Home care management of patients affected by hematologic malignancies: a review

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Home care (HC) has an increasingly expanding role in the global management of patients affected by hematologic malignancies. Integrated strategies, including causal-targeted and supportive treatments according to hematologic expertise and a holistic approach inspired by the philosophy and practice of palliative medicine, may allow suitable management and the possibility for most patients to stay at home. Physical, social and psychological needs of patients are likely to vary according to the course of their disease and the treatments they are receiving. Therefore, consideration should be given to different models of care and how to tackle patients' diverse needs, as outlined by reported experiences which claimed that HC can provide appropriate solutions not only for terminally and chronically ill patients but also for those in other phases of disease. According to these studies and to our own experience, when appropriate measures and structured operating models are adopted, HC results in a safe, effective and economically realistic alternative to traditional in-hospital treatment. Therefore, all efforts should be made to overcome budget and administrative barriers and to ensure a more widespread use of this model of care.

Key words: hematologic malignancies, home care, palliative care, managed care, hematopoietic stem cell transplantation (HSCT), early discharge.

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Although home care (HC) of cancer patients is a common practice, so far only limited efforts have been made to define its role in the global management of patients suffering from malignant blood disorders, who are mainly treated in hospital or in outpatient clinics. HC has not been intensively applied in the treatment of these malignancies, this approach having been traditionally reserved for the final management of a minority of terminally ill patients; moreover the organization of HC has often relied on volunteers,[1] so that the place of death remained almost exclusively the hospital ward, in a setting focused on curing acute illness and prolonging life, rather than relieving suffering.[2-5] Nevertheless, as the costs of acute care in hospitals are increasing and attention to quality of life (QoL) is growing, some efforts have been made to find alternative models to assist chronically and terminally ill patients.[6-12] Moreover, the need to save costs, together with a more rational use of high-technology hospital resources, has led to the development of supervised care plans, based on integrated strategies that move from the traditional inpatient care to the HC setting,[13-18] even for high risk patients such as those undergoing intensive chemotherapy and/or hematopoietic stem cell transplantation (HSCT).[19-23] On this background, hematology HC services can play an important role, establishing specific care systems and decision-making which should be adopted for particular categories of patients (Table 1), defined by the phase of specific diseases and by the patient's life expectancy.[1,7,9] This article attempts to review the published studies on this topic to summarize the current use of HC and to address some points of potential development for this model of care in the setting of blood-related malignancies.

Design and Methods

Data for this review were identified using PubMed to search MEDLINE, limiting the search to abstracts or articles in English, Italian and French. The key words hematology, hematologic malignancies, home care, palliative care, managed care, hematopoietic stem cell transplantation, early discharge, quality of life and outpatient were variously combined in the title, abstract, and key words search list. The abstract database of the most relevant hematology and palliative care meetings and the bibliographies of pertinent articles were also considered.

Table 1. Home care for patients with hematologic malignancies on supportive and palliative care: applications, goals and tools.

Applications	*Goals*	*Objectives/Strategies*
Integrated care pathways for terminally ill and dying patients	Improving or at least maintenance of quality of residual time of life at home until a peaceful demise without uncontrolled symptoms.	Guidelines for the management of symptoms in the last days of life. Continuous care and regular re- assessment of the symptom burden and re-evaluation of therapy, avoiding unnecessary interventions and limiting the medications to those strictly necessary. Home care team readily available on continuous duty 24 hours is essential. Availability at home and rapid access to "core" drugs: morphine, hyoscine, hydrobromide, chlorpromazine and other major sedatives. Psychological, social and spiritual support as required
Supportive care for chronically ill and disabled patients	Providing low-grade intensive interventions at home, avoiding the need to transfer the patients to a hospital.	Taking blood samples for laboratory evaluations, blood transfusions, palliative and mild cytoreductive chemotherapy (generally by oral route), physiotherapy, treatment of bleeding and infections, etc. Availability of a home care team around the clock is unnecessary and clinical problems that may occur can be dealt with by the hospital or general health care services.

Table 2. Home care for patients with hematologic malignancies on disease-specific treatments: applications, goals and tools.

Applications	*Goals*	*Objectives/Strategies*
Early discharge of low-risk patients after SCT and chemotherapy-induced cytopenias°	Providing intermediate-grade intensive interventions at home, avoiding the need of hospital admissions with the aim of improving quality of life and, possibly, reducing hospital-acquired infections and saving health care and financial resources.	Guidelines for measures to prevent infection and the first management of aplasia-related clinical complications at home are essential. Transfusions and other supportive measures must be available at home and delivered as per protocol. An integrated home/hospital caring facility to expedite hospital admission in the event of complications is essential. The patients should receive, at home, once daily visits by a nurse and/or doctor. Home care staff must be readily available on continuous duty 24 hours a day

°*Good and stably maintained clinical conditions; remission of malignancy; absence of uncontrolled illness.*

HC for patients receiving curative treatments

The QoL of patients submitted to remission-inducing treatments and HSCT may be affected by long periods in hospital for the treatment of various complications. In-hospital protective isolation to prevent infections seems to be the accepted best standard of care for patients with cytopenia after intensive chemotherapy. Nevertheless, there has been a recent drive for home-based treatment of patients with chemotherapy-induced aplasia for whom the major concern about early discharge is related to the potential morbidity and mortality caused by infectious complications. In this setting, a risk stratification of neutropenic patients has important implications for management.[24-26] Indeed, it has been stated that hospital admission may generally be avoided for low-risk patients with good performance status, remission of underlying malignancies and no uncontrolled illnesses or active clinical complications (Table 2). However, in some reported experiences, the possibility of being managed at home during the pancytopenic phase after myeloablative treatments and HSCT was offered to highly susceptible patients. One study focused on the home treatment of 36 patients who had undergone allogeneic HSCT and were discharged from hospital early: this study showed that compared to a matched group treated in hospital and to a historical matched groups, HC patients were discharged earlier, spent fewer days on total parenteral nutrition, had lower rates of both grades II-IV acute graft-versus-host disease (GVHD) and transplantation-related mortality, and incurred lower costs. In the light of these very promising results, the study claimed that HC was feasible and safe for allogeneic HSCT patients and that it was advantageous compared to hospital care.[23] The updated follow-up of this study confirmed these findings, with a significantly improved 4-year survival rate in the HC group, compared to the hospital care group (63% versus 44%, p=0.04).[27] A comprehensive review of the six published studies on the feasibility of a HC program after intensive chemotherapy and HSCT has been recently reported together with the results of a pooled statistical analysis, including 585 HSCT recipients. Notwithstanding the small cohort, the marked hetero-

geneity in the study designs and patient populations, including different risk categories, and the lack of randomization, all studies claimed the feasibility and safety of HC when applied to cytopenic patients, with this management strategy being associated with similar morbidity and mortality as that with standard hospital care.[28] In the field of pediatric onco-hematology, one study was carried out in an Italian hospital. The population included children in non-critical clinical conditions previously submitted to intensive chemotherapy, who received parenteral nutrition and transfusion support at home. A report on the first year of activity, including 45 children, of whom 38 were receiving disease-specific treatments, outlined the feasibility of the HC program for children and the possibility of reducing the frequency and duration of hospital admissions.[8] The same group reported another experience on the use of HC for 29 children who had undergone HSCT, confirming their previous findings.[23] These studies proposed HC as an effective alternative to hospitalization, resulting in an ideal model of care to improve QoL, to save resources and to free inpatient beds. However, some issues need attention: these strategies require careful selection of patients (Table 2), a well-structured medical team and expert nursing support in order to deliver the planned program of care appropriately and to ensure close clinical surveillance and readily available emergency care.[23,24] Moreover, the home environment should be comfortable and be endowed with adequate measures and facilities, such as the availability of hot water (>50°C), to manage aplastic patients. In addition, an integrated system of home/hospital care to ensure hospital admission in the case of complications is absolutely essential. In conclusion, the HC management of these categories of patients, discharged early while on intensive curative treatments, should be organized only by selected, well structured and specialized centers with high operating standards.

HC for patients with chronic and terminal diseases

The home can be the optimal place for the management of patients with chronic and advanced hematologic malignancies, for whom a HC plan can provide palliation of specific symptoms,[2,5,29] including anemia-related manifestations,[30,31] pain syndromes,[32-35] infections,[32-36] bleeding,[37,38] as well as many other forms of suffering that often occur in the terminal stages of malignant diseases.[39-44] In this setting, when life-prolonging therapies are not applicable or are ineffective, the referral of patients to a HC team may represent a transition phase between inpatient disease-specific treatments and the terminal phase of life, to be spent at home,[45] the place of care preferred by most dying patients.[46-48] Medical antineoplastic and palliative treatments should be mutually complementary to improve patients' care,[49] so that integrated strategies, including supportive and disease-specific approaches according to hematologic expertise,[49,50] investigational therapies,[51] and a holistic approach inspired by the philosophy and practice of palliative medicine,[52] can allow optimal clinical management[53,54] enabling most patients to stay at home. Indeed, some studies have demonstrated that unnecessary hospital admissions are often due to the unavailability of external care and that they can be avoided by HC interventions, comprehensively addressing the clinical and social burdens of the patients and their families.[5,55-58] HC should be based on precise operating models and the healthcare team's guidelines in order to ensure continuous efforts toward the best quality of care.[1,59-62] The decision to follow a patient at home should be taken by the referring hematologist together with HC team and should be preceded by a comprehensive psychosocial evaluation of the patient and his or her family background. The involvement of the family is largely determined by its role in the socio-cultural context of each country and may be of capital importance in all phases of the HC program. The availability of the reliable and educated caregiver at home is an essential condition, given that a HC plan should involve the family and the patient at the same time.[63-65] HC providers should spend considerable energy in openly discussing all possible treatment objectives in order to reach an agreement on a shared plan of care, making every effort to avoid deleterious consequences of misunderstandings and any communication bias.[66,67] Moreover, regular periodic team meetings give the opportunity to examine emerging problems, to refine the treatment and care objectives, and to reorient the team's activity if necessary. The HC providers should use both the general services and diagnostic structures of the hospital to which they are associated. In addition, close collaboration with a hospice, including a structured program for patient referral and admission, may be useful to ensure family relief in case of intolerable distress of the caregiver and to relieve specific refractory symptoms requiring measures unavailable at home.[68-70] The model of care to be adopted should be congruent with the phase of disease and the patient's needs (Table 1). There are different patterns of decline towards the end of life and different disease courses, such that specific categories of patients, such as terminally ill and chronically ill patients, can be identified.[1,5,7,71,72] The former group includes patients with a short life expectancy, often with a heavy burden of symptoms, and requiring regular clinical monitoring, transfusions and supportive measures. In addition, they may have sudden emergencies due to intolerable symptoms and distress (e.g. pain recurrence, bleeding, progressive dyspnea), developing the need for 24 h/day support. In an Italian experience, this need was met by a doctor available 24 hours a day, all year round, able to go to the patient's home; a nurse was available on call and blood products were supplied by the hospital.[1,7] A

less intensive model of care may be adequate for chronically ill patients, for whom it seems reasonable to provide periodic evaluation by a doctor and transfusion support; in some cases these patients should be treated, generally by the oral route, with palliative chemotherapy. Therefore, a close relationship between the hospital ward and HC activities is essential to avoid fragmentation of components of the service and to develop effective case management plans. In addition, careful and continuous re-evaluation of the patient's clinical profile, according to the concept of *total care*, is required in order to promptly modify the operative model of activity in the domiciliary setting, to provide the most effective symptom control and to avoid administering futile treatments.[73,74] Precise decision-making protocols, in particular regarding pain therapy, transfusion policy, treatment of infections and bleeding management in all phases of HC, from its initiation to end of life care, are essential in order to provide successful HC until the peaceful demise of most patients at home, in accordance with their wishes,[75-82] as reported by an Italian study in which 395 out of 459 (86%) patients died at home.[7] In the light of the reported experiences, hematology centers should be directly involved in the planning and coordination of supportive and palliative HC services.

Conclusions

The advances in treatment that have been made in recent years have increased the chance of extending life and the possibility of curing most types of hematologic malignancies. The management of patients can be complex and often involves long periods in specialized centers with the patients removed from their families and everyday life. Patients can be emotionally distressed by the demand of intensive treatment and may experience many adverse effects.[83] As result, patients and their families should be prepared to cope with a wide range of physical, emotional, and social consequences of the disease and treatments for extended periods of time. In addition, patients with life-limiting disease, for whom treatment is palliative from diagnosis,[84,85] require careful attention and specific interventions aimed to control the heavy burden of symptoms and to ensure comfort and support for themselves and their families throughout the various phases of the disease.[86] As time spent in hospital is being shortened and more treatments are being given on an outpatient and HC basis, family caregivers are taking on more responsibility for providing care, becoming important members of the health care team, not only by providing secure support and encouragement to the patient, but also by managing medications and helping to control symptoms and side effects.[87,88] An acceptable QoL is the major goal in the care of patients with terminal malignancy. In addition to management of symptoms, psychological care and support, such as those provided by a HC service, are considered important determinants of a patient's well-being.[89-93] However, despite the widespread belief that HC benefits patients with hematologic malignancies and their families, there is very little evidence to support this. In fact, most HC-related outcomes, including morbidity and mortality, functional status and QoL, patient and caregiver satisfaction, health care utilization (hospital readmission, emergency care), and cost-effectiveness remain to be specifically explored in the hematology setting.[5,94-96] However, extrapolating from studies on patients with solid tumors,[59,69,73,97-99] it is reasonable to presume that comprehensive HC programs provide positive effects on the QoL of terminally ill patients also in the setting of blood-related malignancies. Therefore, optimal collaboration between palliative care specialists and hematologists should allow for the implementation of hospice/HC services,[100,101] avoiding unnecessary emergency hospital admissions in the last days of life.[102-104] Although HC is mainly used in hematology for the management of end-stage patients, some important experiences have demonstrated the feasibility of domiciliary management in other phases of disease and groups of patients, including some selected high-risk categories of patients with therapy-induced neutropenia. In the studies by Svahn *et al.*, the HC group had several advantages in terms of functional rehabilitation, nutrition, risk of infections, GVHD and survival compared to a group managed with hospital care. Moreover, HC patients could be discharged to the outpatient clinic faster than the other group, although the time to hematopoietic recovery was the same.[21,27] Nevertheless, no controlled randomized study has yet compared HC to hospital-based care with protective isolation, so that the superiority of HC in the HSCT setting remains unproven.[28] Moreover, the utility of these measures, which include several expensive interventions, such as the management of ventilation systems, construction and cleaning of HSCT units and isolation and barrier precautions, is a matter of debate even in the high risk setting of allogeneic HSCT, where they have not been proven to provide patients the intended benefit of decreased infection rates or improved survival.[105] Besides QoL, patient's well-being, and family's support issues, cost containment efforts justify the search for an alternative management model. In the above reported experience of Svahn *et al.* concerning allogeneic HSCT, the median cost of treatment from day 0 until day +76 was $25,340 for the HC group, compared with $36,437 for the hospital care control group ($p<0.001$). In the multivariate analyses, high costs were associated with late engraftment, grades II-IV acute GVHD, and hospital care.[21] In a pediatric hemato-oncology study, the average cost per patient receiving HC (#4,252) was significantly lower than the average cost per in-hospital patient (#14,693).[8] Moreover, the same group reported that the average

cost per HC (#2,936, range 150-20,700) was significantly lower than the average cost per patient hospitalized to undergo the same procedures (#9,785, range 350-96,750).[23]

A recently reported Italian study evaluated the specific cost of domiciliary care according to the phase of the patients' disease. The subjects of the study were cytopenic patients on supportive care, discharged early after intensive chemotherapy and those receiving palliative care. The economic analysis involved cost drivers such as health care providers, coordination/support team, materials and drugs, laboratory activities, transfusion support and indirect costs for the patients and their families. The variables affecting the costs were disease status, transfusion needs and the type of hematologic disease. These costs exceeded the Italian district charges for HC of oncological patients, when compared with national Diagnostic Related Groups (DRG) scale charges for hematologic diseases, and with district charges for palliative HC for patients with neoplastic diseases, with the exclusion of chronically ill patients. However, the highest cost for patients with acute leukemia, recorded for those requiring more than four transfusions/month, was lower than the highest corresponding DRG charge. The study concluded that from the perspective of the purchaser/provider of health services, costs of HC for some categories of hematologic patients are lower than those of hospitalization, although superior to the current national fares for HC programs.[106] The economic burden charged to the patients and their families must also be taken into account in cost evaluations.[68,107] In this light, HC could be an economically realistic alternative to traditional in-hospital disease management and, therefore, hematology community and public health systems should play a major role in ensuring equity of access to effective HC and prevention of suffering and problems during bereavement.[107-110]

In conclusion, optimizing the patient's care directly in his or her own home could offer important advantages. Additional studies, in order to improve the management of patients with blood-related malignant disorders, are urgently awaited given the great social burden of these diseases.

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