Rep Pract Oncol Radiother, 2007; 12(1): 53-59

Review Paper

Received: 2006.11.22
Accepted: 2007.01.15
Published: 2007.03.09

Quality of life in oncological and hematooncological patients after hematopoietic stem cell transplantation: The effect of selected psychosocial and health aspects on quality of life: A review of the literature

Authors' Contribution:
A Study Design
B Data Collection
C Statistical Analysis
D Data Interpretation
E Manuscript Preparation
F Literature Search
G Funds Collection

Ladislav Slovacek[1,2,3], Birgita Slovackova[4]

[1] Department of Field Internal Medicine, Faculty of Military Health Sciences, University of Defence, Hradec Kralove, Czech Republic
[2] Department of Clinical Haematology, Charles University Hospital and Medical Faculty, Hradec Kralove, Czech Republic
[3] Department of Clinical Oncology and Radiotherapy, Charles University Hospital and Medical Faculty, Hradec Kralove, Czech Republic
[4] Department of Psychiatry, Charles University Hospital and Medical Faculty, Hradec Kralove, Czech Republic

Summary

Haematopoietic stem cell transplantation is a therapeutic method which is not only used for the treatment of haematooncological diseases but also as a therapy for solid tumours and non-malignant diseases. Haematopoietic stem cell transplantation influences the further course of the disease and therefore the quality of life for patients in the same way as other therapeutic methods. The authors describe the evaluation possibilities for the quality of life and effect of selected aspects on quality of life of patients undergoing haematopoietic stem cell transplantation in the form of a review of the literature.

Key words **quality of life • haematopoietic stem cell transplantation • quality of life questionnaires**

Full-text PDF: http:/www.rpor.pl/pdf.php?MAN=10079
Word count: 3309
Tables: –
Figures: –
References: 34

Author's address: Ladislav Slovacek, University of Defence, Faculty of Military Health Sciences, Department of Field Internal Medicine, 1575 Trebesska Street, 500 01 Hradec Kralove 1, Czech Republic, European Union, e-mail: ladislav.slovacek@seznam.cz

Background

Haematopoietic stem cell transplantation (HSCT) is a modern therapeutic method used for biomodulation antitumour therapy of haematological malignancies (acute and chronic leukaemia, malignant Hodgkin's and non-Hodgkin's lymphoma, multiple myeloma, etc.) and of solid tumours (Grawitz's tumour of the kidney, breast carcinoma, testicular tumours, neuroblastoma, small cell lung carcinoma) [1,2]. It is also used for the therapy of non-tumour and hereditary diseases (demyelinization disease – sclerosis multiplex, systemic disease – systemic lupus erythematodes, systemic sclerodermia and hereditary disease – Fanconi's anaemia) [1,3]. It is divided into bone marrow transplantation (BMT), transplantation of stem (progenitor) cells (PSCT) and umbilical cord blood transplantation (UCBT) [2]. From a donor's point of view there are three kinds of transplantation: syngenic transplantation (the donor is a monozygotic twin), allogeneic transplantation (HLA from a compatible sibling or parent or HLA from a compatible donor) and autologous transplantation (the patient is the donor).

Aim

The aim of HSCT is to replace a patient's pathological bone marrow which contains tumorous cells with haematopoietic cells from a healthy donor and to restore haematopoiesis which is damaged by intensive antitumour therapy [1–3]. HSCT influences the further course of disease and therefore the quality of life for patients in the same way as other therapeutic methods [4].

Quality of life (QoL) is generally defined as "a patient´s subjective evaluation of his life situation" [5]. This definition is based on Maslow´s theory of needs (the need to sleep, to eat, to drink etc.) [6]. The QoL term contains information on an individual´s physical, psychological, social and spiritual condition [7,8]. QoL evaluation is carried out by means of generic and specific questionnaires [4,5]. Generic questionnaires generally evaluate a patient´s overall condition regardless of his disease. Specific questionnaires are designed for the evaluation of a patient's overall condition in a particular type of disease. Modules are often used with these specific questionnaires. These modules are focused on specific symptoms and complaints in a particular type of disease [4,5]. The areas investigated in QoL questionnaires usually include a patient´s physical, psychological and social functions, including his financial situation, his integration into society, including pain, quality of sleep, spiritual aspects (interests, hobbies) and also symptoms which are specific to a particular disease [4–6].

I. Transplantation type and quality of life

A similar trend was discovered by Hacker [9] in his longitudinal study which was carried out from 1990 to 2000 when he monitored the effect of HSCT type, in particular BMT (the first group of patients) and PSCT (the second group of patients), on QoL. Patients were tested by means of a generic SF-36 and a specific FACT-BMT. De Souza [10] arrived at the same conclusions in a group of 26 patients (13 patients after BMT and 13 patients after PSCT) in his longitudinal study which was carried out from 1995 to 1999. Patients were tested by means of a generic World Health Organization Quality of Life Questionnaire (WHO QOL-100) and by means of the Hospital Anxiety and Depression Scale (HAD). The effect of HSCT on QoL according to graft type (autologous and allogeneic) was monitored by Van Agthoven [11]. He carried out a transversal study in a group of 91 patients (62 patients after autologous PSCT and 29 patients after autologous BMT). These patients were randomly divided into 3 groups. Each group was tested by a different generic questionnaire. These questionnaires were presented to patients in the 3rd month after HSCT. We can state from the results of the study that all 3 questionnaires showed no difference in QoL between groups of patients depending on the type of transplantation (there was the same QoL in patients after autologous and allogeneic PSCT). The opposite trend, i.e. a difference in QoL depending on the type of HSCT, was found by Lee [12]. He evaluated QoL in a group of 10 patients with chronic Graft Versus Host Disease (cGVHD) after allogeneic HSCT. Methodologically the cGVHD module – a specific symptom 30-Item Symptom Scale in combination with a generic SF-36 (the first group with 5 patients) and in combination with a specific FACT-BMT (the second group with 5 patients) – was used. Lee [12] states that the QoL in patients after allogeneic HSCT is worse than in patients after autologous HSCT. The reason is the 30–90% cGVHD occurrence in patients after allogeneic HSCT. This negatively affects the QoL, which was confirmed by means of a specific module in combination with generic and specific QoL questionnaires. From other important studies which show a worse QoL in patients after allogeneic HSCT, we can mention Heinonen's study

[13,14]. He tested in his longitudinal study 109 patients after allogeneic HSCT (the 1st and the 5th year after this transplantation). Methodologically patients were tested by means of a specific FACT-BMT – Version 3. Another result of this study is that Heinonen [13,14] points out a higher QoL in patients after allogeneic HSCT depending on the lapse of time from this transplantation (the longer the lapse of time the better the QoL). This also depends on the manifestation or non-manifestation of cGVHD.

II. Age and quality of life

De Souza [10], Heinonen [13,14], Chiodi [15], Wang [16], Wong [17], Andrykowski [18] and Zittoun [19] discovered a similar trend in their studies. De Souza [10] points out in his longitudinal study conducted in a group of 26 patients (13 patients after BMT and 13 patients after PSCT) a lower QoL in both groups of these patients. He found no differences according to the type of HSCT. Patients were tested by means of a generic WHO QOL-100 and HAD. De Souza (10) further explained his statements by the fact that with increasing age a number of associated diseases can occur. These diseases reduce the QoL. Chiodi [15] also agrees with this opinion in his transversal study conducted in a group of 244 patients with haematological malignancies after allogeneic BMT. He divided these patients into 3 groups (the first group was 1 year after allogeneic BMT, the second group was 3 years after allogeneic BMT, and the third group was 5 years after allogeneic BMT). Methodologically patients were tested by means of the Psychosocial Adjustment to Illness Scale (PAIS). Chiodi [15] also points out the fact that in addition to polymorbidity a negative effect of cGVHD on a lower QoL in patients with increasing age should be stressed. Wang [16], Wong [17] and Andrykowski [18] also agree with the effect of cGVHD on a lower QoL in patients with increasing age. A longitudinal study conducted by Hayes [20] in 2004 revealed an interesting piece of information. He compared the vital lung capacity in a group of 12 patients after PSCT 1 week before this transplantation and in the 2nd week and the 12th week after this transplantation. Hayes [20] recorded a higher QoL in patients with a higher level of overall physical fitness. It follows from this conclusion that with increasing age the level of overall physical fitness and also QoL decrease. Zittoun [19] discovered another interesting piece of information in his transversal study conducted in a group of 179 patients with haematological malignancies after HSCT. He points out that increasing overall fatigue and emotional complaints which decrease QoL correlate with increasing age. Patients were tested by means of a specific EORTC QLQ-C30, HAD and a specific Leukaemia/BMT module. So [21] also discovered an interesting piece of information in his transversal study conducted in a group of 157 patients with haematological malignancies after BMT. He proved a high degree of overall fatigue in patients over the age of 50 with associated diseases. Patients were tested by means of the Fatigue Scale – Chinese Version. Another author who agrees with Zittoun's [19] and So's [21] opinions is Saleh [22]. He conducted a transversal study in a group of 41 patients after BMT. This author points out that in patients with an increasing number of associated diseases there is a lower overall physical condition and this means a lower QoL. Patients were tested by means of a specific QOL-BMT-ST 30 months after BMT.

III. Sex and quality of life

De Souza [10] points out in his longitudinal study conducted in a group of 26 patients (13 patients after BMT and 13 patients after PSCT) a higher QoL in men in both types of HSCT compared to women again in both types of these transplantations. Patients were tested by means of a generic WHO QOL-100 and HAD. Heinonen [13,14] also agrees with De Souza's results [10] in his longitudinal study conducted in a group of 109 patients after allogeneic HSCT. Patients were tested by means of a specific FACT-BMT – Version 3. The reason for a lower QoL in women compared to men is according to Heinonen [13,14] their emotional lability which is associated with the demanding process of HSCT. Chiodi [15] also has the same opinion in his transversal study conducted in a group of 244 patients with haematooncological diseases after allogeneic HSCT. In order to evaluate the effect of sex on QoL in patients after HSCT, Chiodi [15] used PAIS. Another author with the same opinion as Heinonen [13,14] and Chiodi [15] is Wang [16] with his transversal study conducted in a group 95 patients after HSCT. Patients were tested by means of a specific Functional Assessment Cancer Treatment – General Version Questionnaire (FACT-G). Significant differences in QoL between sexes of patients were not proven by Andrykowski [18] in his multicentre, longitudinal study conducted in a group of 200 patients with haematological malignancies after HSCT (46% of patients after allogeneic transplantation and 54% of patients after

autologous transplantation). Patients were tested by means of a specific BMT-QoL. They were presented this questionnaire before this transplantation and the 1st year after this transplantation.

IV. Level of education and quality of life

Henoinen [13,14] points out in his longitudinal study conducted in a group of 109 patients after allogeneic BMT a higher QoL in patients with higher education, meaning patients with secondary and university education. Patients were tested by means of a specific FACT-BMT – Version 3. This questionnaire was presented to patients in the 1st and the 5th year after this allogeneic BMT. Andrykowski [18] arrived at a similar conclusion in his multicentre longitudinal study conducted in a group of 200 patients with haematooncological diseases after HSCT (46% of patients after allogeneic HSCT and 54% of patients after autologous HSCT). He proved a lower QoL in patients with lower education, meaning patients with elementary and apprentice education. Patients were tested by means of a specific BMT – QoL. They were presented this questionnaire before this transplantation and in the 1st year after this transplantation.

V. Increasing number of associated diseases and quality of life

Zittoun [19] discovered an interesting piece of information which showed a correlation among increasing number of associated diseases, overall fatigue and emotional difficulties. Molassiotis [23] also agrees in his longitudinal study conducted in a group of 40 patients after BMT with the opinion which concerns emotional lability. He evaluated the emotional lability of these patients by means of the Emotional Difficulties Scale (EDS). This scale was presented to patients before the BMT. Another scientist who agreed with this opinion was So [21] in his transversal study conducted in a group of 157 patients with haematological malignancies after BMT. He proved a high degree of overall fatigue in patients over the age of 50 with associated diseases. Patients were tested by means of the Fatigue Scale – Chinese Version. Saleh [22] and Slovacek [4] also agree in their transversal study conducted in patients after HSCT with Zittoun's [19] and So's [21] opinions. These authors stress the fact that in patients with an increasing number of associated diseases there is lower overall physical fitness and this causes a lower QoL. Heinonen [13,14] recorded in his longitudinal study conducted in a group of 109 patients after allogeneic BMT a lower QoL in patients in connection with increasing number of associated diseases, increased morbidity, increasing overall fatigue and worse quality of sleep. When he compared polymorbid men and women after allogeneic BMT he discovered a lower QoL in women. Edman [24] arrived at similar results in his transversal study conducted in a group of 25 Swedish patients after allogeneic PSCT. He states that increasing number of associated diseases is associated with greater physical complaints, increased morbidity, emotional lability (anxiety and depression), sexual problems and sleep disorders. Patients were divided into 3 groups and then tested. The first group was tested by means of a generic Sickness Impact Profile (SIP). The second group was tested by means of the Frequency Intensity and Distress Scale (SFID-BMT) and the third group by means of the Sense of Coherence Scale (SOC). All three questionnaires evaluate subjective functional condition, physical complaints and the ability to cope with a particular disease. Patients were tested 2 years after allogeneic PSCT. Edman [24] found no differences in the QoL evaluation in patients after HSCT. However, physical complaints, sexual problems, increased morbidity, anxiety, depression and sleep disorders were recorded in all three questionnaires and in more than half of patients. In the same way as Heinonen [13,14] he points out that the above-mentioned complaints are connected with increasing number of associated diseases.

VI. Marital status and quality of life

The effect of marital status on the QoL in patients after HSCT was proven by Saleh [22] in his transversal study conducted in a group of 41 patients. Patients were tested by means of a specific QOL-BMT-ST. Saleh [22] states that marital status significantly influences QoL in patients after HSCT. Patients who are married have a higher QoL than single or divorced patients or patients who are widowed. According to Saleh [22] functioning family relationships and good friends influence very positively the QoL in patients after HSCT. HSCT is very demanding from a patient's point of view, especially as far as time is concerned. A patient is during the transplantation in the role of a socially isolated person and a functioning family and good friends can help to eliminate this isolation. A similar trend was found by Heinonen [13,14] in his longitudinal study conducted in a group of 109 patients after allogeneic BMT. He points out a higher QoL in patients who are married because of their good family and social relationships, and

in contrast a lower QoL in patients who are divorced and lack these relationships. Heinonen [13,14] also monitored the QoL of life in divorced men and women. He arrived at a conclusion that divorced men have a lower QoL than divorced women. According to this author this is probably because of the continuing social isolation of divorced men after HSCT. Methodologically patients were tested by means of a specific FACT-BMT – Version 3. Another author who confirms the above-mentioned trend, i.e. a better QoL for patients with good family relationships, is Boyle [25]. He conducted a transversal study in a group of patients after autologous HSCT. According to Boyle [25] a well-functioning family and good social relationships positively influence the QoL for patients. Baker [26] discovered in his longitudinal study conducted in a group of 84 patients after BMT an interesting piece of information concerning this issue. He proved that it is difficult for patients after BMT to integrate into their families or among their friends as a result of psychological difficulties – anxiety, depression and stigmatisation caused by the disease. Patients were tested by means of a generic Quality of Life Interview Questionnaire (QoLI) which evaluates 3 areas of psychosocial morbidity: 1. physical complaints – overall physical condition, overall fatigue and eating difficulties, 2. psychological difficulties – self-control, anxiety, depression and worries about the future, 3. problems of social reintegration – family, friends, social role, financial situation and stigmatisation. Patients were tested in the 6th and the 12th month after BMT.

VII. Religion and quality of life

Slovacek [4] recorded that QoL in patients after HSCT who believed in God was higher than in patients who were non-believers. Patients were tested by means of generic Euro QoL. The study was transversal and retrospective; the number of patients was 71. Entonen [27] and Bach [28] recorded these changes in values in patients after BMT. The above-mentioned changes often mean that the patient has to stop various activities, including his interests and hobbies. Boyd [6] found significant changes in patients after HSCT who believed in God. Patients who believed in God had a higher QoL than non-believers.

VIII. Time lapse from transplantation and quality of life

Broers [30] points out in his longitudinal study conducted in a group of 125 patients a higher QoL in patients in the 3rd year after HSCT compared to patients in the 1st and 6th month and the 1st year after this transplantation whose QoL was lower or at the same level. Patients were tested by means of a generic General Health Questionnaire (GHQ). Sutherland [31] has a similar opinion in his transversal study conducted in a group of 251 patients after allogeneic BMT. He proved no significant differences in QoL in patients 40 months after allogeneic BMT. Patients were tested by means of MOS SF-36 and SLDS – BMT. Kopp [32,33] discovered the opposite trend [20,21] in his transversal study conducted in a group of 56 patients after BMT. These patients were divided into two groups. The first group with 15 patients was tested by means of a specific EORTC QLQ-C30 in the 1st year after BMT, the second group with 41 patients was tested by means of a specific FACT-BMT more than a year after BMT. He proved no significant differences in the QoL evaluation carried out by means of the above-mentioned specific questionnaires but he proved a higher QoL in patients more than a year after this BMT. According to Kopp [32,33] a worse QoL in patients in the 1st year after BMT is mainly influenced by "insufficient" adaptation to the given disease and as well to "BMT" itself. Saleh [22] and Duraes [34] arrived at a similar conclusion. Saleh [22] found in his longitudinal study conducted in a group of 41 patients after BMT significant differences in QoL before transplantation and 30 months after this transplantation: a lower QoL before BMT compared to QoL after the transplantation. Patients were tested by means of a specific Qol-BMT-ST. Duraes [34] proved in his longitudinal study conducted in a group of 60 patients after allogeneic HSCT significant changes in the time lapse from this transplantation: the longer the time lapse from this allogeneic HSCT, the higher was the QoL recorded. Patients were tested by means of a generic WHO QOL-100 and HAD before and after this transplantation.

Conclusions

It is common in clinical practice to evaluate a patient´s health condition and the success of the treatment based only on one type of marker, the most often by means of somatic, laboratory or detecting markers [4]. However, the trend in modern medicine is to evaluate a patient´s health condition in a more complex way, using other aspects. QoL means a higher dimensional evaluation of a number of life aspects. Different aspects can be affected in different ways in different phases of

the disease and its treatment. That is why this information enriches our knowledge concerning patients' needs, and it can significantly contribute to the improvement of medical treatment. It can also help us to reveal the mechanisms which modify the origin and the course of disease [4]. There is very good experience abroad with the "Quality of Life Team", which consists of a treating physician (in the case of HSCT it is a haematologist), a transplantologist, nurses who are educated in the problem of QoL for patients, a clinical psychologist, a psychotherapist, a social worker and also a data manager [4]. The reason to establish these special teams is that by providing care to the patient and support to his family a good environment for the patient after HSCT can be created after his return home. This good environment can help the patient to adapt well [23].

REFERENCES:

1. Andel M et al: Internal Medicine – Part IIIb – Hematology. 1st. ed. Praque: Galen, 2001; 138–41
2. Atkinson K et al: The BMT Data Book: A Manual for Bone Marrow and Blood Stem Cell Transplantation. Cambridge: University Press, 1998, 582
3. Giralt S, Slavin S: New Frontiers in Cancer Therapy: Non-Myeloablative Stem Cell Transplantation (NST). Darwin Scientific Publishing, 2000, 159
4. Slovacek L, Slovackova B, Jebavy L: Global Quality of Life in Patients Who Have Undergone the Hematopoietic Stem Cell Transplantation: Finnding from Transversal and retrospective Study. Exp Oncol, 2005; 27: 238–42
5. Salajka F: Quality of life of oncological patients. J Czech Slov Clin Oncol, 2001; 1: 27–9
6. Stablova A: Quality of life of patients. Charles University Press, Praque, 2002
7. Ferrell BR, Grant MM: Quality of Life Scale: Bone Marrow Transplant. In.: Quality of Life from Nursing and Patient Perspectives: Theory, Research, Practice. Jones and Bartlett Publishers, 2nd ed, 2003; 455–65
8. Grant M, Ferrell B, Schmidt GM et al: Measurement of quality f life in bone marrow transplantat survivors. Qual Life Res, 1992; 1: 375–84
9. Hacker ED: Quantitative measurement of quality of life in adult patients undergoing bone marrow transplantation or peripheral blood stem cell transplantation: a decade in review. Oncol Nurs Forum, 2003; 30: 613–29
10. De Souza CA, Duraes MI, Vigorito AC et al: Quality of life in patients randomized to receive a bone marrow or a peripheral blood transplantation. Haematologica, 2002; 87: 1281–5
11. Van Agthoven M, Vellengs E, Fibbe WE et al: Cost analysis and quality of life assessment comparing undergoing autologous peripheral blood stem cell transplantation or autologous bone marrow transplantation for refractory or relapsed non-Hodgkins lymphoma or Hodgkins disease, a prospective randomised trial. Eur J Cancer, 2001; 37: 1781–9
12. Lee SJ, Cook EF, Soiffer R et al: Development and Validation of scale to Measure Symptoms of Chronic Graft-versus-Host Disease. Biol Blood Marrow Transplant, 2002; 8: 444–52
13. Heinonen H, Volin L, Uutela A et al: Gender-associated differences in the quality of life after allogeneic BMT. Bone Marrow Transplant, 2001, 28: 503–9
14. Heinonen H, Volin L, Uutela A et al: Quality of life and factors related to perceived satisfaction with quality of life after allogeneic bone marrow transplantation. Ann Hematol, 2001; 80: 137–43
15. Chiodi S, Spinelli S, Ravera C et al: Quality of life in 244 recipients of allogeneic bone marrow transplantation. Br J Haematol, 2000; 10: 614–9
16. Wang WQ, Lin GW: Study on quality of life in long-term survivors with acute leukemia in Shanghay. Zhonghua Liu Xing Bing Xue Za Zhi, 2003; 24: 1049–51
17. Wong R, Giralt SA, Martin T et al: Reduced-intensity conditioning for unrelated donor hematopoetic stem cell transplantation as treatment for myeloid malignancies in patients older than 55 years. Blood, 2003; 102: 3052–9
18. Andrykowski MA, Greiner CB, Altmaier EM et al: Quality of life following bone marrow transplantation: finding from a multicentre study. J Cancer, 1995; 71: 1322–32
19. Zittoun R, Achard S, Ruszniewski M: Assessement of quality of life during intensive chemotherapy bone marrow transplantation. Psychooncology, 1999; 8: 64–73
20. Hayes S, Davies PS, Parker T et al: Quality of life changes following peripheral blood stem cell transplantation and participation in a mixed-type, moderate-intensity, exercise program. Bone Marrow Transplant, 2004; 8: 156–72
21. So WK, Dodgson J, Tai JW: Fatigue and quality of life among Chinese patients with hematologic malignancy and bone marrow transplantation. Cancer Nurs, 2003; 26: 211–19
22. Saleh US, Brockopp DY: Quality of life one year following bone marrow transplantation: psychometric evaluation of the quality of life in bone marrow transplantation survivors tool. Oncol Nurs Forum, 2001; 28: 1457–64
23. Molassiotis A: Further evaluation of a scale to screen for risk of emotional difficulties in bone marrow transplant recipients. J Adv Nurs, 1999; 29: 922–27

24. Edman L, Larsen J, Hagglund H et al: Health-related quality of life, symptom distress and sense of coherence in adult survivors of allogeneic stem-cell transplantation. Eur J Cancer Care, 2001; 10: 124–30

25. Boyle D, Blodgett L, Gnesdiloff S et al: Caregiver quality of life after autologous bone marrow transplantation. Cancer Nurs, 2000; 23: 193–203

26. Baker F, Zabora J, Polland A et al: Reintegration after bone marrow transplantation. Cancer Pract, 1999; 7: 190–7

27. Entonen A, Wiren R: Adaptation to severe intestinal GVHD after BMT. EBMT Nurses Group Newsletter, 1992; 2: 15–7

28. Bach K et al: A method to improve nursing care and its effect on the rehabilitation of patients undergoing autologous bone marrow transplantation. EBMT Nurses Group Journal, 1995; 1: 36–8

29. Boyd C: Quality of Life: patient education for bone marrow transplant patients. Is it more effective if your patient is a health care professional ? EBMT Nurses Group Journal, 1994; 1: 16–20

30. Broers S, Kaptein AA, Le Cessie S et al: Psychological functioning and quality of life following bone marrow transplantation: a 3-year follow-up study. J Psychosom Res, 2000; 48: 11–21

31. Kopp M, Schweigkofler H, Holzner B et al: Time after bone marrow transplantation as an important variable for quality of life: results of a cross-sectional investigation using two different instruments for quality-of-assessment. Ann Hematol, 1998; 77: 27–32

32. Kopp M, Schweigkofler H, Holzner B et al: B. EORTC QLQ-C30 and FACT-BMT for the measurement of quality of life in bone marrow transplantat recipients: a comparison. Eur J Haematol, 2000; 65: 97–103

33. Duraes MIC: Influencia da fonte de célula (progenitora periférica ou medula óssea) na qualidada de vida de pacientes onco-hematológicos submetidos ao transplante alogenico de medula óssea. Rev Bras Haematol Hemoter, 2002; 24: 63–4

34. Mesanyova M, Simek J: Bone Marrow Transplantation from Patients Perspective. Czech Pract, 2004; 84: 536–40