Physical activity and nutritional intake in patients undergoing hematopoietic stem cell transplantation

– feasibility and acceptability of nurse-led interventions

Sölvi Vejby

UPPSALA
UNIVERSITET

Dissertation presented at Uppsala University to be publicly examined in H:son Holmdahlsalen, Akademiska Sjukhuset, Uppsala, Thursday, 19 September 2024 at 09:00 for the degree of Licentiate of Philosophy. The examination will be conducted in Swedish.

Abstract
Vejby, S. 2024. Physical activity and nutritional intake in patients undergoing hematopoietic stem cell transplantation – feasibility and acceptability of nurse-led interventions. 49 pp. Uppsala: Uppsala universitet.

Purpose: This licentiate project aimed to develop and evaluate nurse-led interventions focused on physical activity and nutrition for patients undergoing hematopoietic stem cell transplantation (HSCT). The ultimate goals were to reduce complications from physical inactivity and poor nutrition, enhance quality of life, and shorten hospital stays. **Methods:** Study I **i**ncluded 22 patients in a standard care group and 21 in an intervention group. A non-equivalent group pretest-posttest design was used to compare physical activity, six-minute walk test (6MWT) distances, and quality of life between the groups. The intervention included physical activity support pretransplant, daily during the hospital stay, and for 14 days post-discharge. Study II **i**nvolved 20 patients in a single-arm intervention focusing on physical activity and nutrition. Both interventions included goal setting, an activity diary, the 6MWT, and in Study I, the FACT-Anemia Scale. Study II added a diet diary and a dietitian consult for nutritional support pretransplant and once during hospitalization. The 6MWT was assessed at admission and discharge in both studies, and additionally pre-transplant in Study II. Feasibility in Study II was evaluated by recruitment and consent rates, and adherence to the intervention's components. Acceptability was assessed through interviews with 14 participants, analyzed using qualitative content analysis. **Results:** In Study I, the intervention group was more physically active, walked further in the 6MWT, and appeared to have a slightly better quality of life compared to the standard care group. The nursing intervention increased physical activity and may be linked to better quality of life in HSCT patients. In Study II, of 52 eligible patients, 27 were approached (52% recruitment rate), and 22 consented (81% consent rate), though two were later excluded due to treatment changes. The remaining 20 participants (14 males, mean age 56 years [SD 13.2]) showed high adherence: 95% completed the pre-transplant diet diary, 30% completed it during hospitalization, 100% set physical activity goals, 95% maintained the activity diary, and spent an average of 57.5 minutes per day being physically active (SD=49.2). Qualitative analysis identified three main categories reflecting intervention acceptability: intervention factors (e.g., visible goal setting, positive effects), individual factors (e.g., coping, previous experiences), and contextual factors (environment and routines). **Conclusion:** Both nurse-led interventions appear feasible. Participants in Study I increased their physical activity, and those in Study II appreciated and adhered to the intervention components without adverse effects. However, only a minority of eligible patients were approached, primarily due to organizational reasons. Future implementation should revise routines for initial pretransplant contact.

Keywords: Hematopoetic stem cell transplant, physical activity, nutrition, nurse-led, feasibility, behaviour change techniques

Sölvi Vejby, Department of Public Health and Caring Sciences, Box 564, Uppsala University, SE-75122 Uppsala, Sweden.

URN urn:nbn:se:uu:diva-532062 (http://urn.kb.se/resolve?urn=urn:nbn:se:uu:diva-532062)

Till alla stamcellstransplanterade,
you are all fighters!

List of Papers

This Licentiate report is built on the following papers, which are referred to in the text by their Roman numerals.

I. Vejby S, Eriksson A, Nordin K, Johansson B. *Is it possible to increase the amount of physical activity in patients isolated due to hematopoietic stem cell transplantation using a nursing intervention?* A feasibility study. Nordic Journal of Nursing Research. 2022;42(1):18-27.

II. Vejby S, Henriksson A, Johansson B, Robelius A, Carlsson M, Wettergren L. *Feasibility and acceptability of a physical activity and nutrition intervention for hospitalized adults undergoing hematopoietic stem cell transplantation*. In manuscript.

Contents

Abbreviations

HSCT	Haemopoietic stem cell transplant
MI	Motivational interviewing
SMART	Specific, measurable, achievable, relevant, time-bound
EBMT	European Society for Bone and Marrow Transplantation
HRQoL	Health related quality of life
RCT	Randomized controlled trial
ADL	Activities of daily living
FACT-An	Functional assessment of cancer therapy – anaemia scale
FACT-G	Functional assessment of cancer therapy - general
PG-SGA	Patient generated subjective global assessment
SD	Standard deviation
MS	Multiple sclerosis
HLA	Human leucocyte antigen
FITT	Frequency, intensity, time and type
GvHD	Graft-versus-host disease
6MWT	Six minutes walk test
BMI	Body mass index

Preface

It is difficult to have a broad overview when being new as a nurse, you feel divided due to the workload and the medical accuracy that is required. During my 24 years working in the hematology department, I have moved from having a primarily medical focus to adopting a more holistic nursing perspective. This shift was driven by experience and by studying courses in hematological care, but perhaps most significantly, by my involvement in research. It's understandable to initially think that motivation and encouragement alone could be the key getting patients undergoing Hematopoietic Stem Cell Transplant (HSCT) out of bed and active. Physical activity is vital for overall health and can have numerous benefits during the recovery process. However, while motivation and encouragement are essential components, the reality is often more complex. At the beginning of this work back in 2014, the written routines regarding physical activity and nutrition at the department of Hematology, Uppsala University Hospital were quite adequate, although not implemented in clinical practice as nobody really knew how to do this. For my master degree, I compared the usual care performed in Lund to an intervention in Uppsala, consisting of Motivational Interviewing education and an activity diary. We approached patients undergoing HSCT (10-13 patients at each hospital) and I arranged for all nurses and assistant nurses to receive 1,5 days of MI training. As this pilot study showed that the participants in the intervention arm were more active, I wanted to do more. Based on this prior experience, my hypothesis was that future healthcare systems will require patients to take greater responsibility for their own rehabilitation and lifestyle management, but with the support of healthcare staff to do so effectively.

In a group initially consisting of 3 hematologists, a nurse and an assistant nurse we investigated if it was possible to increase the amount of physical activity in patients isolated due to HSCT using a nursing intervention. During the conduct of the intervention, I was accepted for doctoral studies and the findings are presented in my first article.

Although my initial beliefs have been somewhat altered, I am convinced that physical activity and adequate nutritional support have the potential to make life easier pre-transplant, during hospitalization, and beyond. As nurses, our role includes managing the damage caused by life-saving treatments, and by implementing physical activity and optimized nutritional routines, we can contribute to survival, improved physical function, and enhanced quality of life. The support provided by nurses is crucial in this context, as we are uniquely positioned to guide, motivate, and monitor patients through these challenging times, ensuring they adhere to and benefit from these interventions. That is possible.

Introduction

Hematopoietic stem cell transplantation

Hematopoietic stem cell transplantation (HSCT) is a well-established procedure with the potential to cure specific haemato-oncological malignancies and non-malignant conditions (1, 2). There are two primary methods of HSCT – *autologous,* utilizing the patient`s own stem cells, and *allogeneic*, where stem cells from someone else other than the patient are used. According to a 2017 survey conducted by the European Society for Blood and Marrow Transplantation (EBMT), 59% of the HSCT procedures performed were autologous and 41% were allogeneic (3). Even though an HSCT treatment is meant to be curative, a relapse of the underlying disease can occur and cause mortality. The prognosis for HSCT varies widely depending on several factors, including the type of transplant, the patient's overall health, the underlying disease being treated, and the patient's response to the transplant (4). Transplantation-related mortality has decreased significantly in the past 40 years to 12.2% for allogeneic procedures (5) and 3.1% for autologous procedures (6). Annually, more than 50,000 HSCT procedures are performed globally, and this number continues to rise (7).

In autologous HSCT, the patient's stem cells are collected when the disease is in a quiet phase and then reinfused into the patient after the conditioning therapy (8). The major benefit of autologous HSCT is the effects of the conditioning regime and the limitation of complications and risks associated with haematopoietic stem cell rescue. It is primarily used to treat lymphoma and myeloma but is also indicated for non-malignant conditions, such as multiple sclerosis (MS) (2).

Allogeneic HSCT leverages both the effects of the conditioning regimen (which can include chemotherapy, antibodies, and total body irradiation) and the immunological effects introduced when stem cells from someone else are used (2, 9). The success of an allogeneic HSCT relies heavily on thorough immunological control and a good match of immunomarkers called human leukocyte antigen (HLAs) between donor and patient. As individuals inherit half of their HLA markers from each parent, siblings have been viewed as ideal donors, although a person statistically has 1-in-4 change of being HLA-identical to their sibling. Nowadays, a matching unrelated donor from a volunteer donor registry is the most common stem cell source, although the use of haploidentical relatives (50% HLA-match) is increasing (3). The main indications include leukemia, myelodysplastic syndromes, and myeloproliferative neoplasms, with severe aplastic anaemia being the leading indication among non-malignant disorders (2). The age limit for an HSCT treatment is debated, but biological age is generally considered more important than chronological age, especially for allogeneic transplants. Generally, there is no strict upper age limit for HSCT, but older patients (typically those over 60-70 years) are often evaluated more carefully due to their increased risk of complications.

Despite the increasing success and improved outcomes of HSCT, the impact of side effects of both autologous and allogeneic HSCT should not be underestimated (2, 10). Side effects associated with the conditioning regimen include a heightened risk of infection, bleeding, anaemia, nausea, vomiting, anorexia and mucositis, often resulting in pain and fatigue. Worst-case mucositis requires morphine as an intravenous infusion, causing more nausea, constipation, and tiredness.

Sarcopenia and malnutrition are commonly caused by prolonged bed rest and decreased food intake/increased catabolism due to side effects (9, 11). Sarcopenia is characterized by an age-related decline in muscle mass, strength, and function involving the progressive loss of skeletal muscle. Treatment primarily includes resistance training and adequate nutrition, particularly sufficient protein intake. Aside from age-related sarcopenia, conditions such as cancer and its treatments can cause secondary sarcopenia (12, 13).

Neutropenia, a condition characterized by a severe decrease in the number of neutrophils, increases susceptibility to infections. The risk is especially high when the absolute neutrophil count falls below 0.5 × 109 neutrophils/μL, in which case even minor infections can rapidly escalate, leading to severe morbidity and potentially fatal complications. To reduce the infection risk in neutropenic cancer patients, protective isolation routines are employed, including dietary restrictions, stipulated by the low-bacterial diet (1). Isolation routines vary by country but typically include several common practices. These may involve having patients stay in a room with an adapted airflow system, shower daily, change bed linens regularly, and wear fresh clothes every day. Patients are encouraged to avoid contact with people showing infection symptoms and minimize visitors. Additionally, they are required to lubricate their skin to prevent dryness, perform thorough mouth care, and take precautions to prevent ulcers and bleeding (14).

The rationale behind dietary restrictions lies in the fact that certain foods, particularly those that are consumed raw or are minimally processed, may harbour pathogenic bacteria such as *Salmonella, Escherichia coli*, or *Listeria*. When someone is in a neutropenic state, even small quantities of these bacteria can lead to severe infections. Although the diet is widely implemented, its benefits and practicality are still debated, causing ongoing discussions among healthcare professionals. Nurses play a crucial role in promoting healthy behaviours and ensuring optimal nutrition, but conflicting advice from healthcare providers can lead to confusion among patients and their caregivers. Thus, the practicality and necessity of a strict low-bacterial diet are being re-evaluated and actively discussed within the medical community.

While these therapies aim to eradicate cancer cells, they also significantly impair the immune system, causing severe bone marrow suppression. Autologous HSCT has also been used to treat autoimmune diseases such as MS since the 1990s. In this approach, hematopoietic stem cells from the patient are used to reset the immune system. The process involves a conditioning regimen followed by the infusion of the patient's own stem cells, which eradicates autoreactive immune cells and facilitates the development of a new self-tolerant immune system (2).

During the early post-engraftment period, the risk of various infections remains, alongside possible immunological effects such as acute graft versus host disease (GvHD) following allogeneic transplants. This immune reaction occurs when the donor's immune cells find the patient´s cells unknown, potentially leading to a chronic condition. Commonly affected organs include the skin, liver, and intestines (9). Even recipients who experience a relatively smooth clinical course after their HSCT face an increased long-term risk for several conditions. These include cardiovascular disease, metabolic disorders (e.g., diabetes, dyslipidaemia, hypothyroidism, and osteoporosis) and secondary malignancies. Additionally, they may encounter gonadal and reproductive dysfunction and neuropsychiatric disorders (9).

Clinical care conditions in Uppsala

During hospitalization, patients are kept in protective isolation from the day they receive stem cells (day 0) until the recovery of neutrophil counts > 0.5 × 109/L. The conditioning regimen usually begins the day after admission and lasts for 1-7 days depending on the underlying disease. Patients are commonly isolated in a room with a bed, two chairs and a small table for approximately 2–4 weeks. According to isolation routines, patients are only allowed to leave their rooms to go outside the building or to visit a large corridor outside the ward (except for various medical/surgical examinations).

All patients have access to resistance exercise bands, dumbbells, exercise bicycles, walking poles and physiotherapist on request. Protective isolation routines also include a modified neutropenic diet with only a few restrictions in what to eat. Per the guidelines, all food should be freshly prepared or immediately frozen after cooking. Defrosted food must be heated to a specified temperature, and deliveries from fast food restaurants are prohibited.

Some patients undergoing autologous HSCT may spend their isolation period in an outpatient setting at home but are admitted for inpatient care if they suffer from severe side effects, such as infections or nutrition issues, or if they need more help for other reasons.

Physical activity

Physical activity is defined as "any bodily movement produced by skeletal muscles resulting in energy expenditure" (15). Exercise, a subcategory of physical activity, is supposed to be planned, structured, repetitive, and purposive, as it is aimed maintaining or improving physical fitness (15, 16).
Physical fitness refers to attributes related to the ability to perform physical activity and is measured using tests like the six-minute-walk-test (6MWT) (15).

Prehabilitation

Prehabilitation aims to improve patients' functional status to an acceptable level before they undergo medical treatment or surgery. Prehabilitation can offer several benefits to those undergoing HSCT, including optimized nutritional and functional status pretransplant, before admission to the hospital (17, 18).

Physical activity in cancer care

Evidence supports the safety and benefits of physical activity at any disease or treatment stage (19). Despite this, patients often become inactive after a cancer diagnosis, as they struggle to engage in exercise or physical activity in general, especially during treatment (20). National and international guidelines recommend regular exercise or physical activity for patients in any phase of cancer treatment. For healthy adults, 150 min of moderate-intensity exercise or 75 min of vigorous exercise weekly combined with resistance training twice weekly are recommended (21, 22). Recommendations for patients with cancer regarding frequency and type of exercise vary based on desired outcomes, such as therapeutic efficacy for anxiety, cardiotoxicity, fatigue, and health related quality of life (HRQoL). To improve physical function, moderate endurance or moderate-to-vigorous resistance training three times a week for 8-12 weeks is strongly recommended (22). Preliminary evidence suggests that exercise during cancer treatment may enhance treatment tolerance (23) and response (24, 25), although current evidence is insufficient in making any recommendations. Clinicians need to devote greater focus helping patients understand the role of exercise and physical activity in cancer care and to empower them to make informed decisions about their lifestyles (26).

Physical activity in HSCT settings

A meta-analysis of only randomized controlled trials (RCTs) evaluated the effects of exercise interventions in patients undergoing HSCT (27). Eight RCTs reported significant improvements in physical function, as evidenced by increased 6MWT distances, favouring exercise interventions conducted pretransplant, during hospitalisation, or at these times plus several weeks post-transplant. Regarding HRQoL, 11 studies demonstrated significant improvements measured at various time points throughout the HSCT process using the EORTC QLQ-C30, favouring the interventions. Fatigue was assessed in eight studies using the same HRQoL instrument, with results indicating less fatigue in the intervention groups compared to control groups (27). According to Fioritto et al., daily clinical instability in patients undergoing HSCT may hinder the intended delivery of standardized exercise training protocols, affecting adherence (28). Concurrently, patients seem to prefer a more flexible approach to physical activity that takes into consideration their individual symptoms and preferences (29). Behavioral change techniques, such as goal setting, self-monitoring, prompts, rewards and action planning, can motivate patients to stay physically active (19, 30, 31). Physical fitness is particularly important for HSCT recipients, as decreased physical function pretransplant is linked to lower overall survival and higher non-relapse mortality (32). However, for HSCT patients, the intensity and duration of exercise should be adapted to the clinical status of each individual (17). If severe side-effects, such as infections or bleeding occur, activity goals can be modified to promote sitting alone and maintaining basic activity of daily living (ADL) (17). For nurses caring for patients undergoing HSCT, it is important to help patients gain health improvements and prevent adverse events (e.g., pressure ulcers, back pain, pneumonia and sarcopenia) during the commonly inactive isolation period by encouraging them to be physically active, even if it means just sitting in a chair. Messages such as “something is better than nothing” or “being as active as current abilities allow” might be more realistic and meaningful compared to “brisk walking for at least 30 minutes” in those situations (26). Extensive bed rest has adverse effects on cardiovascular and muscular systems and causes respiratory complications, including decreased ventilation, atelectasis, and pneumonia (33), contributing to morbidity and mortality after HSCT (34). Thus, increasing the time patients spend sitting in a chair may be an important strategy in reducing time spent in a bedridden position, thereby limiting the duration of bed rest for this population. Frequently moving between the bed and chair is preferable if prolonged sitting is challenging.

Nutrition in HSCT settings

Anticancer drugs are increasingly being used not only to cure a growing number of patients but also to manage cancers that have become chronic conditions, as well as to treat non-malignant disorders. These treatments may be delayed or hampered by malnutrition and metabolic derangements in cancer patients, as well as by malignancy or its treatment (35). The EBMT identified malnutrition as the most common comorbidity during HSCT, as it has an impact on relapse rate, HRQoL, incidence of infections, costs, engraftment and survival (1). Patients suffering from hematological malignancies are, to varying degrees, already malnourished and sarcopenic prior to HSCT (11), but most patients start HSCT treatment relatively well nourished (36, 37). Despite this, patients frequently experience an elevated malnutrition rate during treatment. However, nutritional status is potentially modifiable through adequate nutritional support (36, 38). In general, optimized energy intake pre- and post-transplant is associated with better clinical outcomes (39), but we still do not know if nutritional support in itself is able to modify the outcome. The outcome may also depend on the extent of inflammation and catabolic processes following treatment (36).

There is no consensus regarding the best way to establish malnutrition (38). Various criteria and tools are used to assess nutritional status:

- **Anthropometric measures**: Weight and body mass index (BMI).
- **Phenotype criteria**: Unintentional weight loss, low BMI.
- **Etiologic criteria**: Reduced food intake.
- **Laboratory parameters**: Albumin.
- **Validated tool**: PG-SGA.
- **Functional testing**: Not used in my research but hand-grip strength could have been an option.

These methods aid in the comprehensive evaluation of a patient's nutritional health (1, 36). Albumin was measured regularly as part of medical routines but was not evaluated in our study. Despite their applicability in clinical practice, BMI and weight loss cannot alone be considered sufficient measures of malnutrition, taking into account possible fluid retention caused by treatment or acute inflammation.

The European Society for Clinical Nutrition and Metabolism (ESPEN) practical guidelines recommend nutrition risk screening for early identification and treatment of malnutrition. BMI, weight loss, and an index of food intake should be measured at diagnosis and monitored throughout the treatment and hospitalization period (40). Cioce et al. studied how food intake is affected in patients undergoing allogeneic HSCT. They found that patients started eating less from the first days of the conditioning regimen, often due to nausea and vomiting. In the following days, 70% of patients experienced diarrhea, which continued until around day 9 along with mucositis (41). At this time point, the majority of patients were not receiving adequate nutritional support. In addition, support after transplantation was often delayed (41). Malnourished patients are highly affected by decreased muscle strength. Patients with sarcopenia before HSCT are more prone to adverse events, highlighting the need for assessment and early intervention (42).

Suggested initial steps when establishing a nutrition care plan following the guidelines include identifying a key person responsible for nutrition care followed by validated malnutrition screenings, nutrition-focused physical assessments, medical nutrition therapy interventions, and ongoing monitoring (43). Additionally, a consultation with a dietician is recommended to optimize the nutritional status of HSCT candidates pretransplant (18).

Feasibility and acceptability

Feasibility testing allows for examinations of the uncertainties of interventions (e.g., adherence, cost-effectiveness or capacity of providers to deliver the intervention). It can reveal whether an intervention will play out in "real life" the way it was designed "on paper" (44). Depending on the results of the feasibility study, further work might be required to refine the intervention before a full-scale evaluation can be delivered. Abo et al.'s (2021) meta-analysis found that the feasibility of exercise in HSCT patients varied across RCTs. Consent rates varied from 23% to 99%, retention rates from 58% to 89% and adherence to the intervention from 24% to 92% (27).

In research, "acceptability" refers to the degree to which a study's procedures, interventions, or findings are perceived as suitable, satisfying, or agreeable by participants or the target population. (45). According to Sekhon et al. (2017), acceptability is a multifaceted construct reflecting the extent to which people delivering or receiving a healthcare intervention consider it appropriate based on cognitive and emotional responses. The framework identifies several components of acceptability, including affective attitude, burden, perceived effectiveness, ethicality, intervention coherence, opportunity costs, and self-efficacy. These components help in understanding how various factors influence the overall perception and acceptability of healthcare interventions (46). Acceptability assessments help determine whether an intervention is feasible in real-world settings. If a method is not acceptable, it may face resistance or non-compliance, rendering it unfeasible regardless of its theoretical benefits. By utilizing semi-structured interviews, researchers can gain comprehensive insights into the acceptability of behavioural interventions. This approach ensures that interventions are tailored to the needs and preferences of the target population, ultimately enhancing their effectiveness and sustainability (47).

Theoretical framework

Motivational interviewing

Originally described by William Miller in 1983 for treating alcohol use disorders (48), motivational interviewing (MI) has evolved into a patient-centered approach emphasizing partnership, acceptance, compassion, and evocation. It involves four key processes: engaging, focusing, evoking, and planning (Fig 1). These are supported by core skills: open-ended questions, affirming, reflecting, and summarizing (Fig 2).

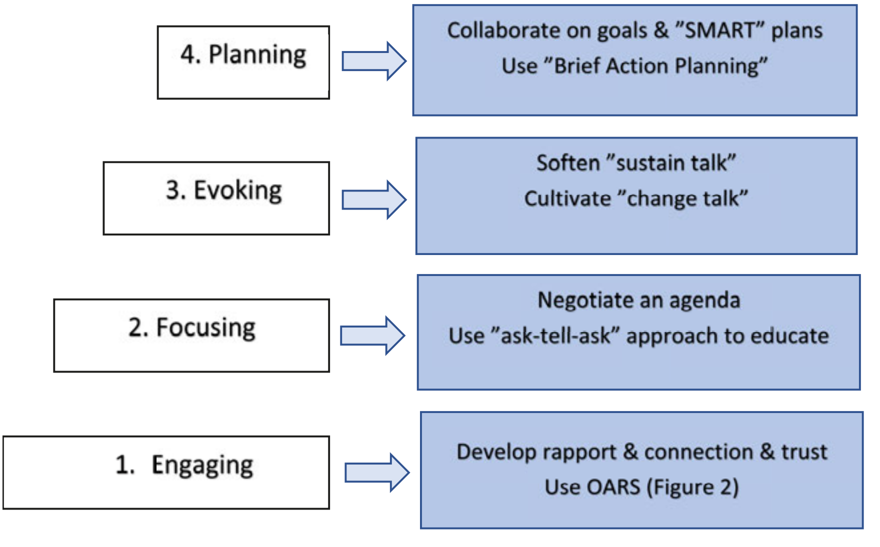

Figure 1. MI's four processes

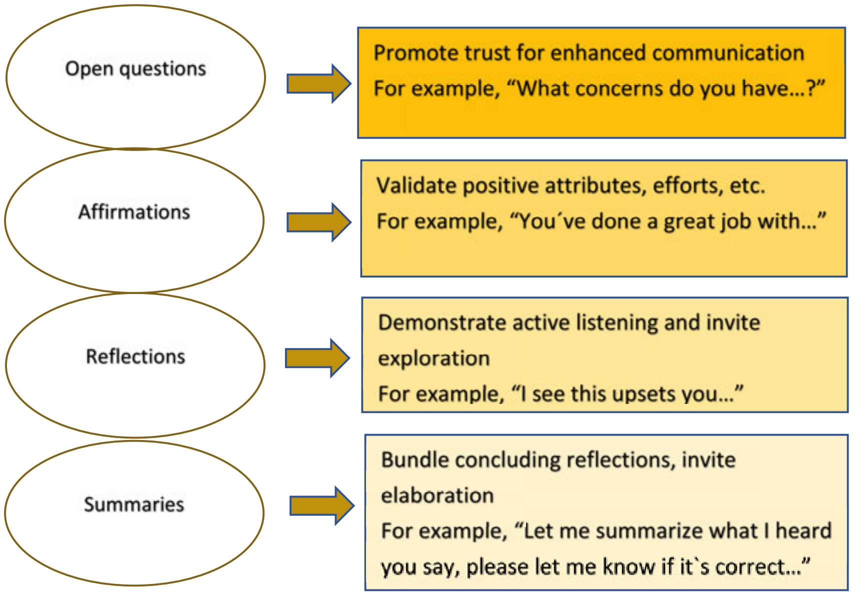

Figure 2. MI's four skills

MI is crucial in guiding and sustaining goal-related behaviors, making it effective in achieving specific goals within particular populations or contexts. A meta-analysis of 48 studies with 9618 participants showed statistically significant improvements in various health behaviors and outcomes such as body weight, sedentary behavior, self-monitoring, confidence in change and approach to treatment, using MI (49). Techniques such as brief action planning enhance patient self-management, fitting well within time-constrained environments (50).

Orem's self-care theory

Dorothea Orem defined self-care as the practice of activities individuals initiate to maintain life, health, and well-being (51). The practice aims to empower patients and their families to care for themselves and clarifies nurses roles when self-care or care for others is not possible (52). In rehabilitation settings, patients are encouraged to become independent. The interventions in my research comprise support regarding physical activity and nutrition using behavioral change techniques to strengthen participants´ own capability and motivation, in line with Orem´s theory. Nursing is needed when individuals cannot maintain the necessary self-care to sustain life, recover from illness, or cope with its effects. Orem identified self-care requisites as universal, developmental, or related to specific conditions, such as hospitalisation during HSCT. A self-care deficit occurs when individuals cannot meet their own needs, and it is the nurse` role to identify these deficits and provide appropriate support (51). This process was in my research integrated into the daily follow-up, with additional support being provided as needed when patients were unable to eat or get out of bed by themselves.

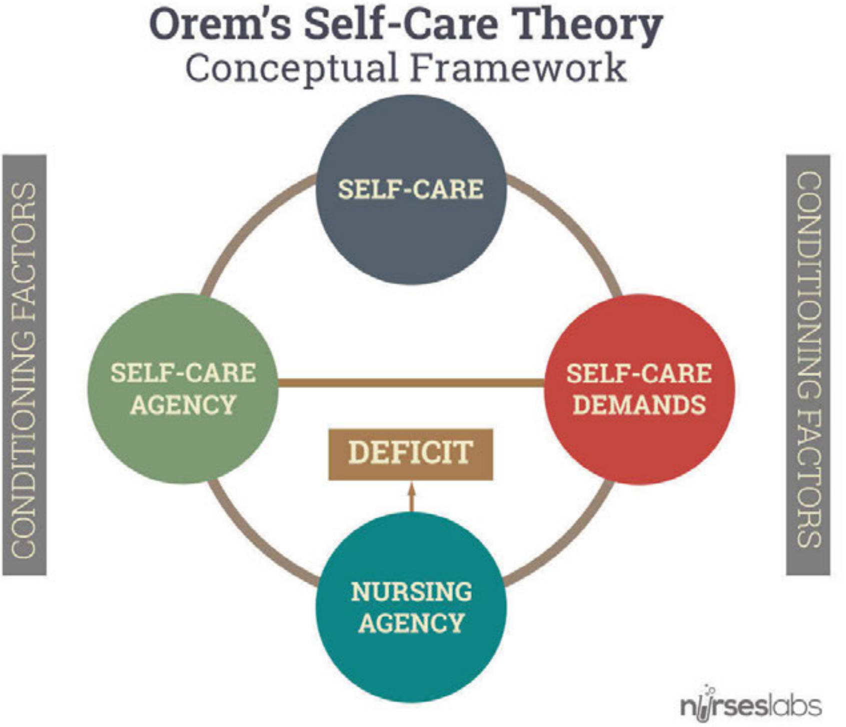

Figure 3. Orem`s self-care theory

Rationale

Physical activity in patients undergoing HSCT is safe and has the potential to improve physical function, HRQoL and fatigue while preventing complications caused by prolonged bedrest and sarcopenia. However, patients undergoing HSCT are diverse, requiring individualized support due to their varying levels of vulnerability during hospitalisation. Malnutrition can lead to delayed or missed treatments and, in the long run, increased non-relapse mortality. Adequate energy and protein intake may prevent malnutrition.

Several researchers have attempted to establish standardized physical exercise programs for hospitalized HSCT patients, but they often faced high attrition rates because the programs did not accommodate side effects such as fever and anaemia. Similarly, efforts to address and prevent malnutrition through various interventions have been made, but few have combined physical activity and nutritional interventions. Additionally, few studies have sought patients' perspectives on participating in these interventions.

Nurses involved in cancer care are experiencing a growing workload due to the medically intensive nature of cancer treatments. As a result, patients are frequently required to take an active role in their own rehabilitation. Orem's theory of self-care suggests that patients aim to maintain independence, while nurses provide the necessary supportive care to assist them. The theory also entails intervening partially or entirely when patients, for instance during hospitalization, are unable to manage their own deficits. There is a need to better understand how to assess and facilitate both physical activity and proper nutritional intake in patients undergoing HSCT, particularly during hospitalization. Few studies have explored the feasibility and acceptability of using behavioural change techniques, such as goal-setting, self-reporting, and follow-ups to support patient adherence and enable their participation in physical activity and nutritional interventions throughout the HSCT process. Understanding the patient's perspective is also crucial in implementing such support in clinical settings.

Aims

Overall aim

The overall aim of this licentiate project was to develop and evaluate nurse-led physical activity and nutritional interventions in clinical care for patients undergoing HSCT, with the ultimate goal being to reduce complications caused by physical inactivity and inadequate nutritional intake, increase quality of life and reduce the length of care.

Aim of Study I

Study I aimed to evaluate the feasibility of a nursing intervention designed to increase physical activity during hospital stays among patients undergoing HSCT. Additionally, it compared HRQoL, medical, and clinical outcomes between patients who received the intervention and those who were offered standard care.

Aim of Study II

Study II aimed to investigate the feasibility and acceptability of a nurse-led intervention supporting physical activity and nutritional intake in patients throughout the HSCT process.

Methods

Design

Study I was a feasibility study that used a quasi-experimental non-equivalent group pretest-posttest design, first including participants to a standard care group followed by including participants to an intervention group. Study II explored feasibility and acceptability from a single-arm intervention study using both quantitative and qualitative methods. A methodological overview is presented in Table 1.

Table 1, Design and methods of Studies I and II

Study	Design	Sample	Data collection	Data analysis
I	Quasi-experimental	43 participants undergoing autologous and allogenic HSCT	Self-reported activity diary, MET`s, 6MWT and Fact-An	Mann-Whitney U test and the chi-squared test
II	Single arm intervention and interview study	20 participants undergoing autologous and allogenic HSCT	Self-reported activity and diet diary, goal-settings and achievements, 6MWT, energy- and protein intake and semi-structured interviews (n=14)	Descriptive statistics and content analysis

Abbreviations: HSCT=haemopoietic stem cell transplant, MET= metabolic equivalent of tasks, 6MWT=6-minutes-walking-test, Fact-An= Functional assessment of cancer therapy – anemia scale

Study participants

Inclusion criteria for both studies were adults, ability to walk for at least 6 min with or without a walking aid and the ability to speak and write in Swedish.

Study I

Consecutive patients admitted for autologous or allogeneic HSCT, regardless of diagnosis, were approached. We first included participants receiving standard care to the comparison group from August 2015 to February 2016. This was followed by including patients to the intervention group between June 2016 and May 2017.

Study II

Patients scheduled for an autologous or allogeneic HSCT between October 2021 and August 2022 were screened for study eligibility. Participants whose treatment was changed to not include HSCT after consenting were excluded.

Fourteen participants were purposefully selected, invited and they consented to participate in a telephone interview conducted 14 days after discharge.

Intervention

Study I

The intervention group received physical activity support based on the MI approach. Support was delivered by the study nurse and consisted of consultations during the pretransplant visits, on admission, during the hospital stay and 14 days post-discharge. Behaviour change techniques (i.e., goal-setting, self-reported diaries and follow-up) were used.

<u>Individual physical activity goalsetting at admission</u>. The study nurse supported the goalsetting by suggesting activities (e.g., “go for a walk,” “ride an exercise bike” or “do resistance band exercises”) and encouraging participants to set frequency goals (e.g., going for walks daily) with the possibility to re-evaluate on a daily basis if necessary. To reduce time spent in bed during their waking hours, the participants also set a sitting-in-a-chair goal. The study nurse made the goals visible by writing them on a whiteboard in the participant`s room and in their medical record as part of an individual care plan.

<u>Daily follow-up on goal achievement (weekdays).</u> The study nurse monitored the use of the activity diary and activity goal fulfilment and if necessary, helped the participants register activities. Based on MI techniques such as reflective listening, rolling with resistance and supporting self-efficacy (53, 54), the study nurse supported motivation and autonomy to help the participants reach their “out-of-bed” goals. The follow-up visits also allowed the opportunity to give advice and suggestions on how to increase physical activity. Such advice included, for example, instructions on how to use resistance band, when and where to walk, and planned rest as well as the importance of doing so.

After discharge from the hospital. Following discharge, participants received a phone call from the study nurse encouraging them to maintain an active lifestyle.

The participants in the standard care group were informed pretransplant that previous studies had indicated that physical activity is important for people undergoing HSCT and that our long-term aim was to improve patient care regarding physical activity. Like the participants in the intervention group, they were instructed to keep an activity diary throughout their entire hospital stay, but they did not receive any additional physical activity support from the study nurse.

Study II

The intervention comprised the same physical activity support as in Study I. Additionally, the intervention supported nutritional intake in several ways, such as a self-reported diet diary, dietician consults and nutritional follow-up by the study nurse (Figure 2).

Nutritional counselling by a dietician. Counselling occurred on two occasions and was based on a 3-day food diary. At the pretransplant visit, the counselling was characterized by the offering of individual advice aimed at optimizing patients` nutritional status before HSCT through a diet rich in calories, protein and fluids. Eight days after stem cell infusion, advice given aimed to minimize weight loss and maintain energy and protein intake, with the dietician offering suggestions regarding supplements better tolerated than usual food.

Daily follow-up on nutrition status. The study nurse followed up on patients` nutritional status based on standard care procedures and the dietician's individual advice. The same day participants started experiencing eating problems, the study nurse provided additional support by recommending more energy- or protein-dense foods and by serving nutritional drinks and supplements for the participants to taste. The study nurse also initiated or took part in the clinical decisions regarding how nutritional problems should be remedied, including decisions having to do with parenteral nutrition, both with the participants and the treating physician.

After discharge. Following discharge, the study nurse followed up on the nutritional intake and physical activity prescription by phone at 14 days and 6-months posttransplant.

Data collection

Study I

Feasibility was evaluated using data from the physical activity diary and the 6MWT. Goalsetting was used but standardized to four goals for the participants to choose between. The metabolic equivalent of task (MET), a well-established method for measuring self-reported physical activity, was calculated for each day of a patient´s hospital stay.

Physical activity diary

The study-specific activity diary was tested several times. Initially, random patients undergoing HSCT used it for a week and provided feedback. After making some minor adjustments, it was then used by patients in an intervention study for a master's degree. There is a method for reporting exercise adherence by describing frequency (sessions per week), intensity (exertion level), time (session duration) and type (e.g., aerobic or resistance training) called FITT (55). The activity diary used in the two studies was developed using FITT principles.

The participants used the diary to register all activities outside bed, such as outdoor walking, cycling, resistance band exercises, taking a shower or sitting in a chair. They could use it as a “check list,” allowing them to reflect on the set goals, or just to summarize the achieved goals at the end of the day. It was built to be user-friendly with suggested activities corresponding to clinical possibilities. Sedentary behavior was included as a physical activity option primarily to avoid prolonged bed rest but also to promote the possibility of achieving the goals even during days in which patients experienced clinical hardships such as fever or vomiting

6MWT

The 6MWT is an easy and reliable way to assess physical function in patients undergoing HSCT. All that is required to carry out the test is a corridor with a measured distance (30 m), a pulse oximeter (for measuring heartbeats and saturation before and after), a sheet to draw a line for each performed 30 m distance, a stopwatch (a mobile phone) and a Borgs RPE scale visualized. The study nurse instructed the participants to walk as fast as possible for 6 minutes while never reaching a jog or run. The participants were observed the whole time, and were asked if they felt okay once or twice. The distances achieved were calculated and registered in each participant`s medical record and compared from pretransplant to admission and from admission to discharge.

Study II

Feasibility regarding physical activity was evaluated using data from both the physical activity diary and the 6MWT as described above. The goalsetting was not standardized in the same way as in Study I (see Table 2 for examples).

Table 2, Goalsetting examples

Sitting goals	Walking goals	Other activity goals
Sit in a chair at least 3 h per day, distributed over 3-5 occasions	Two indoor walks daily	Dumbbell exercise
Limit bed rest	Daily walks outdoor	Rubber band exercise
Sit up daytime	Daily walks, 1 hour	Ride the exercise bike for at least 40 min

Feasibility regarding nutrition was evaluated using data from the diet diary RiksmatenFlex and registered energy and protein intake. The follow-up of nutritional intake was conducted according to Figure 4. Upon admission, all patients underwent a malnutrition risk assessment, as documented in their medical records. Based on their BMI, energy and protein intake requirements were calculated. Throughout their hospitalization, dietary intake was recorded twice weekly, and daily weights were monitored. If patients met their intake goals during the biweekly assessments, this frequency continued. If not, they received guidance on enriched diets and nutritional supplements, and daily dietary intake was recorded. If daily monitoring confirmed the achievement of intake goals, the modified diet plan continued. If not, the next step involved total parenteral nutrition (TPN) or partial parenteral nutrition (PN) alongside some oral intake.

Acceptability was evaluated from interviews performed posttransplant using a semi-structured study-specific interview guide with open-ended questions. Interviews were carried out by telephone 14 days after hospital discharge. Selected patients were asked about possible participation in an interview and gave their written consent before leaving the hospital.

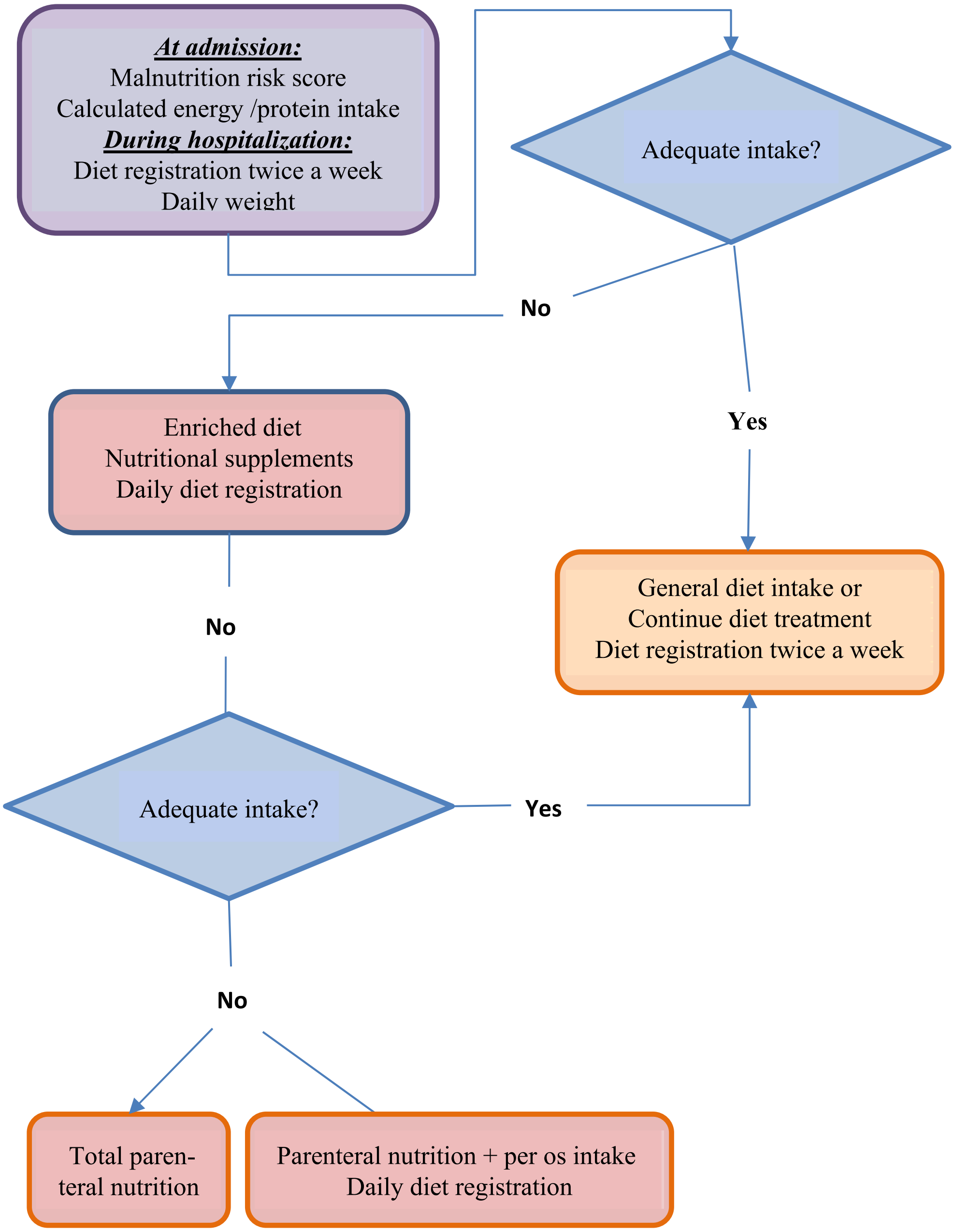

Figure 4. Nutritional plan for follow-up.

Data analysis

Study I

Based on the intensity of each activity mentioned in the activity diary, MET hours were calculated by summarizing time spent, converting minutes to hours and finally multiplying time spent with suggested MET values. The 6MWT distances were compared for differences in meters between groups at admission and discharge. Regarding HRQoL and fatigue, results for the Fact-An consisting of Fact-General (Fact-G), assessing physical well-being (PWB), social well-being (SWB), emotional well-being (EWB), and functional well-being (FWB) and the anaemia subscale (AnS) including a fatigue scale, were compared between the two groups. All mentioned data were analyzed using the Mann-Whitney or chi-squared tests. No within group analyses or comparing of improvements between groups (difference-in-differences) were performed.

Study II

Descriptive statistics were carried out as follows:
The recruitment rates were calculated based on how many eligible patients were approached and how many approached patients wanted to participate and are presented in *percentages.*

Adherence to behavior change techniques was calculated based on how many participants performed goal-setting and how many achieved the set goals. The results are presented in *percentages*. Consultations and follow-ups with the dietician were counted, using notes from each medical record, and are presented as *frequencies.* Follow-ups by the study nurse were only reported, not calculated.

Adherence to self-reporting data was calculated based on the physical activity recorded in the activity diary, converted to minutes, and presented in *means and standard deviations* regarding both sitting time and total physical activity time. We also present *ranges* because these can enhance the understanding of the data. Food intake, based on the diet diary, is presented according to how many participants used the diary both pretransplant and during hospitalization, in *percentages.*

Adherence to assessments was calculated by achieved 6MWT distances and are presented on a group level in *means and percentages.* Regarding how many participants reached 400 m, these figures are presented as *frequencies.* Information on registered food intake from the medical records is presented on a group level as *mean percentages* regarding achieved energy/protein intake.

The interviews were analyzed using manifest content analysis as described by Graneheim och Lundman (2004) (56). Initially, transcripts were read multiple times to extract key words and concepts for coding. Three transcripts were independently coded, and the findings were discussed to reach consensus. The remaining transcripts were then coded, and these codes were reviewed for accuracy. The codes were grouped into sub-categories, which were compared and refined into main categories. Finally, the three main categories were examined to ensure clear distinctions and appropriate alignment with the data (56).

Ethical considerations

Studies I and II were approved by the Swedish Ethical Review Authority (Study I, Dnr 2015/090 and Study II, Dnr 2021-03485). Both adhered to the General Data Protection Regulation (GDPR) standards. In accordance with the 1964 Helsinki Declaration and its later amendments or comparable ethical standards, all participants received both written and verbal information, got the opportunity to ask questions, provided written consent forms before participating and were guaranteed confidentiality. The study nurse who carried out the interventions also worked as a clinical nurse in the ward. This could have created a sense of dependency among the participants, as they might have felt obligated to please the nurse. However, to prevent this, the study nurse made sure not to manage any of the participants in the study while carrying out clinical duties. The interventions were designed to enhance the care of patients undergoing HSCT, with assessments chosen to benefit the patients. While potential risks exist if physical activity is performed incorrectly (e.g., inexperience with heavy dumbbell exercises or excessively high endurance intensity when having low platelets counts), these were minimized through daily follow-ups and access to a physiotherapist and medical staff during hospitalization.

Answering questionnaires could be perceived as invasive, but patients were repeatedly informed by the study nurse that participation was voluntary and that they could withdraw their consent at any time. In Study II, participants might have felt stressed answering questions about a challenging period in their lives, but they could disengage at any time. The questions were focused on their intervention experiences, not on their diagnosis or the HSCT itself. An independent researcher who was not involved in the intervention`s execution conducted the interviews to ensure participants could speak freely.

Results

Characteristics of participants in both studies are presented in Table 3.

Table 3, Clinical characteristics

	Study I Standard Care	**Study I Intervention**	**Study II**
	n=22	n=21	n=20
Age (mean, min-max)	52 (20-71)	52 (22-69)	56 (22-70)
Time in hospital (days)	20 (13-42)	24 (16-41)	28 (18-39)
Gender			
Female	8	16	6
Male	14	5	14
Allogeneic stem cell transplant	**6**	**10**	**17**
ALL	1	2	1
AML	3	3	7
MDS		1	3
CLL			1
T-PLL	1	1	1
Aplastic Anemia		1	2
Myelofibrosis		2	2
Thalassemia	1		0
Autologous stem cell transplant	**16**	**11**	**3**
Myeloma/Amyloidosis	10	7	1
Lymphoma	3	2	2
Multiple sclerosis	3	2	0
Outpatients	5	1	1

Study I

On average, the participants in the intervention group spent significantly more time out of bed and were more physically active compared to participants in the standard care group (Table 4).

Table 4. Differences between patients who received support in being physically active and those who received standard care in Study I

	Standard care n=22, Median (Min-Max)	**Intervention** n=21, Median (Min-Max)	*p*
Sitting in a chair, hours	4.25 (1.50-15.00)	6.25 (0.75-12.25)	**0.053**
Physical activities, hours	0.75 (0.08-3.00)	1.00 (0.50-2.75)	**0.034**
Bedridden, hours	19.50 (8.25-22.00)	16.75 (10.00-22.50)	**0.034**
Number of activities out of bed	3.3 (1.2-6.3)	3.9 (2.1-8.4)	0.453
Borgs RPE scale	10 (7-13)	11 (6-16)	0.076

Mann-Whitney U-test, $p = 0.05$

Study II

The intervention was feasible and acceptable based on the consent rate and adherence, but the diet diary during hospitalization was not. Regarding the recruitment rate, 27 out of 52 eligible patients were approached (52%). All participants set physical activity goals, received daily (weekdays) follow-up visits from the study nurse and kept an activity diary during hospitalization. The goals were generally not time-bound and comprised sitting time and daily walks, 13 participants set 1-2 additional goals (Table 2). A majority of the participants spent an average of 42 min being physically active at a moderate-to-vigorous intensity, expressed as 12-18 on the Borgs RPE scale. All participants reported daily walks and were physically active 1 hour a day.

Regarding physical function using the 6MWT, participants increased their walking distances by an average of 37 m from pretransplant to admission and decreased their distances by an average of 59 m from admission to discharge.

Regarding nutritional intake, participants were monitored twice a week (Mondays and Thursdays) from admission to discharge and daily when they were not achieving their calculated intake goals two times in a row. Eight participants needed parenteral nutrition for 5-24 days, having been treated with different types of conditioning regimens, and they represented varying ages.

The participants reached their calorie intake goals to a large extent (Fig. 5) but their protein intake goals to a smaller extent (Fig. 6).

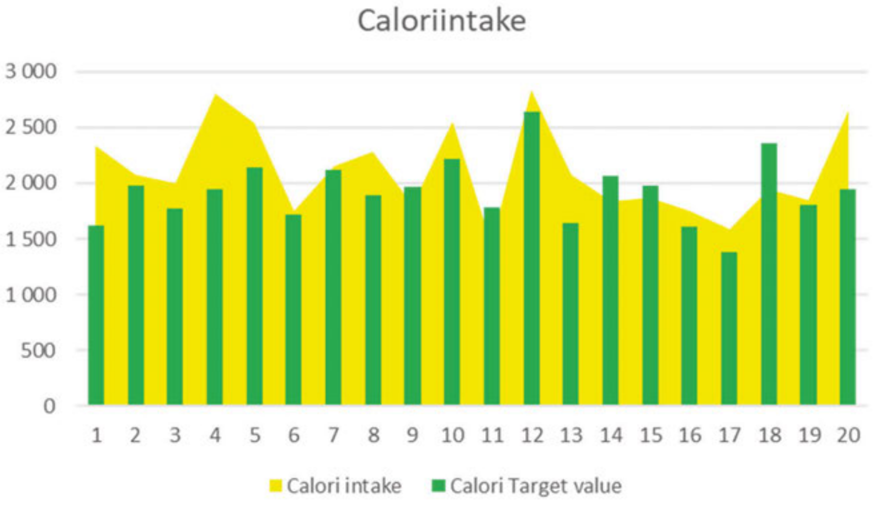

Figure 5, Mean calorie intake and calorie target value for all participants during hospitalisation in Study II

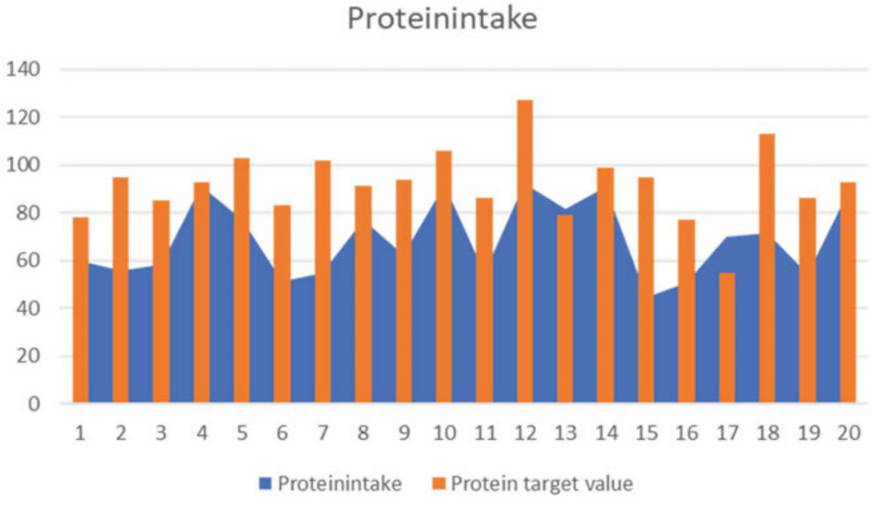

Figure 6, Mean protein intake and protein target value for all participants during hospitalisation in Study II.

Discussion

The physical activity intervention was considered feasible, with Study I presenting data in favor of the intervention. The intervention including nutritional components in Study II failed to be feasible regarding recruitment of study participants and adherence to the diet diary during hospitalization. We experienced recruitment challenges even in Study I, but these challenges did not result in a feasibility outcome issue as in Study II. This is a general problem found in similar intervention studies on the HSCT process, especially when assessments were conducted pretransplant (57). Kuehl et al. (2023) and Wood et al. (2020) both stopped recruitment to their physical activity interventions early because of major short-term planning challenges caused by the changing clinical status of patients and donor availability. They also mentioned other organizational issues, such as a reduced workforce and lack of time in including patients, questioning whether the chosen approaches align with the clinical patient flow and the specific needs of allogenic HSCT patients and their medical providers (57, 58). It is beneficial for patients undergoing HSCT to be in optimal physical condition at the time of transplantation. Although our pretransplant intervention primarily involved providing information and encouragement, this may have been sufficient motivating participants to improve their physical function through increased physical activity and adequate nutrition (59). The results of the 6MWT at admission in Studies I and II may point in that direction regarding physical function. Similarly, the improved malnutrition risk scores from pretransplant to admission in Study II indicate the positive impact of the dietician's promotion of optimized nutritional intake.

In Study I we suggested "sitting" to be an important strategy in avoiding prolonged bed rest. No study has presented data on "sitting time" compared to time in bed before, but we thought that this measurement would be of importance in this very vulnerable group of patients to avoid health problems associated with being bedridden night and day. Sedentary behavior is not recommended for patients undergoing cancer treatment, but given the challenges of high fever, infections, vomiting, and mucositis in HSCT settings, "sitting in a chair" can be a beneficial break from "lying in bed". Some participants in our studies found even sitting to be very exhausting during the isolation period a finding supported by Morishita et al. (2017), who described it as a "sedentary intensity physical activity" (60).

Motivating patients undergoing HSCT to be physically active during the isolation phase can be challenging. Despite this, studies have shown that these patients can increase their levels of physical activity and benefit from it (29). In the late 1990s, Dimeo et al. proposed a bicycle made for bedridden patients (61), while other studies have randomised patients to standard care or daily exercise programs featuring a wide variety of tools, such as bicycles and strength training equipment, to increase physical activity during hospital stays (27, 62). Studies I and II revealed that participants require different approaches to motivate them toward engaging in physical activity and proper nutritional intake. While some participants quickly embraced these changes, others needed guidance from the study nurse to move forward. Some participants needed ongoing support from the study nurse and the staff to eventually regain their self-care abilities and return home. Orem's theory remains relevant, emphasizing the inherent desire for self-care even during illness phases, such as during HSCT.

To foster motivation using an MI approach, the behaviour change techniques used in the present studies seem to be both feasible and acceptable. As such they should be considered for implementation in clinical practice. *Goal setting* and *self-reporting* are simple yet effective techniques for promoting physical activity, especially during hospitalization. In the context of nutrition, setting “calculated intake goals” is essential for preventing malnutrition. However, participants in Study II did not find these goals sufficiently motivating to overcome challenges like loss of appetite or painful mucositis. This suggests that while healthcare workers should be aware of these goals, many patients struggle just to eat something at all, and the goals themselves may not provide significant motivation. Additionally, the study nurse found it impractical to request nutritional self-reporting, as it was seen as an extra burden and more difficult to monitor compared to physical activity goals. It required knowledge of calorie and protein content, which many participants found overwhelming. Despite these challenges, the majority of participants in Study II successfully used the diet diary as an assessment tool before their pretransplant dietician appointment, encountering only minor difficulties. However, all participants in both studies appreciated and highly valued the *social support*; the follow-up by the study nurse but also support given by relatives.

All patients undergoing HSCT will experience anemia, thrombocytopenia and an erased immune system, which results in several risks, and a majority will suffer from side effects from the conditioning regimen. Physical activity levels and nutritional intake will be impacted, suggesting that a combined intervention represents an advantageous strategy.

Methodological considerations

The interventions were conducted at the Hematology Department in Uppsala, Sweden, where some level of support for physical activity was already integrated into regular clinical care. To prevent the spread of the new physical activity support regimen to the control group in Study I, we initially enrolled the control group before the intervention group. While an RCT might have produced more balanced groups, the risk of diffusion supported a quasi-experimental pre-posttest design. Study II was designed to include participants matching those in Study I, allowing the comparison of the effects from receiving only physical activity support and receiving both physical activity and nutritional support. During the planning phase we began transferring patients with myeloma and some with lymphoma from other regions back to their local hospitals the day after receiving stem cells. This made it impossible to equally match participants to those in Study I, where the majority were myeloma patients. As a result, recruiting enough patients to match the diagnoses as well as transplant manner in Study I became exceedingly difficult. To evaluate the feasibility of the combined intervention, we incorporated an interview component to assess participant acceptability. This allowed participants to share their experiences with the intervention, making it easier to implement. From the patients` viewpoint, the content, context, and quality of care received can significantly influence acceptability. When an intervention is perceived as acceptable, patients are more inclined to adhere to treatment recommendations, leading to potential improvements in clinical outcomes (46). From the healthcare professionals' perspective, if a specific intervention's delivery is deemed to have low acceptability, it may not be implemented as intended. This lack of adherence could potentially impact the overall effectiveness of an intervention (46).

Why two feasibility studies? As previous established, it is challenging to recruit participants and conduct RCTs on physical activity and nutrition during the HSCT process. Nevertheless, we were aware of the benefits a combined intervention could imply for our patients and we wanted to find out how to intervene to make a difference or an impact. Designing two different interventions with the first focused on physical activity, comparing feasibility and efficacy outcomes between a treatment group and a control group. The second explored the feasibility of combining physical activity and nutrition in a single-arm study. These efforts added valuable knowledge that may help implement a modified intervention in clinical practice. We added acceptability to Study II because if an intervention is considered acceptable, patients are more likely to adhere to treatment recommendations and to benefit from improved clinical outcomes.

Conclusion

A structured intervention to increase physical activity in patients undergoing HSCT conducted in a clinical environment appears to be feasible. Increased physical activity may be linked to improved HRQoL, indicated by clinically important differences in the Fact-An. Additionally, a nurse-led intervention that incorporated optimized nutrition alongside physical activity support was feasible in most respects, although challenges were noted with recruitment rates and adherence to the diet diary during hospitalization. The combined intervention was evaluated for acceptability, and participants reported that it met their needs and expectations.

Clinical implications

The HSCT coordinator should arrange a pretransplant appointment with a dietician for patients to ensure they are physically well-prepared. This consultation will guide patients in making optimal nutritional choices before admission, helping them achieve the best possible condition for the procedure. Written information on physical activity and encouragement from the physician during the pretransplant appointment is also important. At admission, physical activity goals should be set using the "SMART" procedure because it provides a structure that might increase the effectiveness and clarity of goals. By establishing SMART goals, healthcare providers can adjust goals when needed to optimize physical activity levels for patients undergoing HSCT. This approach increases the likelihood of achieving the desired outcomes and supports overall patient well-being and recovery.

If possible, patients should be encouraged to use an activity diary or logbook to increase their awareness of daily activity levels and to empower them to take responsibility for their own physical activity. Keeping a record of daily activities can be motivating, as patients would see their efforts documented and the diaries can provide valuable information for healthcare providers, who can then adjust the physical activity plan. Daily follow-ups on both physical activity and nutrition should be conducted by regular nurses or a few dedicated nurses. A suggestion is to establish a team with experienced/trained nurses and let them (scheduled) follow-up on physical activity and nutrition on a daily basis, implementing and further developing our adapted intervention. Additionally, more hands-on support should be planned when patients experience deficits, thus leveraging the expertise of multiprofessional teams.

Svensk sammanfattning

Varje år genomförs mer än 50 000 hematopoetiska stamcellstransplantationer i Europa och antalet fortsätter att stiga. En stamcellstransplantation, där patienter får nya blodbildande stamceller, kan antigen vara allogen eller autolog. En autolog transplantation innebär att patienten får sina egna stamceller tillbaka efter att de ”skördats” vid en tidpunkt då sjukdomen befunnit sig i lugnt skede. Stamcellerna återges sedan som ett stöd efter cytostatikabehandlingens benmärgstoxiska effekt. Vid en allogen transplantation erhåller patienten stamceller antingen från en familjemedlem, som regel ett syskon, alternativt från en registerdonator någonstans i världen.

Patienter som läggs in på en hematologisk vårdavdelning för att genomgå en stamcellstransplantation blir under större delar av tiden isolerade på ett rum med en säng, ett bord, en fåtölj och en TV. Isoleringen syftar till att skydda patienten som på grund av den kraftiga cytostatikabehandling som ges blir utan immunförsvar i 2–4 veckors tid, ibland längre. Vårdtiden är påfrestande på flera sätt och kantas ofta av infektioner, trötthet, smärta och låga blodvärden. Risken för inaktivitet är mycket stor och det är ofta en utmaning att lyckas motivera patienterna att vara fysiskt aktiva då många känner sig uppgivna och helst bara vill ”sova bort” isoleringstiden. Cytostatikabehandlingen skadar kroppens slemhinnor vilket kan ge upphov till smärtsamma sår i mun, hals och övriga mag-tarm-kanalen, s.k. mucosit, vilket i sin tur försvårar matintag. Studier har visat att fysisk aktivitet kan öka funktionsnivån, öka välbefinnande och minska fatigue för stamcellstranplanterade patienter. Utan någon form för aktiv uppföljning är det uppskattningsvis mellan 30–60% av de stamcellstransplanterade patienterna som är sängliggande 17–20 timmar av dygnet utan att använda sig av varken motionscykel eller möjligheten till promenader utomhus.

Nutritionsproblem är vanliga inom cancervården och är ofta huvudorsaken till en snabb och kraftig viktnedgång med förlust av muskelmassa och näringsdepåer. Patienter som skall genomgå stamcellstransplantation är i många fall malnutrierade innan behandlingen påbörjas, och studier visar att malnutrition orsakar längre vårdtider, fler komplikationer och ökad mortalitet. Det övergripande målet med all kostbehandling är en fullgod nutritionsstatus för att uppnå bästa effekt av transplantationsbehandlingen, vilket också innefattar energi för att orka vara fysisk aktiv. Det gäller då att tillaga och anpassa kosten efter individuella förutsättningar. För att förebygga malnutrition är det viktigt att tidigt uppmärksamma och sätta in åtgärder för de patienter som riskerar att bli eller redan är malnutrierade.

Övergripande syfte

Det är svårare att påbörja en motivationsinsats gällande fysisk aktivitet och nutrition när patienten redan påbörjat sin behandling och erfar biverkningar. Det vore därför av stort värde att kunna informera och ha motivationssamtal redan innan patienten läggs in eller påbörjar sin behandling. Att kunna göra regelbunden uppföljning under vårdtiden med hjälp av rätt kompetens har också potential att avsevärt förbättra patienternas livskvalitet. Övergripande syfte var att utveckla metoder för ett optimalt omhändertagande av stamcells-transplanterade patienter gällande fysisk aktivitet och nutrition på en hemato-logisk vårdavdelning, med syfte att minska komplikationer, öka livskvaliteten och förkorta vårdtider. I genomförbarhetsstudier kan redan kända forsknings-resultat utvärderas i klinik och komma patienterna till godo på ett praktiskt och ändamålsenligt sätt.

Delstudie I

Syftet med studien var att undersöka huruvida evidensbaserad omvårdnad av-seende fysisk aktivitet i samband med stamcellstransplantation påverkar fy-sisk kondition, komplikationsfrekvens, livskvalitet samt vårdtidens längd. Studien inkluderade 43 patienter (22 i kontrollgruppen och 21 i interventions-gruppen) som identifierades i samband med att de planeras för stamcellstrans-plantation. Interventionen utfördes av studieansvarig sjuksköterska och bestod av 1) samtal innan transplantation med fokus på betydelsen av fysisk aktivitet 2) individuell målsättning gällande fysisk aktivitet framtagen tillsammans med patienten, 3) Fysisk aktivitet på Recept (FaR) skrevs ut vid hemgång med uppföljning efter 2 veckor. Sex minuters gångtest (6MWT) genomfördes vid 2 tillfällen (vid inskrivning samt vid hemgång), daglig aktivitetsdagbok som patienten ansvarade för, samt ett frågeformulär för att mäta livskvalitet vid tre tillfällen. Aktivitetsdagboken beskrev hur ofta patienten satt uppe, cyklade på motionscykel, promenerade utomhus eller utförde andra aktiviteter (som t.ex. dusch), hur länge aktiviteten pågick och hur ansträngande det upplevdes. Re-sultaten visade att deltagare som formulerade mål och följdes upp av en sjuk-sköterska var mer aktiva än gruppen som inte fick det stödet.

Delstudie II

Studiens syfte var att undersöka om en kombinerad intervention gällande fysisk aktivitet och nutrition riktad till stamcellstransplanterade patienter skulle vara genomförbar. Vi ville också undersöka deltagarnas erfarenheter av att delta i interventionen. Tjugo patienter deltog i studien (3 autologa), och 14 av dessa tillfrågades om att delta i en intervjustudie 2 veckor efter avslutad vårdtid. Delen med fysisk aktivitet omfattade 1) ett samtal med studieansvarig sjuksköterska innan transplantationen med fokus på betydelsen av att vara fysisk aktiv, 2) målformulering vid inskrivning, 3) daglig uppföljning under vårdtiden, och 4) ett FaR vid utskrivning.

Nutritionsdelen följde Socialstyrelsens riktlinjer för nutritionsbehandling på sjukhus men omfattade också att en dietist träffade alla patienter, gjorde en nutritionsbedömning baserad på en tre dagars kostdagbok (RiksmatenFlex) och gav nutritionsråd innan transplantationen samt vid ett uppföljningstillfälle under vårdtiden. Studieansvarig sjuksköterska följde upp patienterna dagligen (vardagar), 14 dagar efter utskrivning och efter 6 månader gällande intag av mat och dryck. Avdelningens rutiner kring mat- och vätskeregistrering följdes i samarbete med övrig personal. Fjorton patienter intervjuades av en oberoende person som inte varit delaktig i studien. Frågorna handlade om erfarenheter av att vara fysiskt aktiv samt att få kostråd under vårdtiden. Resultaten visade att intervention i stora delar är genomförbar och att deltagarna var fysiskt aktiva och fick i sig tillräckligt i stor utsträckning. Deltagarna uttryckte i intervjuerna att de uppskattade stödet.

Acknowledgement

Det har varit en lång men otroligt spännande resa att vara doktorand, och jag har många att tacka för allt jag lärt mig på vägen.

Jag vill börja med att tacka tidigare verksamhetschef Hans Hägglund som trodde på mina idéer och gav mig möjligheten att bli klinisk doktorand på hematologen. Min första projektgrupp som la grunden för min forskning: Hans, Torbjörn, Anna, Emelia och Sophia – vilka bra idéer vi utvecklade tillsammans!

Jag vill uttrycka min största tacksamhet till alla patienter som deltagit i mina interventioner - utan er skulle inget av det jag gjort varit möjligt, ni är min ständiga källa till inspiration! Personalen på hematologen, både på avdelning och mottagning, chefer och läkare, förtjänar också ett stort tack - att jag har möjlighet att arbeta med människor som verkligen bryr sig och som alltid gör det bästa för sina patienter, motiverar mig varje dag att fortsätta utvecklas.

Ett mycket varmt tack går till mina handledare, särskilt till Lena Wettergren som varit min huvudhandledare de senaste åren, och som tagit mig igenom denna licentiatprocess. Du är en naturkraft med en outsinlig kapacitet som med en fantastisk glöd driver både dig själv och de runt dig framåt! Birgitta Johansson, min första huvudhandledare, du har alltid kommit med kloka råd och trott på mig genom hela processen - utan dig hade jag aldrig börjat som doktorand, tack för att du funnits med hela vägen! Anna Robelius, tack för din fantastiska förmåga att förmedla hematologi och för att du varit med från tidigt projekt till licentiat. Karin Nordin, som trots tajt schema deltog i min handledning de första åren, och sedan Anna Henriksson som kom in med energi och engagemang de sista två åren – ert stöd har varit ovärderligt. Maria Carlsson, din hjälp med intervjustudien och din långa erfarenhet bidrog till betydande kvalitet.

Ett stort tack går till Karin Jontell, dietist i studie II och genom nutritionsteamet en god vän och doktorandkollega – framöver hejar jag på dig! Anders Thelander, kollega i nutritionsteamet, din förmåga att förmedla kunskap och alla skratt har gett energi på tunga dagar, vilket har varit guld värt. Kristin och Anneli – utan er inget inspirerande nutritionsteam!

Tack till forskningsgrupperna jag fått vara en del av och all inspiration ni gett! Ett särskilt tack till Rebecca och Anne Sophie – ni har hjälpt mig och varit ett större stöd än ni förstår, vilka stjärnor ni är!

Kjerstin Larsson, min första handledare, gjorde magisteruppsatsen till en fantastiskt rolig upplevelse – du är en inspiration! Tack också till mina vänner som jag inte kunnat prioritera som jag velat långa perioder – tack för att ni funnits där för mig ändå!

Sist men inte minst vill jag tacka min familj – Mattias och våra tre döttrar Julia, Pernilla och Sandra (samt svärsöner Jonatan och Johannes). Jag kan inte nog tacka för att ni alltid ställer upp för mig och för att ni alltid supportar mina många infall och idéer genom åren – love you to bits! Ett stort tack också till min norska familj i Mandal – ni är klippor som alltid står fast och som gläds med mig oavsett vad jag gör!

Slutligen, till mina två barnbarn Janelle och Lucia – ni är guldkanten på tillvaron, vilken ynnest att få finnas i era liv!

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