

Proposing a Comprehensive Prehabilitation Model for Individuals with Operable Pancreatic Cancer

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Pancreatic cancer mortality has been increasing in both genders in the USA, and in countries in Europe and Asia during the past decades.^[1,2] Based on the GLOBOCAN 2012 estimates, pancreatic cancer ranks as the seventh leading cause of cancer death in the world.^[1] The aging of the population will continue to greatly affect the number of new pancreatic cancer cases.^[3] It was estimated that by 2040, the total number of cases in the European Union (EU) countries will increase by more than 30%,^[3] and pancreatic cancer is projected to become the second leading cause of cancer-related death in the USA by 2030.^[4] Compared to Western countries, slightly less than half of all new cases of pancreatic cancer in 2012 were documented in the countries of Asia, but new cases are increasing there due to the aging of the population.^[1]

Although the overall 5-year survival rate for pancreatic cancer is about 5%,^[1] the evidence supports that the resectable stage has a favorable impact on long-term survival, and the 5-year survival rate of localized pancreatic cancer is about 25%.^[5] Owing to advances in operative skills, imaging techniques, and enhanced quality of postoperative care,^[6] the number of patients undergoing pancreatectomy

has increased dramatically during the past two decades.^[7] However, complications after pancreatic resection affect a large proportion of patients and include a variety of clinical problems (e.g., infection, pneumonia, pulmonary embolus, bleeding, anastomotic leak, or the need for re-operation).^[8] Worry about postoperative complications and functional impairment influence the patients' treatment decisions preoperation. This situation makes it difficult for patients to make the decision to receive pancreatectomy. Therefore, it is important to develop a prehabilitation model to care for this population.

The aims of the longitudinal study presented in the fourth Asian Oncology Nursing Society Conference were to explore the changes of muscle strength, fatigue, and nutritional status in patients receiving pancreatectomy before surgery (T0) and 1, 3, 6, and 12 months after surgery (T1, T2, T3, and T4) and to further identify the significant factors related to fatigue and nutritional status^[9] partially presented in the Multinational Association of Supportive Care in Cancer/International Society of Oral Oncology 2019 international symposium on supportive

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care.^[10] The findings showed that fatigue was one of the most reported symptoms, and symptom distress and handgrip strength were the significant factors related to changes of fatigue intensity as well as its interference among 75 patients.^[9] In addition, patients having regular exercise (odds ratio [OR] = 0.395, $P = 0.025$) and operation procedure with pylorus-preserving pancreaticoduodenectomy (OR = 0.242, $P = 0.019$) had a lower risk of poor nutritional status at T3 (12 months after surgery) (OR = 0.431, $P = 0.023$). However, the patients who had surgical complications (OR = 2.579, $P = 0.035$) and higher symptom severity (OR = 1.041, $P = 0.001$) had a higher risk of poor nutritional status which has been identified as scores <12 in the Mini Nutritional Assessment^[10] at T1 (1 month after surgery) (OR = 2.434, $P = 0.033$). Therefore, educating patients about symptom management and training in exercises to increase handgrip strength might be good for managing the fatigue for this population during the 1st year after surgery. Encouraging patients to maintain regular exercise might be a modifying factor to prevent them from poor nutrition, and decreasing surgical complications and symptom severity were the factors that require additional attention from health-care providers in this population. A randomized clinical controlled trial for a prehabilitation model is being tested by our research team.

Based on the evidence, a prehabilitation program could be a benefit for the cancer patients in functional walking capacity, reduced hospital stay after surgery, and lower morbidity and mortality rates from the primary treatment of cancer as well as increasing quality of life.^[11] Silver and Baima defined cancer prehabilitation as a process starting between cancer diagnosis and pretreatment, with interventions to decrease impairments and promote physical and psychological health along the cancer care continuum.^[12] A systematic review reported by van Dijk *et al.* concluded that pancreaticoduodenectomy for malignant disease negatively affects the quality of life in the physical and social domains over the short term, which will eventually recover to baseline values after 3–6 months. Several symptom distressors described in previous studies have been studied in this review including fatigue, pain, nausea, dyspnea, insomnia, loss of appetite, diarrhea, and constipation. Pain, fatigue, and diarrhea increased postoperatively, but eventually resolved after 3–6 months.^[13] Kapritsou (2019) conducted a mini review of the impact of enhanced recovery after surgery and found that this multicentric program including the fields of nursing and anesthesia and nutrition and fluid management for minimally invasive surgery could reduce the postoperative complications and stress response,

optimizing the postoperative recovery for the patients with hepato-pancreato-biliary surgery.^[14] Most of the programs in the review included postoperative mobilization and early oral intake which could deliver beneficial outcomes. Furthermore, one systematic review indicated that published studies reported statistically significant benefits for multidimensional rehabilitation interventions over usual care, most notably for the outcomes of fatigue and physical functioning, and also addressed favorable cost-effectiveness ratios.^[15]

However, there is no proposed prehabilitation program for physical and psychological distress for patients with pancreatic cancer. Furthermore, being newly diagnosed with pancreatic cancer and needing to receive pancreatectomy could profoundly impact patients' psychological health because of fear of death and worry about the uncertainty with complications after surgery.^[13] Furthermore, the families of the patients play a more important role for the rehabilitation process after surgery, especially in Asian countries.^[16,17] After considering the specialized needs for the patients with pancreatic cancer after surgery, we have proposed a comprehensive rehabilitation model during cancer trajectory from preoperative and through postoperative periods and survivorship for individuals with operable pancreatic cancer including physical and psychological components.

Comprehensive Rehabilitation Model

The prehabilitation program was developed based on a prospective surveillance model for physical rehabilitation reported by Stout *et al.* with good results for breast cancer.^[18] It focused on assessing relevant measures (e.g., muscle strength performance, pain, fatigue, function, and body weight), identifying impairment and management, and promoting health skills and behaviors from baseline prior to surgery, early postsurgery, to ongoing surveillance.^[19] Once impairments are detected, rehabilitation intervention is implemented. However, this program was focused only on physical rehabilitation and lacked a component of psychological rehabilitation. A common psychological distress for cancer patients is fear of recurrence, especially due to the high recurrence rate for pancreatic cancer. A previous study reported that compared to other types of cancer (e.g., breast, colon, lung, or head-and-neck cancers), patients with pancreatic cancer had higher levels of psychological distress (anxiety and depression).^[20] In addition, in a previous study, family involvement was shown to play an important role for patients with pancreatic cancer after surgery who benefited from walking, breathing exercises, cognitive activities, and oral hygiene after surgery.^[17] However, caregivers of these

patients can face the same or even greater psychological stress as the patients.^[19] Therefore, we revised the prospective surveillance model for patients with pancreatic cancer to include family-centered care labeled as family involvement, optimistic attitude, coping effectiveness, uncertainty reduction, symptom management (FOCUS), which was developed by Northouse and Wortman.^[21,22] Because exercise can improve the quality of life in patients after pancreatectomy,^[14] the components of this model were adjusted to include physical enhancement (FOCUS + P) across preoperative, early postoperative, and ongoing surveillance periods [Table 1].

During the nursing process of assessment, problem identification, intervention, and evaluation, the baseline of patients' physical function (body weight, muscle strength, nutritional status, and symptom distress) and psychological concerns (anxiety, depression mood, and uncertainty) as well as effective coping strategies and family support are used to assess and offer interventions with FOCUS + P prior to surgery. While waiting for the surgery at home, patients can be educated about the surgical procedure and can achieve physical enhancement by increasing the muscle strength of their four limbs. Family involvement at this time involves identifying the primary caregiver and defining their role and function. In addition, the family is educated on how to help the patient with symptom management as well as on how to build up the ability for food selection and preparation for the patient after surgery. Optimistic attitude, coping effectiveness, and uncertainty reduction are the strategies needed for psychological care to maintain real hope, and

individualized effective coping strategies in daily life need to be learned in order to face the uncertain surgical outcomes and prognosis. Symptom management is a vital component affecting physical and psychological health across the cancer trajectory. It is suggested to assess the most distressed physical and psychological symptoms and offer self-care management for the most often reported symptoms (e.g., fatigue, pain, gastrointestinal tract symptoms, loss of appetite, anxiety, and depression). For physical enhancement, it is important to assess the exercise behavior and baseline of activity and function (or limited function) prior to surgery and then to educate patients about continuously and regularly performing preferred exercises or increasing physical enhancement by walking or muscle strength training prior to surgery and after surgery as well as to encourage the caregiver accompanying the patient to do so.

Conclusion

Patients with pancreatic cancer have been an understudied population for prehabilitation programs due to its low 5-year survival rate compared to other types of cancers. However, the mean age for this population is older than for other types of cancer, and therefore, these patients need more help from a comprehensive rehabilitation model combined with physical and psychological care as well as family involvement. The proposed model has been developed based on our previous study's program. It is expected that the proposed model could be tested and used in clinical settings to help these patients recover smoothly with better outcomes.

Table 1: Components for the proposed comprehensive rehabilitation model for patients with pancreatic cancer during cancer trajectory

Component	Intervention
F (family involvement)	Identify the primary caregiver Assess the role and function of the caregiver Assess the level of family support Educate the family about symptom management and increase their ability to prepare food after surgery
O (optimistic attitude)	Identify the source of negative thoughts Assess the level and source of hope Offer the resource for cultivating positive thinking Provide training in positive thinking
C (coping effectiveness)	Assess the baseline of coping strategies Identify effective coping strategies Educate about more effective coping strategies (e.g., stress reduction, deep breathing, or mindfulness)
U (uncertainty reduction)	Identify the sources of uncertainty Offer surgery-related information Educate about how to communicate with health-care providers
S (symptom management)	Assess the most distressed physical and psychological symptoms Offer self-care management for the most reported symptoms (e.g., fatigue, pain, gastrointestinal tract symptoms, and loss of appetite, anxiety, and depression)
P (physical enhancement)	Assess the exercise behavior and baseline of activity and function (or limited function) prior to surgery Educate patient on how to continuously and regularly perform preferred exercises or increase physical enhancement by walking or muscle strength training prior to surgery and after surgery Encourage the caregiver accompanying the patient

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Conflicts of interest

There are no conflicts of interest.

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