Home management of hematological patients requiring hospital admission

Gianluca Isaia, Vittoria Tibaldi, Marco Astengo, Marco Ladetto, Renata Marinello, Mario Bo, Giuliana Michelis, Fiorella Ruatta, Nicoletta Aimonino Ricauda

1. Introduction

The ever-increasing demand of acute hospital services requires alternative methods of delivering the services of health care (Ademokun et al., 2005). It often happens, especially in urban centers, that hospital beds are not sufficient to answer the high request of patients. For these reasons, in several countries a lot of home care services providing, at home, hospital therapies for acute or chronic patients have been recently developed (Caplan, 2006; Leff et al., 2006).

Many studies could be found in the literature reporting home treatment of patients affected by advanced hematological malignancies (Finlay et al., 2002; Niscola et al., 2006), but fewer studies can be found reporting systematic home administration of hemocomponents to frail elderly, without a poor prognosis. A home care service is especially helpful for elderly patients with multiple comorbidities and with high functional impairment.

Blood has been transfused at home for decades (Rabiner et al., 1970; Madgwick and Yardumian, 1999; Brook et al., 2003), but even though the practice of home administration of hemocomponents has been found to be safe and fewer errors occur at home as compared to a busy hospital, the volume of out-of-hospital transfusions is estimated to be less than 1% of the total, in the United States (Benson, 2006).

This paper presents the experience of the HHS on acutely ill elderly patients with hematological illnesses. To our knowledge, this is the first paper reporting results on home treatment of elderly patients showing hematological illnesses. The aim of this study is to show the possibility of providing globally compromised subjects with continuous home medical assistance.

2. Patients and methods

2.1. The study pool

This retrospective study included patients with hematological illnesses as primary or secondary diagnoses at discharge among those admitted to the HHS from 1st January 2007 to 31st December 2007. All the patient’s clinical records reporting anemia or leukemia as primary or secondary discharge diagnosis were reviewed by a group of physician involved in the study.

Clinical records were used, fulfilled by physicians reporting, as a primary diagnosis, the main clinical problem showed by the patient during hospitalization. In order to report objectively the general conditions of patients involved, in terms of functional and cognitive status and, especially, in terms of severity of the diseases...
showed, many different standardized and international questionnaires were fulfilled. For each patient, general data (gender and age), mean length of stay, number of illnesses, admission functional status (activities of daily living = ADL, instrumental activities of daily living = IADL, Karnofsky performance status) (Katz et al., 1963; Lawton and Brody, 1969; Crooks et al., 1991), comorbidity level (Cumulative Illness Rating Scale = CIRS) (Conwell et al., 1993), and severity of diseases (acute physiology and chronic health evaluation = APACHE II) (Knaus et al., 1985) were collected from the clinical records. Laboratory data such as hemoglobin, white blood cell count, platelet count and albumin were collected too.

2.2. The HHS

This is a service of the San Giovanni Battista Hospital of Torino that has been operative since 1985. The HHS-team is multidisciplinary and consists of three geriatricians, 13 nurses, two physiotherapists, one social worker, and one counselor. The team has seven cars. The main feature of HHS is that doctors and nurses work together as a real team, with daily meetings to discuss each patient’s needs and to organize individualized medical care. The team operates 7 days a week and looks after 25 patients a day, on average. Every year, a mean of 450 patients has been treated at home. The most common causes of admission are cardiopulmonary, cerebrovascular, metabolic, and neoplastic diseases.

HHS can be directly activated by the patient’s general practitioner as an alternative to traditional hospital care, or by hospital wards to allow early and protected discharge from hospital. There is a close collaboration between the HHS and the emergency department (ED) of the hospital, to propose home care as an alternative to traditional admission. In the ED, all the necessary diagnostic tests (e.g., blood tests, radiography, electrocardiogram) are provided, and the patient is then transferred home by ambulance. Usually, the patients return back home within a few hours.

Approximately 60% of the patients are referred from the ED, 25% from other hospital wards, and 15% from specialists or general practitioners in the community. Medical consultation with other hospital specialists is possible in the hospital or at the patient’s home. The HHS provides substitutive hospital-at-home care in a “clinical unit” model (Tibaldi et al., 2004; Ricuda et al., 2005; Aimonino Ricauda et al., 2008). Several examinations and treatments can be carried out at home, including blood tests, electrocardiogram, spirometry, pulse oximetry, ultrasonographic investigations such as echocardiograms and vascular Doppler-ultrasonographies, placement of peripherally inserted central catheters, oxygen and other respiratory therapies, intravenous fluids and drugs, blood transfusions, surgical treatment of pressure ulcers. Other treatments include physiotherapy, occupational therapy and counseling.

Admission criteria are: appropriate care supervision at home, a telephone connection, living in the HHS geographic catchment area. Exclusion criteria are: absence of family and social support, factors related to the need of continuous medical monitoring such as severe hypoxemia, severe acidosis or alkalosis, extremely severe concomitant illness, as for instance need for hemodialysis.

2.2.1. Transfusion management at the HHS

At HHS indications to hemocomponent administration are: symptomatology related to anemia or thrombocytopenia or hemoglobin levels below 8 g/dl for blood transfusions and platelet count under 10,000/μl for platelet transfusions.

Subjects that have never been administered hemocomponents in an in-hospital setting, are usually considered not eligible for home transfusions. Blood samples are collected by nurses the day before planned transfusion. Before transfusion, the patient’s informed consent is required. The process of home blood transfusion is followed by a physician and by a nurse specialist in transfusions (Hewitt and De Silva, 1998). The rate of administration of each red blood cell (RBC) unit is about 3 ml/min so that each unit is transfused in 1.5–2 h; platelets are generally transfused as quickly as the patient can tolerate. Each RBC unit is transfused within 4 h to prevent excessive warming. Heart rate, temperature and blood pressure are checked by the nurse before transfusion, every 30 min throughout the period of administration of the hemocomponent and finally 30 min after the end of the transfusion. Two hours after the transfusion is completed, the condition of the patient is checked by a nurse to ensure that no adverse effects occurred. An emergency kit, containing adrenalin, corticosteroids, antihistamines and anti-pyretics, is always available at the patient’s home during hemocomponent administration.

3. Results

Over a total of 481 patients treated by the HHS in 2007, 54 fulfilled the study inclusion criteria. Twenty (37%) and seven (13%) patients showed anemia and leukemia as primary discharge diagnoses, respectively. Twenty five (46%) and four (7%) patients showed anemia and leukemia as secondary discharge diagnoses, respectively. Two patients had a double hematological diagnosis: one presented acute myeloid leukemia as primary diagnosis and anemia due to hemorrhage as secondary diagnosis, while the other presented anemia as primary diagnosis and chronic lymphoid leukemia as secondary diagnosis. Almost half of them (44.4%) were female. Mean age was 80.9 ± 9.6 years. Most patients (55.5%) were admitted directly from the Emergency Department; 22.3% were transferred by another hospital unit; 18.5% were referred by their general practitioner and 3.7% by the Blood Bank of our hospital. Mean length of stay was 26.04 ± 21.26 days.

Even if the sample included subjects with hematological diagnoses at discharge, only 31.48% were admitted from the ED for a hematological acute illness, while 24.1% were admitted for a lower respiratory tract infection (chronic obstructive pulmonary disease exacerbation or pneumonia) 11.1% for heart failure or cardiac arrhythmias, 5.5% for falls or fractures, 3.7% for hemorrhage (especially of the gastrointestinal tract). The remaining 22.2% showed different admission diagnoses as hypoglycemia, fever or pancreatic disease.

Patients were highly compromised functionally (functions lost at ADL: 3.15 ± 2.31; IADL score: 4.38 ± 4.18) and presented a high degree of comorbidity (Table 1).

Among the enrolled patients, 34 (62.9%) needed blood or platelet transfusions for a total volume of 112 blood units and 49 platelet pools. During the period studied, no adverse reactions were observed. Patients requiring blood or platelet transfusion were more functionally compromised and presented a higher level of acute physiology and chronic health evaluation (Table 2).

We observed 5 (9.2%) patients with infections, but all of them presented the infection already at the admission time in the ED. No new cases of infection (nosocomial infections) were detected.

### Table 1

<table>
<thead>
<tr>
<th>Parameters</th>
<th>Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>ADL</td>
<td>3.15 ± 2.31</td>
</tr>
<tr>
<td>IADL</td>
<td>4.38 ± 4.18</td>
</tr>
<tr>
<td>APACHE II</td>
<td>8.11 ± 2.89</td>
</tr>
<tr>
<td>CIRS severity</td>
<td>1.1 ± 0.36</td>
</tr>
<tr>
<td>CIRS comorbidity</td>
<td>3.63 ± 1.20</td>
</tr>
<tr>
<td>Karnofsky index</td>
<td>56.6 ± 21.29</td>
</tr>
</tbody>
</table>

According to whom the most frequent problem of blood transfusion sample reinforces the experience of Stainsby et al. (2006), hospitalization even for patients with serious hematological illnesses could make of the HHS a valid alternative to traditional in-hospital admissions for different acute illnesses are treated at their own homes. The HHS demonstrated to be as effective as an in-hospital setting for some acute and chronic illnesses. Sophisticated investigations, complications therapies and procedures can be carried out when a patient is admitted to the HHS. The HHS is not only suitable for terminally ill patients, wishing to die at their homes, but also for elderly, compromised patients suffering from certain acute illnesses. The possibility of home blood and platelet transfusions could make of the HHS a valid alternative to traditional hospitalization even for patients with serious hematological illnesses.

Moreover, the lack of transfusion related complications in our sample reinforces the experience of Stainsby et al. (2006), according to whom the most frequent problem of blood transfusion is human error. Other authors (Ademokun et al., 2005) have reported that transfusions at home are probably more checked with the potential for fewer mistakes as compared with those occurring in the setting of a busy hospital. Older patients with hematological illnesses are more prone to develop nosocomial infections. Therefore, it could be speculated that home treatment might represent a safer option than hospital admission. Other authors reported a lower prevalence of hospital-acquired infections for patients treated at home compared with the overall national rate and compared with long-term hospital care and rehabilitation wards (Patte et al., 2005). However, on the basis of our data this can just be hypothesized and much more systematic research is needed.

Another important point is the economic burden of care. Even though this study was not performed to analyze costs for management of hematological patients, the HHS has already demonstrated economical advantages over traditional care in the management of elderly patients affected by stroke or chronic obstructive pulmonary disease (Ricauda et al., 2005; Aimonino Ricauda et al., 2008). The home treatment of patients during the post-transplant pancycropenic phase has been found cheaper than in-hospital treatment (Svahn et al., 2002). Cartoni et al. (2007) demonstrated that the mean monthly cost for subjects with hematological illnesses are lower than the average costs that would have been charged to the National Health System in the event of hospitalization. Treating hematological patients at their homes and performing post discharge controls and transfusions permit to avoid unnecessary emergency admissions, most likely resulting in an economically favorable strategy.

We could also consider that if home is the preferred place for anyone, it becomes very important especially for the elderly, who have shown a faster degree of functional impairment during hospitalization.

Our study is a retrospective study with a small sample size and can therefore only be regarded to as a hypothesis generating study. The present study shows the experience of a HHS in treating elderly, highly compromised patients with hematological illnesses. In our opinion, this could be the starting point for future studies in the field that could increase the power of HHS for this type of patients.

Conflict of interest statement

None.

References
