

To be Safe At Home Or At Hospital after Autologous Stem cell Transplantation – why Readmission to Hospital

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Abstract

Background: Chemotherapy in connection with autologous stem cell transplantation (SCT) is an established treatment for patients diagnosed with myeloma and lymphoma. Chemotherapy has side effects nausea/vomiting, infection, diarrhoea, fatigue and oral mucositis. SCT often requires hospitalization for weeks. Today it is common to treat patients in an outpatient care in combination with visits at the clinic/ward. Despite experience about outpatient care in connection with SCT, it is still a small proportion of patients who are treated on an outpatient basis. Reasons to readmit unplanned from homecare to hospital are mainly incidence of infection.

Purpose: To investigate in what extend patients undergoing autologous SCT, received an outpatient care or care at a University hospital in Sweden during transplant period and if the treatment at outpatient care was interrupted to study the reason for readmitting to hospital care, also to compare intra venous (iv) treatment with antibiotics or total parenteral nutrition and length of hospital stay.

Method: The study was a quantitative, retrospective, descriptive design. A review from medical and nursing records of 88 adult patients who underwent autologous SCT in 2013-2014 and treated at a University Hospital in Sweden.

Results: Thirty-nine patients were cared for outside hospital at home/home-like environment and 28 of them were readmitted to hospital. Forty-nine was cared for at hospital ward. The results showed that the main reason of readmission to hospital was related to nausea/vomiting, oral mucositis, stomach problem or other reason. No patients treated outside the hospital in the home/home-like environment the entire post-transplant period (n=11) needed total parenteral nutrition in contrast to patients readmitted to hospital (n=28) where 7 patients needed total parenteral nutrition. Among patients cared for at hospital ward during the entire post-transplant period (n=49), 17 patients needed total parenteral nutrition.

Conclusion: Staying at home during the transplant period leads to less total parenteral nutrition, iv antibiotics and fewer days in the hospital.

Keywords: Stem cell transplantation; Myeloma; Lymphoma; Chemotherapy; Side-effects; Homecare; Readmission

Background

Autologous stem cell transplantation (SCT) is a well-established treatment option for patients diagnosed with myeloma and lymphoma. Most common condition therapy in connection with autologous SCT for patients with myeloma is high dose melphalan, and for patients with lymphoma (including Hodgkin's disease) BEAM (becenun, etoposide, cytarabine, melphalan) or BEAC (becenun, etoposide, cytarabine, Cytoxan) [1]. The treatment may offer a long-term control of the disease and sometimes even a cure [2]. High dose chemotherapy (HDCT) has many side effects and interferes with several systems in the patient's body. Common side effects are chemotherapy induced nausea and vomiting (CINV) infections, bleeding, fatigue, loss of appetite, mouth sores, and skin reactions [3,4]. Over time, severe side effects and mortality associated with SCT have been reduced due to several improvements such as better pre-treatment and, improved

supportive care and treatment of infections [5]. The therapeutic arrangements on HDCT followed by SCT are different around the world. Usually autologous SCT led to hospitalization for 3 to 4 weeks but today it is more common to treat patients in an outpatient care in combination with visits at the clinic/ward on weekdays and with implanted phone contact [6].

Studies shows that patients treated outside hospital environment feel better than patients treated at hospital [7,8]. Svan et al. [9] compared allogeneic stem cell transplanted patients treated at home with matched control subjects treated in a hospital. They saw several advantages to home care, such as earlier discharge to the outpatient clinic, fewer days on total parenteral nutrition, and lower costs [9].

It is also shown that treatment at home in connection with autologous SCT is a safe and cost beneficial treatment form due to fewer days at hospital and do not appear, in patient with multiple myeloma receiving autologous SCT, to jeopardize patient outcome [10-12].

Reasons for myeloma and lymphoma patients treated with HDCT in connection with autologous SCT to readmit unplanned from homecare to hospital care are shown in a study to be mainly incidence of infection, antibiotic use and severity of mucositis [13].

In a study in patients who underwent autologous SCT (n=70) and treated outside the hospital in the home/home-like environment, the main reason for readmission to hospital (55 of 70 patients readmitted within 30 days), was febrile neutropenia, fatigue, diarrhoea, hypotension and nausea/vomiting [14].

Aim

The primary aim of the present study was to investigate in what extend patients diagnosed with myeloma or lymphoma, who underwent autologous SCT, received care at home/home-like environment or at a University hospital in Sweden, during transplant period and if the treatment carried out at home/home-like environment was interrupted, why did patients readmit to hospital care. The secondary aim was to evaluate whether patients in connection with readmission to hospital were given intravenous antibiotics or nutritional support or several days in hospital and if so to what extent compared to patients treated in a hospital during the entire transplant period

Method

Design

The study was a quantitative, retrospective, descriptive design.

Diagnosis	Myeloma n=45 (51.1%)	Lymphoma n=43 (48.9%)	n=88 (100%)
Women	12	11	23 (26.1%)
Men	27	38	65 (73.9%)
Age, over 60 years of age	42	37	79 (89.8%)
Age, under 60 years of age (range 27-68 years of age)	3	6	9 (10.2%)
Cared for at hospital ward*	26	23	49 (55.7%)
Cared outside hospital* entire post-transplant period	6	5	11 (12.5%)
Cared outside hospital* but readmitted to hospital during post-transplant period	13	15	28 (31.8%)

*Received care at home/home-like environment

Table 1: Patient characteristics, diagnoses and cared for at hospital or outside hospital*, outside hospital* but readmitted.

Hospital information of out-patient-care

The patients received oral and written information. Information to patients about routine Out-patient-care at University Hospital in Uppsala, Sweden: "It is possible to be at home during the post-

Every other day this takes the form of a visit to the clinic (weekdays) or ward (weekends) and otherwise as a telephone discussion with a nurse. The ward covers all travel costs. You will be given medicines and anything else you may need until your next visit. If you develop a fever or other condition, you will often need to stay in the ward for one or transplantation phase and be treated as an out-patient if you live no more than 1 hour's journey away from Uppsala. If you live further

Study sample

A retrospective review from medical and nursing records of 105 consecutive adult patient who underwent autologous SCT in the year 2013-2014, diagnosed with myeloma or lymphoma and treated with high-dose chemotherapy (HDC) in conjunction with autologous stem cell transplantation (SCT) at the University Hospital in Uppsala, Sweden. As a safety measure, the patient was assessed by a physician if it was psychologically and medically appropriate to be cared for at home. All patients received supportive care following hospital routine including mouth care and infection prophylaxis. The inclusion criteria were patients who stayed in the surroundings to the University Hospital in Uppsala, in home/home-like environment the entire transplantation period or at the Uppsala University Hospital (n=88). Exclusion criteria was if the patient returned to their local hospital directly after SCT (n=17). Out of eighty-eight (88) patients included, thirty-nine (39) were cared for outside of hospital in home/home-like environment according to the hospital routine during transplantation period versus forty-nine (49) cared for at hospital ward.

Patients

Patients were diagnosed with myeloma or lymphoma and between 18 and 69 years of age. They were scheduled for HDCT in connection with autologous SCT at a University Hospital in Uppsala, Sweden. Gender, both male and female. Demographic characteristics of the 88 patients are given in Table 1. To be treated outside of hospital in home/home-like environment during transplant period was offered to patients on a voluntary basis and not as a hospital routine. The patients received oral and written information.

away, it is possible to stay in one of the apartments that the ward has. Our intention is to promote your quality of life, so that you do not lose as much of your condition as if you had been in your room on the ward throughout the period of care. You are admitted to the ward as usual and receive your planned chemotherapy and receive back your hematopoietic stem cells. After this you can go home or to the apartment, but you are still registered to the ward and have access to the same care and resources as you would have had as an in-patient.

You are in contact with the clinic/ward twice a day. More nights for further treatment. When you are feeling better, you may be able to return home or to the apartment, with continuing antibiotic treatment for example.

This brochure contains information about what is important to consider for residents at home.

Your home environment

Because you are particularly sensitive to infections over the next few weeks, there are some things you and your relatives need to consider.

Cleaning

Use cleaning equipment. Use regular detergent. Use disposable cloth or kitchen paper instead of dishcloth or change the dishcloth daily. Keep the refrigerator clean. Clean the toilet daily. It is good to vacuum-clean. Dishwashing detergents, disinfectants and hand disinfectants are provided by the department. When visiting the hospital, tell if the cleaning equipment is running out.

The toilet brush should be replaced with a new one that you get with you. If you want, you can bring toilet paper with you.

If you live in a hospital apartment, you need to clean when moving out. You will receive a special brochure that will give you more detailed information about the apartment and how to clean it.

Soil

There are fungal spores in the soil that can make you sick and therefore you must not dig into the ground, transplant or water the flowers. You who live at home need to move houseplants from the bedroom. There should be no flowers in the hospital apartment.

Water

The water temperature in your home should be 60 degrees. If you live in a rented or tenant apartment, you can check it with the property manager. If you live in your own house, you can regulate the temperature yourself. If you have your own well, the water should be boiled before it can be used (durable one day) otherwise you will have to use bottled water. If you live in a hospital apartment, you do not need to think about it. The water temperature is already ordered.

Visitors

Visitors must not have any on-going infection such as colds or stomach problems. Meeting children goes well as long as they are not sick.

Pets

Be reluctant to have close contact. Have no animals in bed!"

Data collection

To assess demographic and clinical variables and total days enrolled at hospital in conjunction with autologous stem cell transplantation (SCT) a retrospective review from medical and nursing records was conducted and transferred in to a review protocol. The review protocol, which was designed specifically for this study, included demographic variables such as the patient's age, gender and whether the patient had been cared for at hospital or at home/home-like environment. Variables such as diagnosis, intravenous (IV) antibiotics, total parenteral nutrition (TPN) at any stage of the care period and length of hospital stay were included in the protocol. The protocol also included variables whether the patient's cared for at home/home-like

environment was readmitted to hospital or not, and if so, information about the cause of readmission; chemotherapy induced nausea and vomiting (CINV), fever, diarrhea, oral mucositis (OM) or stomach ache.

Ethical considerations

The study followed both the Declaration of Helsinki [15] and Sweden's national ethical guidelines [16] and is approved by the Regional Ethical Review Board in Uppsala (Dnr:2016/521).

Data analysis

Descriptive statistics were used for demographic data. For comparison between patients cared for at hospital or at home/home-like environment the unpaired t-test and Mann-Whitney U tests was applied. Data were analysed with IBM SPSS statistics version 23.0. Only 88 analyses from medical and nursing records were conducted and therefore statistical differences were not reported. The reported differences in this retrospective review from medical and nursing records can be viewed as trends that provide direction for future care planning.

Results

To investigate in what extend patients diagnosed with myeloma or lymphoma, who underwent autologous SCT, received care at home/ home-like environment or at a University hospital in Sweden, during transplant period and if the treatment carried out at home/home-like environment was interrupted, why did patients readmit to hospital care. A total of eighty-eight (88) medical and nursing records were reviewed. Of these 88 patients, 39 patients received care at home or home-like environment outside the hospital and 49 patients in the hospital department (Table 1). Of the 88 medical and nursing records, 23 (26%) belonged to female patients and 65 (74%) to male patients, age; under 50 years of age (n=8) and over 50 years of age (n=80) (range 27-68 years) in the entire group. There were no differences in diagnosis, they were evenly distributed between myeloma and lymphoma (Myeloma n=45, Lymphoma n=43). A third (n=11) of 39 patients treated outside the hospital in the home/ home-like environment were at home the entire post-transplant period whereas twenty-eight (n=28) were readmitted to hospital (Table 1).

The results showed that the main reason of readmission to hospital was related to CINV (n =8), fever (n=6), diarrhea (n=4), OM (n=7), stomach problem (n=1) or other reason (n=2). Other reasons for readmission to hospitals indicated in the patient's journal were anxiety and loneliness. Effect on the gastrointestinal tract (GI) from the mouth to the rectum caused by the chemotherapy and its severe side effects such as CINV, OM, diarrhea and abdominal pain (n=20) was the most common cause for readmission to hospital compared to fever (n=6) (Table 2).

No patients treated outside the hospital in the home/home-like environment the entire post-transplant period (n=11) needed TPN at any stage of the care period in contrast to patients readmitted to hospital (n=28) where 7 patients needed TPN at some stage (Table 2).

The result for IV antibiotic showed the same pattern. One patient (n=1) treated outside the hospital in the home / home-like environment entire post-transplant period (n=11) needed IV antibiotic at some stage of the care period in contrast to patients readmitted to hospital (n=28) where 24 patients needed IV antibiotics. Among

patients who were cared for at hospital ward during the entire post-transplant period (n=49), 32 patients needed IV antibiotics during some stage of the care period (Table 2).

Total days enrolled at hospital: Eleven patients (myeloma n=6, lymphoma n=5) whom underwent HDCT in connection with autologous SCT were treated outside the hospital in the home / home-like environment and were at home the entire post-transplant period. Their total days enrolled in the hospital but cared for at home were, myeloma n=6, 109 days, with a mean total of 18 days (range 16-21 days) and lymphoma n=5, 111 days, with a mean total of 22 days (range 20-26 days) (Table 3).

Twenty-eight patients (myeloma n=13, lymphoma n=15) intended to spend the post transplant period outside the hospital in the home/

home-like environment but was readmit to hospital care due to medical problems. Their total days enrolled at hospital during post transplant period were, myeloma n=13, 276 days, with a mean total of 21 days (range 17-27 days) and lymphoma n=15, 338 days, with a mean total of 23 days (range 17-25 days) (Table 3).

Forty-nine patients were cared for at hospital ward at University Hospital in Uppsala, Sweden the entire SCT period (myeloma n=26, lymphoma n=23). Total days enrolled at hospital during post transplant period were, myeloma n=26, 553 days, with a mean total of 21 days (range 17-35 days) and lymphoma n=23, 549 days, with a mean total of 24 days (range 19-35 days) (Table 3).

Diagnosis	Myeloma n=45 (51.1%)	Lymphoma n=43 (48.9%)	n=88 (100%)
Readmission to hospital related to nausea/vomiting	12	11	23 (26.1%)
Readmission to hospital related to fever	27	38	65 (73.9%)
Readmission to hospital related to diarrhea	42	37	79 (89.8%)
	3	6	9 (10.2%)
Readmission to hospital related to oral mucositis	26	23	49 (55.7%)
Readmission to hospital related to stomach problem	6	5	11 (12.5%)
Other reason to readmission to hospital*	13	15	28 (31.8%)
*Anxiety, loneliness			

Table 2: Home/home-like environment versus cared for at hospital ward: Reason for readmitting to hospital.

Diagnosis	Myeloma n=45 (51.1%)	Lymphoma n=43 (48.9%)
TPN when cared for outside hospital** (n=11)	0	0
TPN when cared for outside hospital but readmitted to hospital** (n=28)	5	2
TPN when cared for at hospital (n=49)	12	5
Iv antibiotic when cared for outside hospital ** (n=11)	0	1
Iv antibiotic when cared for outside hospital but readmitted to hospital* (n=28)	10	14
Iv antibiotic when cared for at hospital (n=49)	26	23
Total days at hospital when cared for outside hospital (n=11**)	109 (mean 18.2, range 16-21 days)	111 (mean 22.2, range 20-26)
Total days at hospital when cared for outside hospital but readmitted to hospital (n=28***)	276 (mean 21.2, range 17-27)	338 (mean 22.5, range 17-25)
Total days at hospital when cared for at hospital (n=49****)	553 (mean 21.3, range 17-35)	549 (mean 23.9, range 19-35)
* Received care at home/home-like environment; ** Myeloma n=6, Lymphoma n=5; *** Myeloma n=13, Lymphoma n=15; **** Myeloma n=26, Lymphoma n=23		

Table 3: Post-transplant period uses of iv total parenteral nutrition (TPN), iv antibiotics and total days at hospital.

Discussion

The aim of the present study was to investigate in what extend patients diagnosed with myeloma or lymphoma, who underwent HDCT in connection with autologous SCT, received care at home/home-like environment or at a University hospital in Sweden, during transplant period and if the treatment carried out at home/home-like

environment was interrupted, why did patients readmit to hospital care.

Forty-nine (n=49) patients were enrolled and cared for at hospital ward. Thirty-nine (n=39) patients were enrolled in the hospital but cared for outside hospital at home/home-like environment whereas eleven (n=11) the entire post transplant period. Twenty-eight (n=28) were readmitted to hospital. When the author to this article randomly

asked the staff (nurses and physicians) at the haematology ward at University hospital in Sweden, what they believed the reason for readmitting to hospital would likely to be, doctors and nurses at the department of haematology assumed that most of the patients returned to hospital because of fever and infections associated with neutropenia. It is in line with Freeman et al. which indicated febrile neutropenia as the most common cause of hospitalization [14].

The result in this study pointed at a different direction where the effect on the gastrointestinal tract (GI) from the mouth to the rectum caused by chemotherapy and its severe side effects such as CINV, OM, diarrhea and abdominal pain was the dominating reason for readmitting to hospital. There is little data on the specific role of prevention and information to patients, nurses and physicians on GI problems such as CINV, diarrhea and OM and it would be of interest to further investigate the number of days for re-hospitalisation and why patients do not return home after treatment of the current medical problems to continue care at home. If hospital nurses and physicians extend the work with prevention due to guidelines and evidence the impact on the patient's well-being could improve. Although this is a small sample of patients, the results should not be ignored. There is still a lack of guidelines and definition of the standard criteria and procedures for re-hospitalization during the aplastic phase at home [17]. Today, the patient returns to the hospital usually on plea of GI problems and fever. After the clinical judgment of doctors and remedy the cause of the hospitalization, the patient should be able to return to the home

Prevention of serious side effects from chemotherapy treatment is a in need of more research and nurses and physicians should be encouraged to take a larger responsibility for implementation of results from guidelines.

What do we know about the prevention of side effects of chemotherapy? Are we using that knowledge? Nurses should be able to support patients to feel secure being cared for at home after SCT and provide them with information and knowledge of what is expected to happen during the neutropenic phase. Studies show that oral cryotherapy (OC) is recommended in the guidelines to prevent/alleviate OM but there is still a lack of evidence about the best timetable for cooling the oral cavity [18,19]. further studies must be made to alleviate the problem of OM and to find out why the implementation of OC do not reach the caregivers and the patients in a larger extent. CINV appeared to be one of the biggest problems to solve despite standard of care antiemetic with 5-HT₃ antagonists and cortisone [20] and was the main reason for readmission to the ward during the transplant period (n=11) in this study.

Svanberg et al. [21] showed that patients treated with HDCT associated with autologous SCT who was treated with standard anti-emetic treatment plus a neurokinin-1(NK-1) receptor antagonist, aprepitant (Emend[®], first dose=125 mg, thereafter 80 mg/day) which was started 1 hour before the first HDCT dose for SCT and administrated daily until 7 days after end of chemotherapy significantly decreased vomiting among patients treated with HDCT and SCT [22]. But what about nausea? Nausea is remaining a severe problem for the patient and studies how to treat nausea as an isolated problem must be done. Colagiuri et al. [23] showed that patients' expectations of nausea after chemotherapy is a risk factor for CINV and patients need to know this in order to better deal with the problem when it comes. Perhaps our main work as nurses should emphasize prevention of serious side effects emanating from the GI tract with CINV in focus and thereby increasing the opportunity for the patient

to be cared for at home/home-like environment during the transplant period. Findings indicate that health care professionals (HCP) perceive that patients undergoing SCT are helped to some extent by the delivered information but that they are in need of additional information [23]. In a study by von Essen et al. [24] the following five items were ranked among the top 10 by both patients and staff about what skills patients expect from nurses: "knows when to call the doctor"; "puts the patient first no matter what else happens"; "tells the patient in an understandable language what is important to know about the illness and the treatment"; "listens to the patient" and "is perceptive to the patient's needs". HCPs seem to provide more information on issues relating to disease and treatments than issues patients are confronted with outside of the hospital in the home/home-like environment and that would include information about side effects from treatment and how to manage to prevent them.

Nurses must provide professional information and knowledge to the patient about the disease and treatment. Nurses must identify what knowledge the patient need to know to take care of self-care outside the hospital and make sure that the patient understands the information. Nurses must investigate patient satisfaction/quality of life, safety and expectations of outpatient care in Sweden and other countries. Special patient surveys are required, and quality of life instrument needs to be upgraded to capture home-related care issues that are required for patient safety. Nursing staff plays an important key role in the conduct and management of patient's treatment strategy [25]. Nurses can be important in achieving improvements in post-transplant care for patients who have undergone allogeneic SCT by adapting care to the individual needs [26]. This approach should also be applicable to patients undergoing autologous SCT. Hopefully, answers from these studies could lead to new guidelines concerning home care in patients receiving HSCT in connection with SCT. Could extend treatment carried out at home/home-like environment cut days at hospital and hereby the costs for society? The results in this study support that hypothesis. Patients with myeloma treated outside the hospital in the home/home-like environment and being at home the entire post-transplant period were enrolled in the hospital fewer days (18 days) compared to myeloma patients readmitted to hospital (18 versus 21 days). The pattern was the same for myeloma patients cared for at hospital ward the whole period (18 versus 21 days). As for patients with lymphoma treated outside the hospital in the home/home-like environment and being at home the entire post-transplant period, they were also enrolled in the hospital fewer days (22 days) compared to lymphoma patients readmitted to hospital (22 versus 23 days when readmitted to hospital). Lymphoma patients cared for at hospital ward the whole period, they were enrolled at hospital for 24 days.

Conclusion

Staying at home during the transplant period leads to less TPN, iv antibiotics and fewer days at University Hospital in Uppsala. Despite extensive experience from home care of patients receiving high dose chemotherapy in connection with autologous SCT in literature, it is still a small proportion of patients who are treated on an outpatient basis at University hospital, Uppsala, Sweden.

Recommendation

Nurses should work preventive with information to the patients and their relatives on the side effects from chemotherapy to increase the patient's ability to relieve and prevent side effects according to existing

guidelines, which can lead to higher quality of life for patients and reduced drug usage, which in turn can cause side effects. It could also lead to increased care satisfaction for patients (and their families) who are undergoing HDCT in connection with SCT at University Hospital in Uppsala and the expected reduction in hospital-related complications (infection, malnutrition, MRSA, ESBL). Reduced need to coat hospital beds at the hospital. Possibly also a decrease in visits to the hematology day treatment unit while the patient is enrolled for care. Further studies need to be done to establish a safe educational routine among physicians and nurses about to prevent chemotherapy induced side effects in patients receiving high dose chemotherapy in connection with autologous stem cell transplantation. Also, to teach patients and their relatives how to handle the information about chemotherapy induced side effects and what they can do to with the information. Perhaps they can treat some of the issues at home with extended knowledge

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