Is it possible to increase the amount of physical activity in patients isolated due to stem cell transplantation?

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Research article

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Abstract

Abstract

Purpose: To investigate if physical activity (PA) support could increase PA and health-related quality of life (HRQoL) in patients isolated after haematological stem cell transplantation, compared with standard care.

Methods: A prospective historical control group design was used. Patients were sequentially included in a standard care group (SCG, n=22) or a physical activity support group (PASG, n=21). PASG patients received PA support at a pre-transplantation consultation, daily during admission, and at follow-up 14 days post-discharge. All participants undertook a 6-minute walking test (6MWT) at the beginning and end of their hospital stay. HRQoL was evaluated using the Functional Assessment of Cancer Therapy – Anaemia scale. Patients reported all PA, including sitting, throughout their hospital stay. Metabolic Equivalents of Task (METs) were calculated.

Results: PASG patients spent more time sitting and doing various activities, and less in bed, than SCG patients (p=0.03–0.06). They had more calculated METs for total PA out of bed (p=0.02) and time spent sitting (p=0.05). PASG patients walked further in the 6MWT than SCG patients at baseline (p=0.02) and at discharge, but not significantly. There were no statistically significant differences in HRQoL, but PASG patients had clinically important less fatigue at discharge and clinically important better HRQoL 6 months post-discharge.

Conclusions: Providing stem cell patients, pre-transplantation, with individual care plans for structured PA support during the hospital stay might increase PA and have a clinically important impact on HRQoL. Larger studies are needed to evaluate the effects of PA support on medical outcome and length of hospital stay.

Background

Annually, more than 40,000 hematopoietic stem cell transplantations (HSCT) are performed in Europe—a number increasing steadily [1]. Stem cell transplantations provide patients with new hematopoietic stem cells, either from the patients themselves (autologous HSCT) or from a donor (allogeneic HSCT). For an autologous HSCT, the patient's own stem cells are collected when the disease is in a quiet phase and given back to the patient as support after the conditioning therapy, to counteract its pronounced toxic effect [2]. Allogeneic HSCT is used to treat malignant and non-malignant conditions, but also disorders arising from the immune system. The procedure allows for high-dose conditioning regimens, but also utilizes the immune system of the donor to battle the underlying disease [3].

Patients who have undergone HSCT at our department are isolated for approximately 2–4 weeks afterwards, because of severe susceptibility to infections. The ward room contains a bed, a chair, a table, a TV, and limited space to move around. During isolation, patients are prone to suffer from nausea,

mucositis, pain, fever, fatigue, and psychological distress related to the treatment and the isolation; the risk of inactivity is substantial [1, 4]. Patients undergoing allogeneic HSCT usually require longer hospital stays than those undergoing autologous HSCT, due to more severe treatment-related complications [5–7]. Most patients planned for autologous HSCT are encouraged to spend their isolation at home or in apartments offered by the department (outpatients). They come for check-ups every other day and are admitted to hospital care if they suffer severe side effects. Autologous patients admitted to hospital are often fragile, affected by comorbidities, or feel insecure and in need of more help.

Physical activity (PA), defined as “any bodily movement produced by skeletal muscles resulting in energy expenditure” [8], is one of the most powerful health-promoting practices that healthcare professionals can recommend patients in general [9]. Physical exercise (PE) is a subcategory of PA that is planned, structured, repetitive, and purposive, aimed to maintain or improve fitness [10].

A randomized controlled trial (RCT) from 1996 found that autologous HSCT patients participating in an exercise programme experienced less pain, less thrombocytopaenia and shorter hospital stays than patients in standard care [11]. More recent RCTs suggest that PE improves strength, endurance, lung function, functional ability and quality of life, and diminishes fatigue, mucositis and other problems from the gastrointestinal tract [4, 12–15]. To our knowledge, “sitting” has not been regarded as PA in earlier studies of HSCT patients, though bed rest due to the treatment and infections is very common in this group [16, 17]. Prolonged bed rest has adverse effects on cardiovascular and muscular systems and causes respiratory complications, including decreased ventilation, atelectasis, and pneumonia [18]. Pulmonary complications, although decreasing in frequency, remain a significant cause of morbidity and mortality after HSCT [19].

Increasing patients’ PA in a clinical setting is a more challenging task than increasing PA in a research environment. Severe illness, intensive therapy, and isolation can subject HSCT patients to considerable physical and mental strain, making behavioural changes even more challenging. The aim of the present study was to integrate support for PA in a real-world clinical setting and to evaluate if this increased the level of PA during HSCT hospital stays, improved quality of life and decreased side effects or duration of isolation or hospital stay, compared with standard care.

Methods

Design

A historical control group design is used (Figure 1). We first included the control group and then the intervention group, to avoid diffusion of the new PA support to the control group. Baseline for both groups was hospital admission before treatment started.

Patients and settings

Consecutive patients admitted for HSCT at the haematology department in Uppsala, Sweden were approached, regardless of diagnosis and type of HSCT (Figure 1). The standard care group (SCG) was included between August 2015 and February 2016 and the physical activity support group (PASG) between June 2016 and May 2017. Eligible patients were approached by a study nurse (SN), in person, during their pre-transplantation examination (2–4 weeks before HSCT) or by mail, with the notice for the pre-transplantation examination appointment. Exclusion criteria were inability to speak or understand Swedish, cognitive inability, or severe physical disability. Written informed consent was obtained from all patients upon inclusion. The project was approved by the regional ethical review board in Uppsala (Dnr 2015/090).

Standard care group

Patients in the SCG were informed that previous studies have indicated that PA is important for people undergoing HSCT and that our long-term aim was to improve patient care regarding PA. They were instructed to keep an activity diary during the entire hospital care period but did not receive any extra PA support.

Physical activity support group

The PA support, based on a motivational interviewing (MI) approach [20], was delivered by the SN and consisted of consultations at the pre-transplantation visit, on admission, at the end of the hospital stay, and 14 days post-discharge. MI is a counselling method that helps people find the internal motivation needed for behavioural changes. It is a practical, empathetic and short-term process that takes into consideration the difficulty of making life changes [21]. Individual goals such as “sitting in a chair instead of staying in bed most of the day,” “doing resistance band exercise,” or “going for a walk outside” were formulated on a whiteboard in the patient’s room, for everyone to see. The goals were followed up on all weekdays by the SN, who gave advice and encouragement. The goals were also noted in each patient’s individual nursing care plan [22]. The patients had access to resistance bands, dumbbells, exercise bicycles, and walking poles, and the possibility to go outside for PA. They were encouraged to take part in everyday cleaning of the room, including making the bed. At discharge, they received a prescription for PA [23], including type of activity and time goals. Fourteen days later, they received a phone call from the SN to follow up the prescription and encourage them to keep up an active lifestyle.

Measures

Medical and demographic background data were collected from medical records, along with data about days with intravenous antibiotics, number of transfused units of erythrocytes and thrombocytes, days spent in isolation, and total days admitted.

Activity diary

All patients reported their physical activities daily during the entire hospital stay, using a project-specific activity diary (Online resource 1). Patients entered how often and for how long they were sitting, cycling on an exercise bicycle, walking outside, doing strength training, or doing daily activities like “taking a shower,” cleaning, or making the bed. Thus, all kinds of activities out of bed were registered. The Borg Rating of Perceived Exertion (RPE) scale [24] was used by patients to assess exertion during activities on a numerical scale from 6 to 20, where 6 means “no exertion at all” and 20 means “maximal exertion.” The Borg scale has been used in a previous study to evaluate strength after HSCT [25].

METs

Metabolic Equivalent of Task (MET) a well-established method for measuring self-reported physical activity, was calculated for each day during hospital stay [26]. One MET is defined as energy expenditure while resting and is equal to 1 kcal per kilogram of body weight per hour [27]. MET values range from 0.9 (sleeping) to 23 (running at 22.5 km/h). We used the 2011 Compendium of Physical Activities that quantifies behaviours: sitting was 1.5 METs and light to moderate intensity activities, e.g., going for a walk, doing light exercise, or taking a shower, were 2.0–5.9 METs [28].

6-minute walking test (6MWT)

The 6MWT was used to assess physical capacity at baseline and after treatment/hospital stay and was carried out in accordance with the American Thoracic Society guidelines [29].

Health-Related Quality of Life and fatigue

Health-Related Quality of Life (HRQoL) and fatigue were measured at baseline, at discharge, and after 6 months, using the Functional Assessment of Cancer Therapy—Anaemia scale, version 4 (FACT-An) [30], which has demonstrated good stability and strong internal consistency. FACT-An consists of a core questionnaire FACT-General (FACT-G), assessing physical well-being (PWB), social well-being (SWB), emotional well-being (EWB), and functional well-being (FWB), and an anaemia subscale (AnS) including a fatigue scale (FS). A higher score indicates better well-being on all subscales, the FACT-G, the Trial Outcome Index (TOI = PWB+FWB+Ans), the Trial Outcome Index-Fatigue (TOI-F = PWB+FWB+FS), and the total scale. Clinically important differences (CIDs) have been determined as 3 points for the FS, 4 for FACT-G, 7 for FACT-An, 5 for TOI-F, and 6 for TOI-An [31].

Statistical methods

All statistical analyses were performed using SPSS (Statistical Packages for the Social Sciences), version 23. Differences between the SCG and the PASG at baseline were analysed using either the Mann-Whitney U test or the chi-squared test. Data from the activity diaries were used to calculate MET hours and total PA hours for each day. CIDs were determined in accordance with Cella et al. [31].

Results

There were more men (74%) in the SCG than in the PASG (67%) (p = 0.009; Table 1). The proportion of patients undergoing autologous versus allogeneic HSCT differed between the SCG (73% vs. 27%) and the PASG (52% vs. 48%). Also, 5 of 16 autologous HSCT were outpatients in the SCG, compared with 1 of 11 in the PASG. However, none of these differences were statistically significant.

Activity diary

SCG patients spent 4 hours and 14 minutes daily sitting, compared with 6 hours and 16 minutes for PASG patients (p = 0.053) (Figure 2). PASG patients were also more physically active in general (1 hour/day) compared with SCG patients (45 minutes/day; p = 0.061). SCG patients were bedridden 19 hours and 18 minutes each day, while PASG patients spent 16 hours and 46 minutes in bed (p = 0.033). There were no statistically significant differences concerning the number of activities out of bed or the perceived exertion on the Borg RPE scale (Table 2), although a tendency for higher values was seen in PASG patients. There were individual patients who reported very high estimated efforts for sitting (RPE 17–20) during neutropenia, but no difference was seen between the groups.

METs

The mean daily METs value was 8.2 in the SCG and 12.4 in the PASG (p = 0.022; Table 2). METs from sitting totalled 6.4 in the SCG and 9.4 in the PSAG (p = 0.049). There was no difference regarding METs from light to moderate intensity activity.

6-minute walking test (6MWT)

PASG patients walked significantly further than SCG patients at baseline (p = 0.026). The 6MWT distances of SCG patients had shortened by 8% at discharge, while those of PASG patients had shortened by 14%. However, PASG patients walked almost as many metres at discharge (480 m) as SCG patients did at baseline (488 m; Table 2).

Health-Related Quality of Life and fatigue

There were no statistically significant differences between the SCG and the PASG regarding HRQoL or fatigue (Table 3). However, the PASG reported slightly better physical well-being than the SCG (Md 25 vs. Md 22; $p = 0.077$) and a slightly better score on the Trial Outcome Index (Md 116 vs. Md 110; $p = 0.087$) 6 months post-discharge. The PASG reported clinically important, but not statistically significant, less fatigue (median 37 vs. 34) at discharge and clinically important better HRQoL compared with the SCG regarding the TOI-An (6 points), the FACT-G total score (5 points), and the TOI-F (5 points) 6 months post-discharge. Fatigue remained stable from before the start of treatment (median 37) to discharge (median 37) in the PASG, but worsened in the SCG (from median 41 to median 34).

Medical outcomes and duration of hospital care

No significant differences regarding duration of hospital care, time in isolation, need of intravenous antibiotics, or number of transfusions (Table 4) were seen between the two groups.

Discussion

We found that patients who received support for PA during the HSCT care period were significantly more physically active than patients who received standard care. PASG patients were less bedridden, spent more time sitting, and performed more physical activities than SCG patients. PASG patients expended more METs than SCG patients. In addition, patients who received support did not experience worsening fatigue from admission to discharge and had a clinically meaningful better HRQoL after 6 months compared with those in standard care. However, the PASG included more patients undergoing a tougher allogeneic HSCT, compared with the SCG, limiting the possibilities to draw firm conclusions regarding the benefits of the PA support.

It is a challenge to motivate patients going through HSCT to be physically active during the isolation phase. Motivation primarily comes from a readiness to change something in life, but it is our experience that many people undergoing HSCT because of a serious and potentially life-threatening disease need all their energy just to cope and accept the situation. Despite this, studies have shown that it is possible for these patients to increase their levels of PA and benefit from this. A recent meta-analysis confirmed that early PE might help prevent decline in muscle strength arising from immobility and prolonged bed rest in HSCT patients [32]. In the late 1990s, Dimeo et al. proposed a bicycle made for bedridden patients [11], while other studies have randomised patients to standard care or daily exercise programmes encompassing a wide variety of tools, such as bicycles and strength training equipment, to increase PA during hospital stays [12, 13]. A single-blinded RCT using a 6-week strength training programme showed that members of the training group improved or maintained their status from baseline to after intervention compared with those in standard care [4] and the authors concluded that there was a need for developing uncomplicated exercise interventions to fit into clinical practice. Our study aimed to meet this challenge by using a clinical setting. We found that it is possible for patients to be physically active using simple tools and exercise programmes in a standard clinical setting. To succeed, we believe that

advice, goalsetting, and follow-up time are crucial, and our results suggest that it may be enough to improve physical fitness before a HSCT, although further research is needed. The activity diary and individual goalsetting are simple and appreciated tools for encouraging HSCT patients and have been used in previous studies, but most often in the outpatient setting [33]. All patients in our study used the diary as instructed and the daily follow-up inspired them to continue with PA throughout their hospital stay. The most important instrument could be the daily follow-up visits by the SN, who used a MI approach to inspire and evaluate goals, give simple advice and challenge the patients. Tarasenko et al. [34] found that healthcare providers' recommendations are associated with higher levels of leisure-time aerobic PA among cancer survivors; using a MI approach makes this even more effective [21].

Although we did not expect any major baseline differences between the groups, the PASG patients walked further in the 6MWT before treatment start than the SCG patients. As the PASG contained more patients undergoing allogeneic transplantation relative to those undergoing autologous transplantation, we believe that a likely contributor to this difference was the verbal advice given to the patients in the PASG pre-transplantation setting about being physically active. The higher frequency of myeloablative regimens in the PASG compared with the SCG might explain the reduced capacity at discharge, but the 6MWT distances of PASG patients at discharge were close to those of SCG patients at the start. An important finding was that we managed to support HSCT patients to achieve the same level of physical capacity as patients in previous studies, comparing 6MWT before and after HSCT [35, 36].

Based on the findings from our study, it seems effective to have a pre-transplantation appointment with HSCT patients talking about the importance of being physically active. Liang et al. concluded, in a meta-analysis, that the optimal timing of PA for HSCT patients is pre-transplantation [32]. Previous studies have concluded that supervised exercise prior to HSCT is safe and feasible [37] and that patients in partly self-administered pre-transplantation PE programmes can become stronger and achieve better physical condition compared with a control group [38].

Except for research done to explore sleeping patterns among allogeneic HSCT patients, there is, to our knowledge, no study reporting the effects of time in bed or time spent sitting. The patients in our study estimated their efforts using Borg's RPE scale and a few found even sitting very exhausting during the isolation period. Therefore, we wanted to include sitting in PA, as a positive activity compared with bed rest. This is supported by Morishita et al., who described it as a sedentary intensity PA [35].

In the present study, we also wanted to see if PA might affect HRQoL and found that patients in the PASG experienced improved clinically important HRQoL regarding FACT-G, TOI-An and TOI-F after 6 months, as compared with patients in the SCG, although no statistical significance could be established, possibly due to the small sample size. Jarden et al. [13] found that fatigue was the most prevalent symptom for patients undergoing HSCT. The patients in the PASG maintained their fatigue levels from baseline at discharge, while levels worsened for those in the SCG, which is an interesting result considering the HSCT treatment in between. Using the FACT-An questionnaire to evaluate HRQoL in HSCT patients is not standard procedure, but the questions are relevant, and treatment-related fatigue is a major problem in

this patient group. Furthermore, we did not want to use cancer-specific questionnaires, as patients with MS were included in the study.

The main outcome in most studies of PA is fatigue, cardiovascular/strength capacity, or HRQoL, but there are previous studies reporting an impact of increased physical activity on reducing the time of thrombocytopaenia and neutropaenia, as well as shortening the hospital stay in patients undergoing autologous HSCT [11], although later studies have failed to repeat these results [12]. We did not find any differences regarding medical outcomes or the need for isolation and hospital care in the present study.

Limitations and strengths

The small sample and the uneven distribution of patients undergoing allogeneic and autologous HSCT in the two study groups limit the internal validity of the study and the possibility to draw firm conclusions regarding the effects of PA support. An RCT would probably have resulted in more equal groups, but would on the other hand imply a considerable risk for diffusion of the PA support to the SCG, as the study was conducted in routine care. The small sample size also hampered the possibilities to study impact on medical outcomes, as patients undergoing HSCT are heterogeneous regarding diagnoses, treatments, and comorbidities. Future studies evaluating implementation of PA support in routine care should include larger samples of patients and apply strategies to ensure more equal comparison groups. This could be done by adapting the inclusion in the intervention group to the distribution of diagnoses in the earlier included standard care group. Another limitation was that the baseline assessment was conducted after the pre-transplantation consultation, which made it impossible to determine if the noted difference regarding the 6MWT before transplantation was due to the pre-transplantation consultation or other important differences between the groups. Thus, a more precise design should have been applied. The main strength of the present study was that it was conducted in routine haematological care and that the PA support was possible to implement without large additional costs, which are usually required in clinical trials.

Clinical implications

There is a clinically important message to haematological departments when it comes to HSCT patients: that consultations using an MI approach regarding PA, pre-transplantation, on admission, before a patient leaves the ward, and 14 days after hospital discharge, can be integrated in clinical care routines. This seems to be an effective, cheap and easy way to implement PA for HSCT patients.

Conclusions

It is possible to increase the amount of PA in patients undergoing HSCT treatment by implementing structured PA support, starting before admission and continuing throughout the hospital stay. Increased

PA may improve HRQoL in a clinically significant way. However, larger studies with a more rigorous design are needed to confirm the positive effects of PA support and to evaluate the effects on medical outcomes and the need for hospital care.

Abbreviations

HSCT: Hemapoetic Stem Cell Transplant

PA: Physical activity

PE: Physical exercise

HRQoL: Health Related Quality of Life

SN: Study Nurse

RCT: Randomized Controlled Study

SCG: Standard Care Group

PASG: Physical Activity Support Group

6MWT: six-minute-walking-test

MET: Metabolic Equivalent Task

MI: Motivational Interviewing

Declarations

Ethics approval and consent to participate

Written informed consent was obtained from every patient. The study was conducted in accordance with the Declaration of Helsinki and the protocol was approved by the regional ethical review board in Uppsala (Dnr 2015/090).

Consent to publish

Not applicable.

Availability of data and materials

Our data are not deposited in publicly available repositories. However, the datasets used and/or analyzed during the current study are available from the corresponding author on reasonable request

Competing interests

The authors declare that they have no competing interests

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Authors’ Contributions

Study concept: SV; Study Design: SV, BJ, KN, AE; Data acquisition: SV: Data Analysis: SV, BJ; Data interpretation: SV, BJ, AE, KN; Manuscript writing: SV; Review of manuscript: SV, BJ, AE, KN. All authors read and approved the final manuscript.

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Tables

Table 1. Baseline characteristics.

	Standard care n = 22	**Activity support** n = 21	*p*
Age (years; mean, min–max)	52 (20–71)	52 (22–69)	0.942[1]
Gender (n)			0.009[2]
Female	8	16	
Male	14	5	
Allogeneic stem cell transplant (n)	**6**	**10**	0.168[2, 3]
Reduced intensity conditioning (RIC)	**4**	**5**	
ALL		1	
AML	3	1	
MDS-AML		1	
MDS		1	
T-PLL	1	1	
Myeloablative conditioning (MAC)	**2**	**5**	
ALL	1	1	
AML		1	
Aplastic anaemia		1	
Myelofibrosis		2	
Thalassemia	1		
Autologous stem cell transplant (n)	**16**	**11**	
Myeloma/amyloidosis	10	7	
Lymphoma	3	2	
Multiple sclerosis	3	2	
Outpatient	5	1	

[1]Mann-Whitney U test, [2]chi-squared, [3]regarding allogenic/autologous HSCT.

Table 2. Comparison of MET hours, number of activities out of bed, exertion on Borg RPE scale and distance walked in 6MWT for patients receiving standard care and those receiving support to be physically active.

	Standard care n = 22 Median (min–max)	**Activity support** n = 21 Median (min–max)	*p*
Physical activity, total METs	8.2 (3.7–28.5)	12.2 (3.7–24.4)	**0.022**
Sitting, METs	6.4 (2.1–22.4)	9.4 (1.1–18.3)	**0.049**
Light to moderate intensity activity, METs	2.5 (0.9–11.6)	2.8 (0.7–8.1)	0.098
Number of activities out of bed (per day)	3.3 (1.2–6.3)	3.9 (2.1–8.4)	0.453
Exertion on Borg RPE scale (average all activities)	10 (7–13)	11 (6–16)	0.076
Distance walked in 6MWT, metres			
Before transplantation	488 (315–615)	555 (405–720)	**0.026**
At discharge	450 (180–600)	480 (120–750)	0.415

MET, Metabolic Equivalent Task
6MWT, six-minute walking test
Mann-Whitney U test.

Table 3. Comparison of HR-QOL and Fact-An for patients receiving standard care and those receiving support to be physically active.

	Standard care n = 22	Activity support n = 21	*p*
	Median (min–max)	Median (min–max)	
PWB (0–28)			
Before treatment	22 (13–28)	24 (8–28)	0.810
At discharge	18 (9–27)	19 (4–28)	0.511
At 6-month follow-up	22 (13–26)	25 (10–28)	**0.077**
SWB (0–28)			
Before treatment	25 (21–28)	25 (21–28)	0.713
At discharge	24 (20–32)	26 (18–28)	0.146
At 6-month follow-up	24 (19–28)	24 (15–28)	0.696
EWB (0–24)			
Before treatment	19 (7–24)	19 (7–23)	0.383
At discharge	21 (2–24)	21 (10–24)	0.606
At 6-month follow-up	20 (7–24)	20 (12–24)	0.806
FWB (0–28)			
Before treatment	19 (10–28)	17 (9–26)	0.830
At discharge	17 (4–26)	14 (10–26)	0.688
At 6-month follow-up	20 (10–26)	21 (4–27)	0.303
FACT-G (0–108)			
Before treatment	85 (63–108)	84 (53–102)	0.724
At discharge	81 (39–105)	79 (51–104)	0.942
At 6-month follow-up	85 (66–97)	90 (49–102)	0.156
AnS (0–80)			
Before treatment	60 (12–73)	61 (34–77)	0.970
At discharge	54 (17–76)	57 (29–77)	0.706
At 6-month follow-up	65 (22–74)	67 (39–77)	0.361
TOI-An (0–136)			
Before treatment	102 (57–124)	101 (55–131)	0.860
At discharge	88 (57–129)	92 (45–128)	0.680
At 6-month follow-up	110 (45–124)	116 (57–132)	**0.087**
FS (0–52)			
Before treatment	41 (23–49)	37 (49–50)	0.442
At discharge	34 (21–49)	37 (13–51)	0.780
At 6-month follow-up	42 (13–52)	44 (25–52)	0.350
TOI-F (0–108)			
Before treatment	82 (63–108)	77 (41–104)	0.597
At discharge	72 (35–100)	70 (29–102)	0.780
At 6-month follow-up	86 (36–98)	91 (39–105)	0.169
Total FACT-An (0–188)			

Before treatment	145 (101–176)	141 (89–179)	0.791
At discharge	129 (85–181)	134 (80–180)	0.618
At 6-month follow-up	152 (88–168)	156 (92–179)	0.303

Mann-Whitney U test.
FACT-An, Functional Assessment of Cancer Therapy – Anaemia scale; PWB, physical well-being; SWB, social well-being; EWB, emotional well-being; FWB, functional well-being; FACT-G, Functional Assessment of Cancer Therapy-General; AnS, Anaemia Subscale; TOI-An, Trial Outcome Index – Anaemia; FS, Fatigue scale; TOI-F, Trial Outcome Index – Fatigue.

Table 4. Comparison of duration of hospital care, time in isolation, need of intravenous antibiotics, and transfusions for patients receiving standard care and those receiving support to be physically active.

	Standard care n = 22 Median (min–max)	Activity support n = 21 Median (min–max)
Duration of hospital care (days)	22 (13–42)	26 (16–41)
Time in isolation (days)	16 (10–31)	17 (12–32)
Antibiotics iv (n, days)	4 (0–16)	6 (0–23)
Erythrocytes (n, transfusions)	2 (0–16)	4 (0–16)
Thrombocytes (n, transfusions)	2 (0–19)	3 (0–17)

Figures

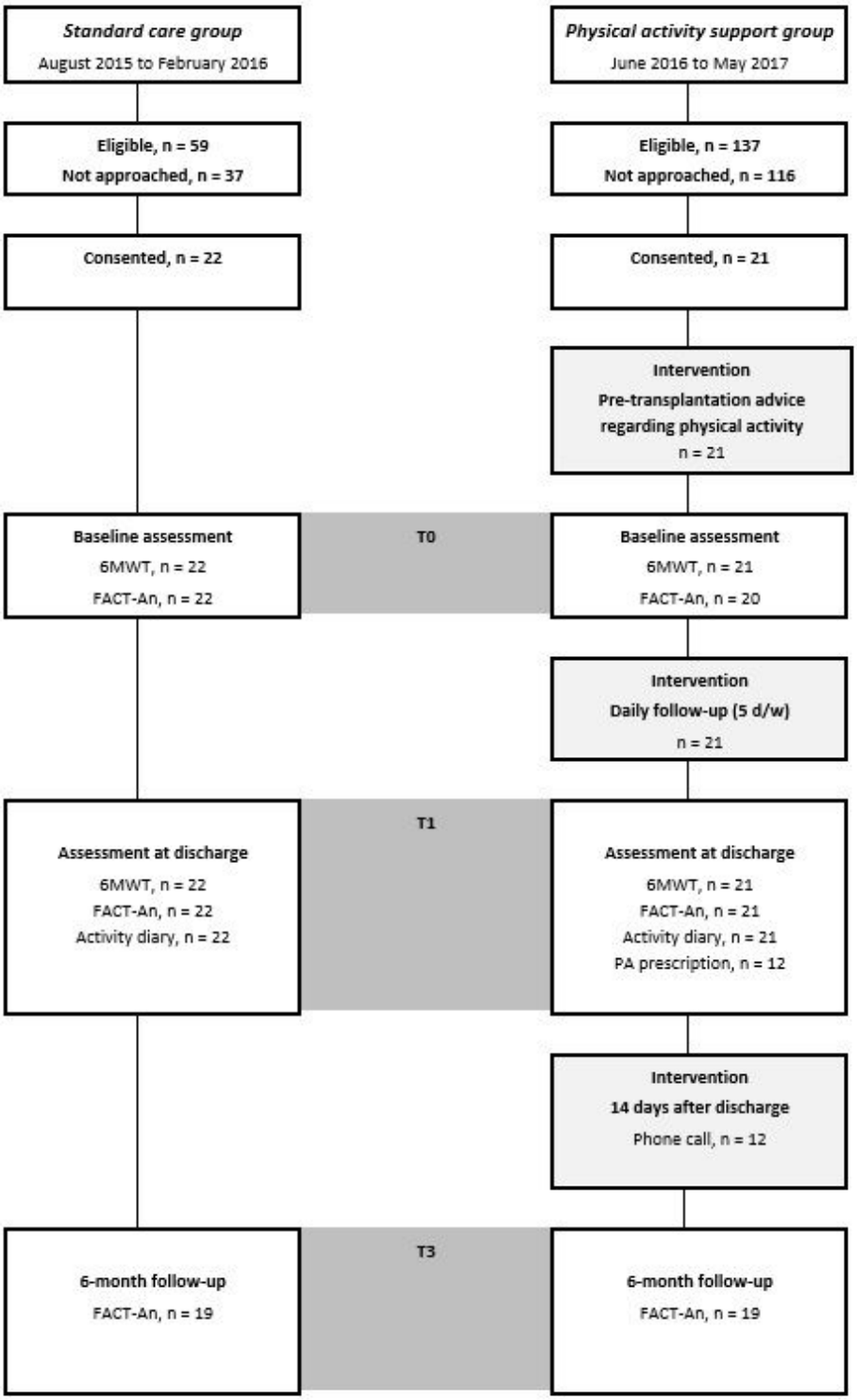

Figure 1

Flow chart for the study. 6MWT, six-minute walking test; d, days; FACT-An, Functional Assessment of Cancer Therapy – Anaemia scale; PA, physical activity; w, week

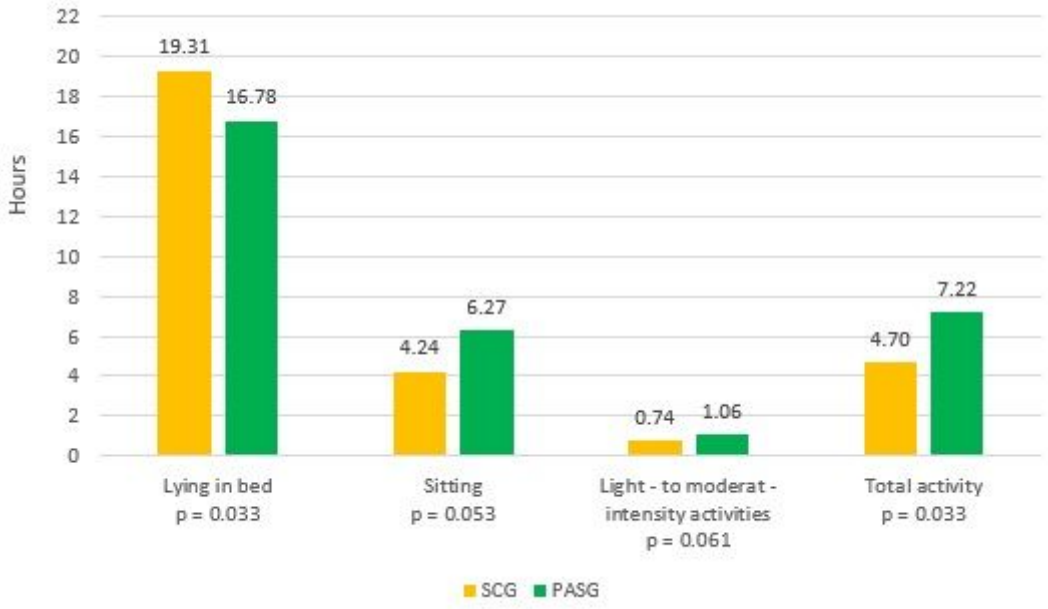

Figure 2

All activities mentioned in the diaries, showing median hours per day for both study groups

Supplementary Files

This is a list of supplementary files associated with this preprint. Click to download.

- Activitydiary.pdf