working with cancer patients.
3 Outline the opportunities for private physiotherapists.
4 Highlight guidelines, training appropriate courses and research articles.

Introduction

In Dominique Royle's excellent *In Touch* article on the evolving role of the musculoskeletal physiotherapist in the management and rehabilitation of patients living with cancer (Royle 2019), she provides the rationale for the wider physiotherapy workforce to upskill their knowledge on the screening, assessment and treatment of cancer related impairments through continuing professional development and professional discourse. Additional knowledge in the area of exercise oncology is particularly invaluable to physiotherapists working in non-cancer settings such as community rehabilitation, women's and men's health services, and private practitioners with general musculoskeletal (MSK) outpatients.

In the aftermath of the COVID-19 pandemic, NHS resources in cancer care have become considerably overstretched and more cancer patients are being referred or are turning to non-cancer specialist settings, including private physiotherapist practices, to help address their unmet needs / issues. Although physiotherapists already possess many skills required to help people with cancer, a recent publication stated that many physiotherapists lack the confidence and are apprehensive of treating a patient with a cancer (Kenyon *et al* 2020). This article aims to highlight where physiotherapy support is important along the cancer care pathway, provide current evidence and guidelines for preventing or alleviating relevant side effects of cancer treatment and look at specific opportunities for the private physiotherapist to develop their knowledge in cancer rehabilitation and work with clients with cancer.

Cancer incidence, treatments and survivorship

Half of the people born after 1960 will be diagnosed with cancer at some stage during their lifetime (Smittenaar *et al* 2016). Every year, there are more than 360,000 new cancer cases in the UK, which equates to nearly 1,000 every day (Cancer Research UK). On a positive note, novel and effective cancer detection techniques and targeted biological cancer treatments have resulted in cancer survival rates doubling in the last 40 years, and by 2040 it is expected that there will be 5.3 million people living with cancer (Maddams *et al* 2012). With so many people living longer, cancer can now be considered and managed in many cases as a chronic illness that may extend from early detection to the end of life, with diagnosis, treatment, rehabilitation, survivorship / palliative care all being potential stages of the trajectory. This places new demands on patients and families to manage their own care. In a cross-sectional study of the 10 most frequent cancer types, 63% of cancer patients needed at least one rehabilitation service (Holm *et al* 2012) and another study found that more than

60% of breast cancer survivors had one or more treatment related impairments over a six-year follow-up period, with the need for physiotherapy most frequently reported (43%) (Thorsen *et al* 2011). After breast cancer treatment, 30% of patients will have persistent pain (Wang *et al* 2018) and up to 50% will have joint dysfunction(Giacalone *et al* 2019).

For many cancer survivors, treatments such as surgery, chemotherapy, radiotherapy, hormone treatments and targeted biological treatments lead to chronic / late appearing side effects, and this can have a profound impact on quality of life (Gegechkori *et al* 2017). Figure 1 illustrates a list of physical and psychological cancer treatment side effects, some of which (such as falls and limited range of movement (ROM)) physiotherapists are accustomed to managing with other patient groups. The list includes additional treatment consequences, for example lymphoedema, that physiotherapists, with some specialist training, can take a lead role in preventing and managing.

Role of exercise on cancer prevention and control

There is robust evidence to show that being active significantly lowers the risk of seven types of cancer, i.e. colon, breast, kidney, endometrium, bladder, stomach and oesophageal (Physical Activity Guidelines Advisory Committee 2018) and this puts physiotherapists in an ideal position to lead on exercise education to help prevent cancer and optimise cancer treatments. Minimising the time spent in sedentary behaviour may help to lower the risk of endometrial, colon and lung cancers, and there is strong observational evidence that higher levels of physical activity after a breast, colon or prostate cancer diagnosis is associated with a 30% lower risk of cancer recurrence and mortality (Li *et al* 2016). There appears to be a dose-response relationship between recreational physical activities levels and breast cancer outcomes. Two studies have demonstrated that those randomly assigned to an exercise intervention lived longer than the controls (Courneya *et al* 2014; Hayes *et al* 2018).

Cancer Rehabilitation education and training for health and fitness professionals

Acute / Chronic / Late appearing side effects of cancer treatment:

Physical	Psychological
– Fatigue	– Lack of confidence
– Weight changes	– Changes in body image
– Reduced fitness – C/V & MSE	– Anxiety
– Endocrine problems	– Depression
– Osteoporosis	– Cognitive dysfunction
– Cardiotoxicity	– Social isolation
– Lymphoedema	– Loneliness
– Limited range of movement	– Loss of control
– Pain and arthralgia	– Self-esteem
– Sexual dysfunction	– Helplessness
– Incontinence	– Fatigue
– Peripheral neuropathy	– Insomnia
– Falls	
– Nausea	
– Pain	
– Treatment tolerance	
– Constipation	

FIGURE 1: The physical and psychological side effects of cancer treatment

Conversely, physical activity is associated with a higher risk of melanoma, a serious form of skin cancer. Therefore a clear message for anyone who exercises outdoors is to seek out shade and use sunscreen and clothing as protection from UV exposure (Casla *et al* 2015).

Several mechanisms have been proposed to ascertain how exercise can modulate tumour development and growth (figure 2). These include influencing the immune function, inflammation, sex hormones, oxidative stress, genomic instability and myokines. Regulation of insulin / glucose metabolism may further play a role by reducing circulating insulin-like growth factor (IGF) binding proteins and sex hormone-binding globulins, resulting in increased bioavailability of IGF-1 and sex hormones which can drive cell proliferation (Patel *et al* 2019). Physical activity can also reduce cancer risk mediated through obesity. Obesity is associated with increased risk of developing as many as 13 cancer types through similar biological mechanisms (Doerstling *et al* 2017; Kerr *et al* 2017; Hojman *et al* 2018).

The benefits of exercise after a cancer diagnosis

Physiotherapists can help patients stay active and provide significant physical and psychological benefits during each stage of the cancer journey (Stevinson *et al* 2017). Furthermore, specific "doses" of exercise using the frequency, intensity, time and type (FITT) principles (American College of Sports Medicine 2020) can effectively address anxiety, depression, physical function deficits, cancer related fatigue, bone health, sleep, lymphoedema and quality of life (Campbell *et al* 2019). This is summarised in figure 3.

Exercise may also directly improve the effectiveness of chemotherapy and radiotherapy treatments (Bland *et al* 2019). Using the short physical performance battery (SPPB) which measures balance, gait speed and five times sit-to-stand on a 12-point scale, where 12 and 0 respectively are the best

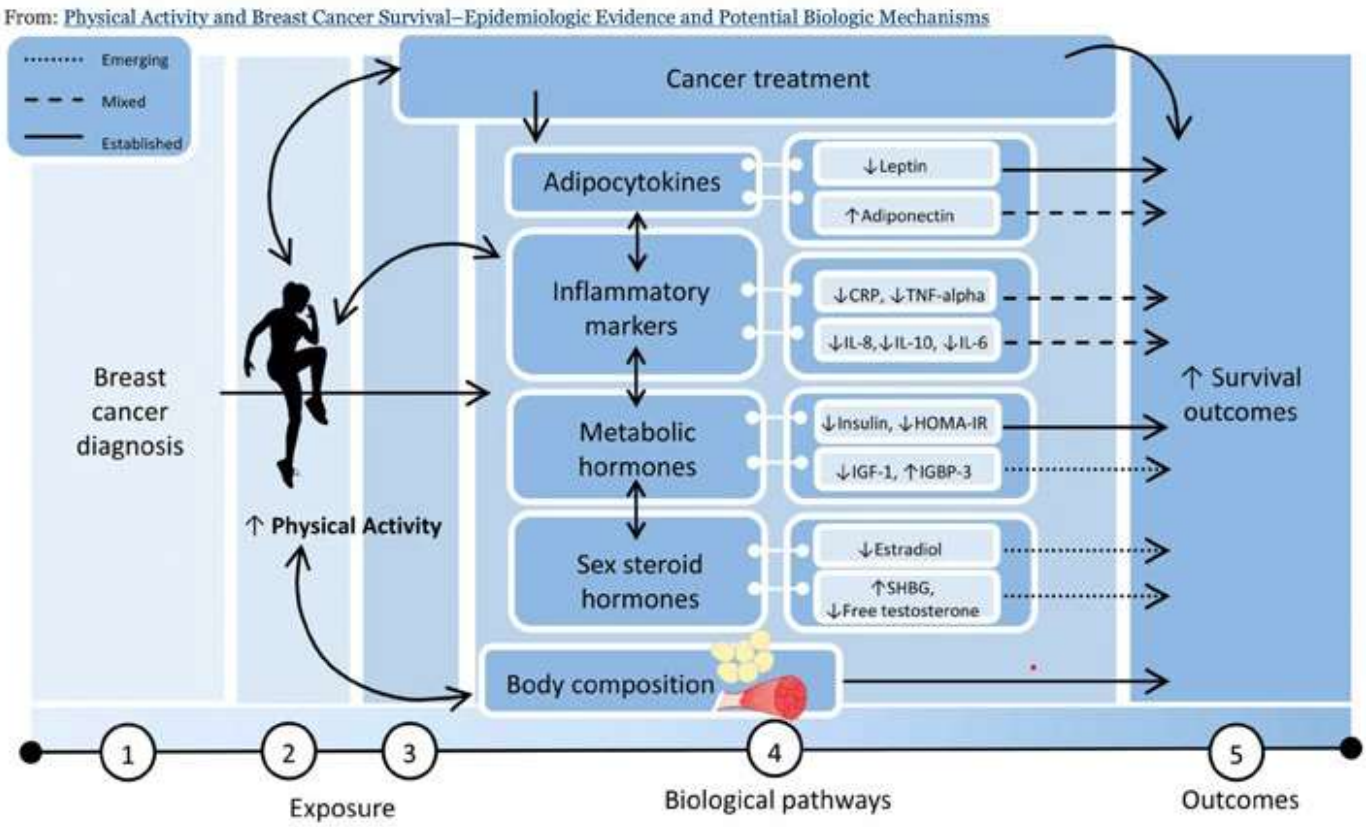

FIGURE 2: From Friedenreich CM, Morielli AR, Lategan I, Ryder-Burbridge C, Yang L. Physical activity and breast cancer survival – epidemiologic evidence and potential biologic mechanisms. *Current Nutrition Reports* 2022. Reproduced with permission from Springer Nature

and worst possible score, the odds of completing three or more cycles of chemotherapy have been shown to be 11 times greater in lung cancer patients with gait speeds ≥0.8m/s compared to those unable to achieve this gait speed (Collins *et al* 2018). Low skeletal muscle mass and / or greater adiposity can also influence chemotherapy pharmacokinetics, altering the volume of distribution for chemotherapy agents and increasing the risk of toxic effects (Williams *et al* 2018). In a study of 1,395 patients with non-metastatic breast cancer, greater visceral and intramuscular adiposity were associated with increased probability of having the recommended chemotherapy dose reduced by greater than 15%. Greater muscle mass was also associated with decreased odds of haematological toxic effects. A dose reduction of greater than 15% of the recommended chemotherapy was associated with a 30% increased risk of death (Cespedes Feliciano *et al* 2020). Physiotherapists can prescribe resistance exercises to preserve and potentially increase skeletal muscle mass during chemotherapy (Stene *et al* 2013; Mijwel *et al* 2019). In summary, this will be an ever-growing client group, so it should be seen as a call to action, and the professional duty of physiotherapists to be equipped to provide a clinically excellent service for this demographic.

Role of physiotherapists in cancer prehabilitation

A systematic review of 21 studies suggests that it is safe and feasible to undertake exercise in the weeks prior to surgery and that prehabilitation (figure 4) reduces postoperative stress and complications, enhances early discharge from hospital and improves clinical outcomes by optimising cardiopulmonary reserve prior to surgery (Michael *et al* 2021). Most prehabilitation that involves improving cardiorespiratory fitness, muscle strength and flexibility has been with patients undergoing surgery for abdominal, e.g. colon, rectal, oesophageal and gastric cancers, or lung cancer. These surgical procedures are challenging, complex and normally entail a significant time under general anaesthetic. Some patients receive chemotherapy prior to surgery (known as neoadjuvant treatment) and the emphasis is to maintain as much function and fitness as possible during this treatment phase.

PROSTATE CANCER

Men with prostate cancer who are on the waiting list for a prostatectomy require physiotherapy support. In a systematic review of 10 randomised controlled trials (RCTs) and a meta-analysis of seven RCTs, which included 739 men undergoing prostatectomy, preoperative pelvic floor muscle strengthening exercises (PFMSE) improved postoperative urinary incontinence after radical prostatectomy by 36% (Chang *et al* 2016). A later systematic review and meta-analysis of 20 RCTs involving 2,188 men showed that post-surgery, supervised PFMSE also decreased short-term urinary incontinence rates. Unsupervised PFMSE showed similar effects to no PFMSE in postoperative urinary incontinence (Baumann *et al* 2021) emphasising that PFME for men undergoing a prostatectomy should be supervised by physiotherapists and supported with biofeedback therapy.

Effects of Exercise on Health-Related Outcomes in Those with Cancer

What can exercise do?

- **Prevention of 7 common cancers***
  Dose: 2018 Physical Activity Guidelines for Americans: 150-300 min/week moderate or 75-150 min/week vigorous aerobic exercise
- **Survival of 3 common cancers****
  Dose: Exact dose of physical activity needed to reduce cancer-specific or all-cause mortality is not yet known; Overall more activity appears to lead to better risk reduction

**bladder, breast, colon, endometrial, esophageal, kidney and stomach cancers*
***breast, colon and prostate cancers*

Overall, avoid inactivity, and to improve general health, aim to achieve the current physical activity guidelines for health (150 min/week aerobic exercise and 2x/week strength training).

Outcome	Aerobic Only	Resistance Only	Combination (Aerobic + Resistance)
Strong Evidence	Dose	Dose	Dose
Cancer-related fatigue	**3x**/week for **30** min per session of moderate intensity	**2x**/week of **2** sets of **12-15** reps for major muscle groups at moderate intensity	**3x**/week for **30** min per session of moderate aerobic exercise, plus **2x**/week of resistance training **2** sets of **12-15** reps for major muscle groups at moderate intensity
Health-related quality of life	**2-3x**/week for **30-60** min per session of moderate to vigorous	**2x**/week of **2** sets of **8-15** reps for major muscle groups at a moderate to vigorous intensity	**2-3x**/week for **20-30** min per session of moderate aerobic exercise plus **2x**/week of resistance training **2** sets of **8-15** reps for major muscle groups at moderate to vigorous intensity
Physical Function	**3x**/week for **30-60** min per session of moderate to vigorous	**2-3x**/week of **2** sets of **8-12** reps for major muscle groups at moderate to vigorous intensity	**3x**/week for **20-40** min per session of moderate to vigorous aerobic exercise, plus **2-3x**/week of resistance training **2** sets of **8-12** reps for major muscle group at moderate to vigorous intensity
Anxiety	**3x**/week for **30-60** min per session of moderate to vigorous	Insufficient evidence	**2-3x**/week for **20-40** min of moderate to vigorous aerobic exercise plus **2x**/week of resistance training of **2** sets, **8-12** reps for major muscle groups at moderate to vigorous intensity
Depression	**3x**/week for **30-60** min per session of moderate to vigorous	Insufficient evidence	**2-3x**/week for **20-40** min of moderate to vigorous aerobic exercise plus **2x**/week of resistance training of **2** sets, **8-12** reps for major muscle groups at moderate to vigorous intensity
Lymphedema	Insufficient evidence	**2-3x**/week of progressive, supervised, program for major muscle groups does not exacerbate lymphedema	Insufficient evidence
Moderate Evidence			
Bone health	Insufficient evidence	**2-3x**/week of moderate to vigorous resistance training plus high impact training (sufficient to generate ground reaction force of **3-4** time body weight) for at least **12** months	Insufficient evidence
Sleep	**3-4x**/week for **30-40** min per session of moderate intensity	Insufficient evidence	Insufficient evidence

Citation: bit.ly/cancer_exercise_guidelines

Moderate intensity (40%-59% heart rate reserve or VO_2R) to vigorous intensity (60%-89% heart rate reserve or VO_2R) is recommended.

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FIGURE 3: Infographic with guidelines for physical activity for cancer patients as directed by the American College of Sports Medicine (reproduced with permission)

BREAST CANCER

Brahmbhatt *et al* (2020) showed that breast cancer prehabilitation can lead to better shoulder girdle mobility and facilitate recovery of shoulder function post-surgery. They concluded that there is a substantial body of evidence to support the use of ROM exercises after breast cancer surgery.

Cancer specific functional rehabilitation

Physiotherapists should already be playing a role in the detection of many cancer related impairments, e.g. pain, reduced ROM, low cardiorespiratory fitness and muscle weakness, and can help with the management of these by teaching coping strategies, maximising compensation capacity and improving ergonomics of (alternative) movement strategies (Stuiver *et al* 2019). However, more specialised knowledge about cancer treatments, their side effects and key practical points on how to screen, assess and deliver specific exercises can help support individuals with cancer in their specific needs throughout the cancer continuum. This includes, but is not limited to, lymphoedema, peripheral neuropathy, stoma management, cancer related fatigue and bone health. Even if a client is presenting with a basic MSK issue, advanced skills in clinical reasoning are necessary when the client is asked to provide information on current comorbidities, surgery and treatments. A cancer diagnosis often comes with anxiety or depressive symptoms which need to be recognised and accounted for during the physiotherapy treatment. Managing these issues requires high-level communication skills, therefore Stuiver *et al* (2019) believe that additional education in oncology is a prerequisite for physiotherapists to be fully capable of providing high-quality care to people affected by cancer.

TRIAGE AND TRAINING

Royle (2019) mentions that many physiotherapists are working in isolation with little research or guidelines to support them and states that any physiotherapist working with a patient with a history of cancer is doing so in a "red flag zone". I recently published a paper with physiotherapy colleagues in the United States (Stout *et al* 2020) in which we set out five domains that could provide perspective on the complexity of a cancer survivor's condition and guide clinical decision making for individualised recommendations. The domains include cardiometabolic status,

oncological factors, aging considerations, behavioural characteristics and environmental elements.

SCREENING

Screening has two functions: to ensure that the participant is safe to exercise and to identify the baseline physical activity level of the patient, and it should happen as soon as possible following diagnosis. Screening for underlying unstable and stable cardiac, respiratory and metabolic comorbidities can be implemented using a validated tool such as the physical activity readiness questionnaire (PARQ+ http://eparmedx.com/), and self-reported physical activity levels can also be measured using a validated tool such as the international physical activity questionnaire (IPAQ) (Craig *et al* 2003).

Patients with the following presentations may, in the process of screening, require specialist assessments and interventions:

- complex acute / chronic cancer treatment side effects, e.g. bone metastases
- severe physical impairment and / or disability, e.g. complex comorbidities
- very low functioning levels, e.g. frailty
- unstable or stable cardiac / respiratory issues, e.g. unstable blood pressure
- severe psychological disabilities – clinically depressed / high level of anxiety.

ASSESSMENT

Individualised assessment should encompass a comprehensive identification and evaluation of the specific needs of the patient as this will inform the individualised exercise prescription. Assessment requires a more complete approach that includes taking a history and conducting specific functional and fitness tests. Screening tools such as "sit to stand" and "sit and reach" can be used for ensuring basic functioning (Simmonds 2002). Physical fitness tests such as the six-minute walk, incremental shuttle, timed get up and go, or the 60-second chair stand test can be used. However, with fitter patients there may be an aerobic ceiling effect and therefore the 12-minute Cooper test, a submaximal test or a cardiopulmonary exercise test (CPET) would be more appropriate assessments of aerobic fitness. The baseline functions of specific parts of the body likely to be affected by the cancer treatment, e.g. pelvic floor and shoulder ROM, should be assessed so that deficits are quantified and prehabiltation and rehabilitation targets can be appropriately set.

INTERVENTION

The primary aim of prehabilitation and rehabilitation is to address any functional needs and to increase physical activity

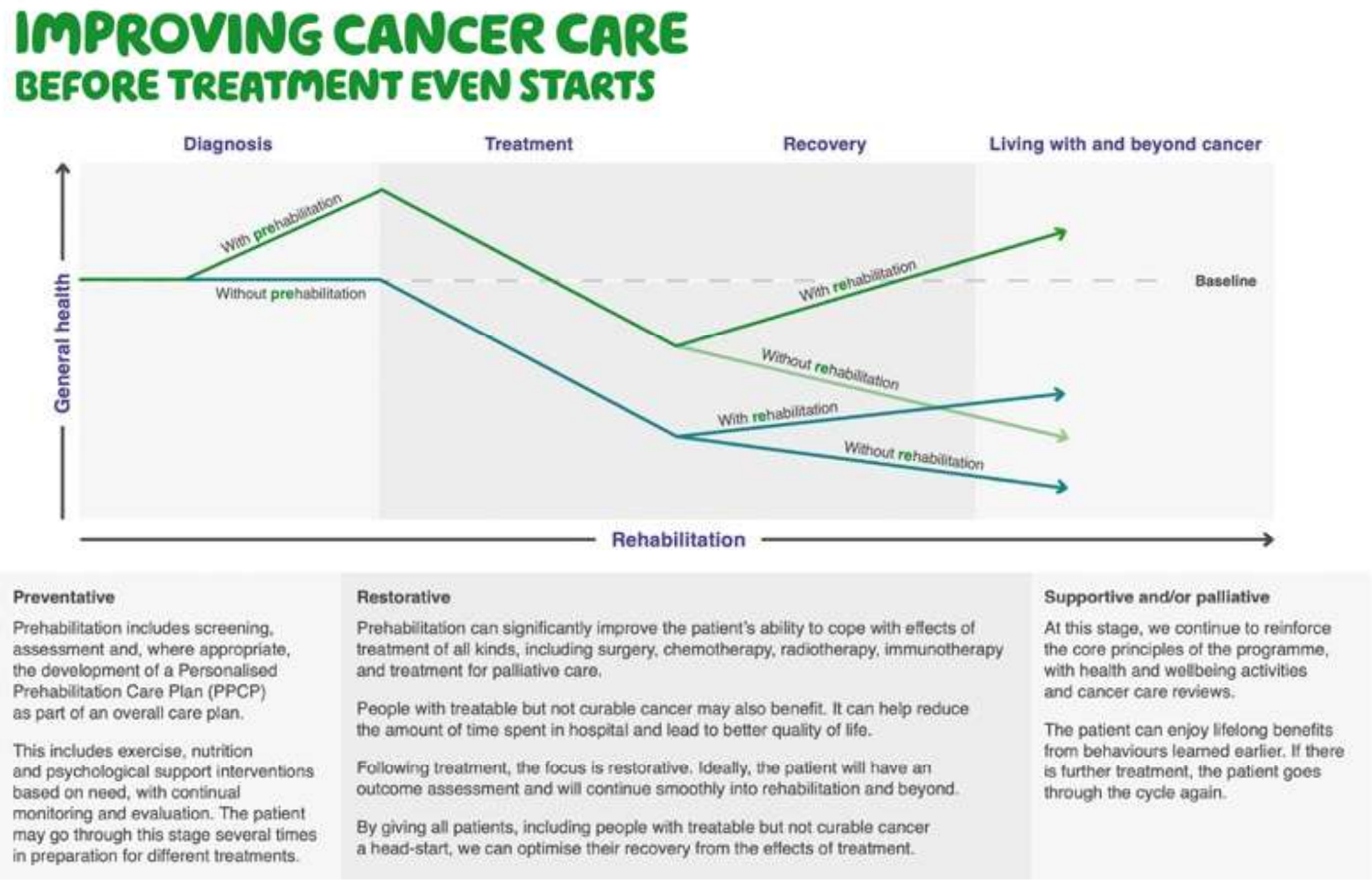

FIGURE 4: Illustration of the relationship between prehabilitation and rehabilitation on general health taken from *Prehabilitation for people with cancer* (reproduced with permission from Macmillan.org.uk)

levels towards meeting current guideline recommendations. When prescribing an exercise programme, the needs / preferences of the patient should always be considered. Do they require / prefer the exercise programme to be supervised in a clinical setting, at a gym or at home? Should the type of programme be group classes, individual training and is the preference for remote or face to face? What modality / type of exercise is needed / preferred? A series of exercises that the patient may not feel sufficiently confident to accomplish can result in poor adherence. A patient-centred approach enhances adherence and maximises the opportunity to achieve positive clinical outcomes.

MONITORING AND EVALUATION

Monitoring can be achieved through patient self-monitoring or by using appropriate validated measures. It is only by monitoring adherence to the intervention and recording efficacy and experience outcomes that the effectiveness, from a personal and programme level, can be evaluated. It helps to better understand why some patients decline to engage or partly adhere to the prescribed intervention and can help to determine the factors that influence / optimise the response to the intervention.

Conclusion

Physiotherapists in private practice have strong foundational knowledge and the skills that, with the help of reputable specialist courses, can be used to assist in clinical reasoning and decision making for identifying red-flag patients. They are well placed to play an increasingly important role in the management of individuals with cancer.

CONTACT DETAILS
info@canrehab.co.uk
www.canrehab.com
Twitter: @Canrehab
Facebook: CanRehab
LinkedIn: Professor Anna Campbell MBE

About the author

For the past 22 years, Professor Anna Campbell has worked in the field of exercise oncology. She has published more than 50 peer-reviewed research papers and three educational book chapters on the subject of cancer and exercise. She has been instrumental in the implementation of evidence based rehabilitation for people affected by cancer across the UK. As key advisor to Macmillan Cancer Care, Anna worked on the development and evaluation of the UK-wide "MoveMore" programmes. She is also a member of the WHO cancer rehabilitation 2030 advisory group and Director of CanRehab, an international provider of cancer rehabilitation training for health professionals.

Useful resources

- Association of Chartered Physiotherapists in Oncology and Palliative Care (csp.org.uk)
- The Bowel Cancer Recovery Toolkit (sarah-russell.co.uk)
- Cancer Research UK (www.cancerresearchuk.org)
- *Exercise Oncology*: Kathryn H. Schmitz (editor): 9783030420109: Blackwell's (blackwells.co.uk)
- Physical activity and cancer guidance for professionals – Macmillan Cancer Support
- Prevention of Shoulder Problems trial (PROSPER): Physiotherapist Manual [intervention manual and related materials] – WRAP: Warwick Research Archive Portal: online training for non-cancer specialist physios

Gemma Harris, Exercise Clinic Lead for GenesisCare Windsor and a course tutor for CanRehab UK, writes…

"Working with oncology patients is the most rewarding work I have ever done. It is a really exciting time to work in oncology where the evidence base for physiotherapy and exercise in oncology is growing by the week. The preconceptions on what a "cancer patient" can do are regularly challenged and I take great pride in seeing patients not just completing their treatment but joining fundraising events and bucket list worthy activities. Having completed CPD courses and joining professional networks, I have learnt a huge amount about working within a speciality I previously avoided. Oncology patients can have many complexities which require our expertise as physiotherapists. I'd encourage everyone to complete some oncology CPD training and explore how their physio skills could help this client group."

Kerry Archer, course tutor for CanRehab UK, writes:

"I worked predominantly as a respiratory physiotherapist in the NHS, so when the opportunity arose to work in oncology I was intrigued. Using a variety of clinical skills and knowledge that I had developed over the years, I was able to apply this to assessing and treating cancer patients. I have continued to develop through CPD activities, structured learning and surrounding myself with experts in the field. Three years ago I joined the Active Against Cancer team, part of the Harrogate and District NHS Trust exercise referral service for cancer patients, as the cancer specialist physiotherapist. The world of exercise oncology has gathered significant pace in recent years and it is a privilege to be able to deliver prehab and rehab to patients as part of their cancer treatment pathway, and see the real benefits of being active following a diagnosis, and how exercise can support them during and after treatment."

REVIEW SUPPORTING QAP

How might this article improve patient outcomes?

With more people surviving a cancer diagnosis, physiotherapists will inevitably encounter more cancer patients in their clinics. There is strong evidence to show that physiotherapy can improve patient outcomes, however we must take stock of our existing personal scope of practice and, if necessary, take steps to upskill. Private physiotherapists have the communication skills and time to engage effectively with cancer patients, but knowledge of oncology is essential for providing safe and effective care. Understanding the pathophysiological mechanisms is important in underpinning evidence-based practice, as well as being able to translate complex information into language lay people will understand. Specific screening prior to full assessment is vital and collection of baseline data is required to measure progress and outcomes.

How can this article help with achieving or maintaining QAP status?

This article provides invaluable insight into evidence-based physiotherapy management of cancer patients and highlights the opportunities for private physiotherapists to extend their skill set and practice offering. The author not only describes the importance of holistically managing, for example, an MSK patient with cancer, but also explores the potential for cancer-specific prehab and rehab as an extension to a physiotherapy practice. With stretched NHS resources, physiotherapists working in private practice are ideally placed to offer a holistic high-quality service within longer treatment sessions, utilising honed assessment and communication skills to manage what are often complex presentations.

Reviewer
Cabella Lowe

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