

Preoperative physical activity and functional performance levels are predictors of acute postoperative outcomes in a private South African colorectal cancer cohort

Authors:

Megan Whelan¹
Helen van Aswegen¹
Ronel Roos¹
June Fabian²
Brendan Bebington^{3,4}

Affiliations:

¹Department of Physiotherapy, Faculty of Health Sciences, University of the Witwatersrand, Johannesburg, South Africa

²Clinical Research Department, Wits Donald Gordon Medical Centre, Johannesburg, South Africa

³Department of Surgery, Faculty of Health Sciences, University of the Witwatersrand, Johannesburg, South Africa

⁴Colorectal Unit, Wits Donald Gordon Medical Centre, Johannesburg, South Africa

Corresponding author:

Megan Whelan,

Dates:

Received: 25 Aug. 2020
Accepted: 19 Jan. 2021
Published: 08 Mar. 2021

Read online:



Scan this QR code with your smart phone or mobile device to read online.

Background: For patients with colorectal cancer, surgical resection of the primary tumour remains the best treatment option. Surgery for colorectal cancer is being performed on patients who would previously not have been considered as suitable candidates. It remains to be seen which factors influence hospital length of stay (LOS) and the development of acute postoperative complications in South African patients.

Objectives: The objectives of our study were to determine the modifiable factors that influence patients' development of postoperative complications and hospital LOS and, to identify the types of postoperative complications that develop.

Method: A retrospective review and secondary analysis of information in an existing database of patients with colorectal cancer were conducted. Regression analysis statistics were used to determine the predictors of postoperative outcomes. The level of significance at which testing was performed was set at 5% ($p \leq 0.05$).

Results: Data of 125 patients were included. Surgical site infections and postoperative paralytic ileus were the most frequently reported postoperative complications. Preoperative vigorous-intensity physical activity ($p = 0.048$, $\beta = -0.000$) and functional performance status ($p = 0.05$, $\beta = 0.926$) significantly predicted hospital LOS and the incidence of postoperative complications, respectively.

Conclusion: Preoperative physical activity and functional performance levels are predictors of acute postoperative outcomes in a private South African cohort of patients with colorectal cancer. Future research which includes other modifiable factors is required to make informed suggestions for changes in clinical practice.

Clinical implications: Patients requiring surgery for colorectal cancer should be screened for signs of physical deconditioning and referred for physiotherapy intervention before elective surgery to optimise their recovery.

Keywords: physical activity; functional performance; colorectal cancer; predictors; postoperative outcomes.

Introduction

By the end of the 21st century, cancer (Ca) is expected to globally rank as the leading cause of death (Bray et al. 2018). Colorectal Ca is one of the top five most commonly reported Ca types in both men and women worldwide and this is similar to reported incidences in South Africa where colorectal Ca is the fourth most common type of Ca in females and males (Brand, Gaylard & Ramos 2018).

Where indicated, surgical resection of the primary colorectal tumour and its metastases remains the best treatment option for these patients (Van Cutsem et al. 2014). Patients with Ca present with higher perioperative risk because of immune system disturbances, reduced physiologic reserves and longer surgical procedure duration (Simões et al. 2018). As a result of advancements in oncological treatment over the past 50 years, surgery for colorectal Ca is being performed on patients who would previously not have been considered suitable candidates (Boereboom et al.

How to cite this article: Whelan, M., Van Aswegen, H., Roos, R., Fabian, J. & Bebington, B., 2021, 'Preoperative physical activity and functional performance levels are predictors of acute postoperative outcomes in a private South African colorectal cancer cohort', *South African Journal of Physiotherapy* 77(1), a1526.

Copyright: © 2021. The Authors. Licensee: AOSIS. This work is licensed under the Creative Commons Attribution License.

2015). A rising number of patients with advanced age, a population at high risk for postoperative complications, are presenting for colorectal Ca surgery (Grosso et al. 2012).

Short-term postoperative outcomes include postoperative complications, increased hospital length of stay (LOS), higher re-admission rates and reduced survival (Aravani et al. 2016; Kelly et al. 2012). Length of stay is an important contributor towards the use of hospital resources (Aravani et al. 2016; Kelly et al. 2012) and has been shown to predict patient re-admission rates to hospital (Chiu et al. 2017; Kelly et al. 2012). There is also evidence to describe a strong link between postoperative complications and a prolonged postoperative hospital LOS (Chiu et al. 2017). Potential complications after colorectal surgery are similar to those reported for other types of abdominal surgery (Kirchhoff, Clavien & Hahnloser 2010). Surgical site infection is one of the most commonly reported hospital-acquired infections described in the literature and is associated with significant morbidity (Badia et al. 2017). Gomila et al. (2018) examined the predictors of early-and-late-onset surgical site infections, with results indicating that previous chemotherapy was the strongest risk factor for the development of late-onset surgical site infections (Gomila et al. 2018). Therapies such as chemotherapy lead to chronic non-resolving inflammation and reduced immune function (Khosravi et al. 2019). As a result of the positive effects of exercise on the immune system functioning in patients with Ca (Khosravi et al. 2019), patients with increased pre-and-postoperative physical activity levels are likely to be less at risk for the development of surgical site infections.

Postoperative paralytic ileus (POI) has long been considered to be an unavoidable complication following any gastrointestinal surgery (Kirchhoff et al. 2010). The factors associated with POI are multifactorial and include humoral, neural, inflammatory and physical components (Millan et al. 2012). Physical causes of POI include manipulation of the bowel during surgery and peritoneal irritation (Lluis & Biondo 2018). Neural causes include postoperative sympathetic hypersensitivity whereas humoral factors include increasing levels of circulating catecholamines and changes in gastrointestinal hormones (Lluis & Biondo 2018; Millan et al. 2012). The inflammatory component includes inflammatory cell activation (Lluis & Biondo 2018). The common final pathway results in impaired gut motility and relative intestinal ischaemia (Vather & Bissett 2018). Opiate use has also been widely described as a causative factor of POI (Millan et al. 2012; Waldhausen & Schirmer 1990). Other commonly reported postoperative complications following abdominal surgery include respiratory (e.g. atelectasis), renal (e.g. acute kidney injury), neurological (e.g. stroke), wound-related problems (e.g. dehiscence) and in some cases even death (Isik et al. 2015; Khan, Khan & Afshan 2017; Moran et al. 2016; Simões et al. 2018).

Various postoperative strategies are used by physiotherapists to reduce the incidence of and manage postoperative

complications following abdominal surgery. The 'Enhanced Recovery After Surgery' (ERAS) recommendations emphasise the use of early postoperative mobilisation strategies to improve postoperative outcomes (Gustafsson et al. 2013). Although widely utilised in a clinical setting, research regarding the perioperative role of physiotherapists for patients who have had abdominal surgery is inadequate and equivocal (Reeve & Boden 2016). However, supporting literature is available for the use of prehabilitation for patients undergoing abdominal surgery to improve postoperative outcomes (Boden et al. 2018; Boereboom et al. 2015; West et al. 2015). The composition of prehabilitation programmes is variable; however, many take on a multimodal approach comprising exercise training, nutritional care and anxiety-coping strategies (Hijazi, Gondal & Aziz 2017). Preoperative education is also considered as an essential part of the ERAS guidelines (Melnyk et al. 2011).

Studies performed internationally have reported sarcopenia as an independent predictor of poor postoperative outcomes (Nakanishi et al. 2018; Reisinger et al. 2015). Body mass index (BMI) and waist circumference are associated with survival outcomes in patients with colorectal Ca in South Africa (Whelan et al. 2021). However, it remains to be seen whether modifiable factors influence postoperative outcomes, namely hospital LOS and the development of acute postoperative complications in South African patients. Such information may be used to implement changes in the approach to patients' preoperative care. If given access to patients preoperatively, health professionals such as physiotherapists could screen patients to determine whether they are at risk for poor postoperative outcomes and assist them to manage modifiable factors before surgery (Patman et al. 2017).

The objectives of our study were to determine the modifiable factors that influence patients' postoperative hospital LOS to identify the types of acute complications that develop and which modifiable factors influence the development of these complications following surgical resection for colorectal Ca in a South African private sector cohort.

Method

Our study was a retrospective analysis of an existing database captured using Research Electronic Data Capture REDCap electronic data capture tools (Harris et al. 2009, 2019).

Database information

The database includes patient information collected from one private university specialist referral centre and three public sector hospitals (two tertiary referral centres and one secondary care facility) situated in urban Johannesburg. These facilities form part of the Academic Teaching Complex of the University of the Witwatersrand (Bebington et al. 2018).