

## ORIGINAL INVESTIGATION

# Hip fracture: preliminary results supporting significant correlations between the psychological wellbeing of patients and their relative caregivers

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**Background and aim.** Hip fracture is one of the major causes of loss of self-sufficiency in older patients. The associated caregiving rehabilitation task often falls to the lot of a member of the patient's family. Our study aims at assessing the relationship between the psychological well-being of patients with hip fracture and their caregivers.

**Methods.** The study was carried-out on 53 elderly patients with hip fracture and their primary caregivers. The Mini Mental State Examination (patient), Activities of Daily Living (patient), Instrumental Activities of Daily Living (patient), Geriatric Depression Scale (patient), Psychological General Well-Being Index (patient/caregiver) and the Caregiver Burden Inventory (caregiver) were administered to each participant.

**Results.** The results revealed significant correlations between stress levels and the psychological well-being of hip-fracture patients and relative caregivers. In particular, the Caregiver Burden Inventory's total score was negatively related to the patient's Psychological General Well-Being Index score ( $p < 0.05$ ) and with Anxiety ( $p < 0.05$ ), Depressed Mood ( $p < 0.01$ ), Positive Well-being ( $p < 0.05$ ) and General Health ( $p < 0.05$ ) subscale scores, as well as with the patient's Activities of Daily Living ( $p < 0.05$ ) score. Patients' Psychological General Well-Being Index scores were related to the caregivers' General Health subscale ( $p < 0.01$ ), and negatively related to Caregiver Burden Inventory Time Dependence ( $p < 0.05$ ) and Social Burden ( $p < 0.05$ ) subscales, as well as with the Geriatric Depression Scale score ( $p < 0.05$ ).

**Conclusion.** A mutual relationship seems to exist between a patient's psychological well-being and his/her caregiver's burden. These findings highlight the importance of a bio-psychosocial approach to both patients and caregivers.

**Key words:** Hip fracture, Psychological well-being, Caregiver's burden

## INTRODUCTION

Hip fracture (HF) is one of the major causes of loss of self-sufficiency in older patients who are among the most vulnerable of hospitalized patients, presenting with different major comorbid geriatric syndromes (frailty, dementia, disability) which make the discharge planning process difficult. HF affects independent ambulation and functional ability resulting in reduced

health-related quality of life. Functional recovery following surgery varies according to patients' comorbidities, cognitive and functional status, and their psychosocial state. Bueckling and colleagues<sup>1</sup> have found a pre-existing need of care, limited function, cognitive impairment, and depression to be independent factors associated with lower Health-related Quality of Life (HrQoL) during a patient's postsurgical period. Depression, delirium, and cognitive-impairment

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rates, at the time of hip fracture, have been estimated at between 9% and 47% (mean 29%), between 43% and 61% (mean 49%), and between 31% and 88% (mean 47%), respectively <sup>2</sup>. Mental health status at the time of surgery has been reported as being an important determinant of outcome, with mental disorder associated with poorer functional-recovery and higher mortality rates <sup>3,4</sup>. The psychological state of the individual who suffers from a hip fracture is highly relevant when determining how well that person may recover <sup>5</sup>. The affective responses to a hip fracture predict both psychological and physical functioning over time, providing a potential target for the enhancement of recovery from this debilitating injury <sup>6</sup>. The recovery process that follows surgery varies on the basis of patients' comorbidities, cognitive and functional status, and their psychosocial state. Well-being in this sense means more than health as such and is possible to achieve during illness as a means by which to balance suffering. The embodied experiences of both well-being and suffering include a variety of simultaneous qualities <sup>7</sup>.

The caregiving rehabilitation task associated with hip fracture fall, more often than not, to the lot of a member of the family <sup>8</sup>. Studies have focused, in particular, on the concept of burden, defined as "burden of care", losing sight of the importance of assessing the positive aspects that characterize the state of health of an individual. Informal caregivers are an important resource for elderly patients suffering from hip fracture because they play a key role during their recovery. One important task is that of motivating the patients to adhere to their therapy programmes. The majority of caregivers (86%) are represented by family members (prominently women) who are also defined as "informal caregivers" <sup>9</sup>. They fulfil their caring-giving role from 7 to 11 h a day on average, up to 10-15 h when clinical conditions worsen <sup>10</sup>. Informal caregivers have to cope with physical, psychological and social stressors that affect their health conditions and quality of life negatively. Many caregivers assume the caregiver role with little or no preparation and have to learn to deal with several aspects of care in a very short time. Most often they have no professional skills in assistance procedure. In fact, more often than not, caregivers do not know what to expect during hip-fracture recovery. They face situations where they have to address various care-related tasks, such as arrangement of rehabilitation services and assistive devices. These situations become more stressful when caregivers have to juggle their own professional and family lives with their activities as carers. The primary stressors experienced by informal caregivers are related to the severity of the ailment and the quantity of time devoted to assistance.

The increased risk of burnout identified among informal caregivers is closely related to their perceived level of burden, defined as a multidimensional response to negative appraisals and perceived stress <sup>11</sup>. Joint assessment of the burden and well-being dimensions, that coexist in caregivers' experiences, allows for the identification of personal and relational resources that may be usefully included in interventions addressed to caregivers <sup>11,12</sup>. In a recent preliminary study, we also found a correlation between patients' psychological well-being and caregivers' burdens <sup>12</sup>.

This study aims at providing some initial data on the relationship between the psychological well-being of patients with HF and their caregivers, in an effort also to verify some of the possible implications existing between psychological variables and HF prognosis. Our study adopts a positive approach, taking into consideration not only deficits but also psychological resources that may prove useful to hip-fracture rehabilitation programming.

## MATERIALS AND METHODS

The study was carried out on 53 elderly patients with HF (mean age: 83.9 +/- 8.1), hospitalized within the Geriatrics Division of Rome's Sant'Andrea Hospital, in 2015, and their primary caregivers (mean age: 53.2 +/- 15.9; 40.4% of them living with patients). Each patient was given a socio-demographic questionnaire and the Psychological General Well-Being Index (PGWBI), the Mini Mental State Examination (MMSE), the Activities of Daily Living (ADL), the Instrumental Activities of Daily Living (IADL) and the Geriatric Depression Scale (GDS). The caregiver burden was also assessed using the Caregiver Burden Inventory (CBI). In Table I we illustrate which tests were assigned to each participant.

As follow-up outcomes, ADL and IADL patient scores, 2 months after surgery, were taken into account.

Below we shall illustrate the different tests we availed of, also summarizing the importance that each area we investigated had for HF patients and caregivers alike.

**Table I. Materials and participants.**

<p>Each participant (Patient [P] and Caregiver [C]) was given:</p> <ul style="list-style-type: none"> <li>• Socio-demographic questionnaire [P/C]</li> <li>• Mini Mental State Examination (MMSE) [P]</li> <li>• Activities of Daily Living (ADL) [P]</li> <li>• Instrumental Activities of Daily Living (IADL) [P]</li> <li>• Geriatric Depression Scale (GDS) [P]</li> <li>• Psychological General Well-Being Index (PGWBI) [P/C]</li> <li>• Caregiver Burden Inventory (CBI) [C]</li> </ul>
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### MINI MENTAL STATE EXAMINATION (MMSE)

The Mini Mental State Examination (MMSE)<sup>13</sup> is a 30-point questionnaire used extensively in clinical and research settings to measure cognitive impairment. It has proved to be a valuable instrument for the assessment of cognitive impairment. Pre-fracture cognitive impairment places patients at greater risk of institutionalization<sup>14</sup>. Furthermore, pre-fracture cognitive impairment is also associated<sup>4 15</sup> with higher mortality rates. Dementia plays a role in the genesis of hip fractures<sup>13</sup>, as it increases the risk of falling by a factor of 5, and risk of significant injury after a fall by a factor of 2.2<sup>16</sup>. Dementia has varying degrees of severity, with greater severity linked to poorer<sup>17</sup>. Few effective studies have linked cognitive impairment to patient clinical outcome<sup>18</sup>. Some studies suggest that cognitive impairment, found in 31-88% of elderly patients experiencing hip fracture, was a predictor of poor functional recovery after hip-fracture surgery<sup>3-4</sup>.

### ACTIVITIES OF DAILY LIVING (ADL)

The Katz Index of Independence in Activities of Daily Living (ADL)<sup>19</sup>, commonly referred to as the ADL, is the most appropriate instrument to avail of in order to assess functional status as a measurement of a person's ability to perform activities of daily living, independently. The Index ranks adequacy of performance in the six functions of bathing, dressing, toileting, transferring, continence, and feeding. Patients are scored yes/no for independence in each of the six functions. A score of 6 indicates full function, 4 indicates moderate impairment, and 2 or less indicates severe functional impairment. ADL are an important health outcome in the orthogeriatric population. Functional decline can lead to disability and may lead to prolonged hospital stays, institutionalization and even death<sup>20 21</sup>. Some authors<sup>22 23</sup> have suggested that pre-fracture dependence in ADL is a stronger predictor of further functional decline resulting in institutionalization or death than pre-fracture dementia. Recovery of pre-fracture health and functional levels is one of the main goals in hip fracture management<sup>24</sup>. Therefore, it is important to assess deterioration in functional level over time. In many cases, it may prove difficult to assess pre-injury ADL's accurately at the time of admission. In such cases, Liem and colleagues<sup>25</sup> suggest consulting a proxy, who will typically be a family member, friend or caregiver.

### INSTRUMENTAL ACTIVITIES OF DAILY LIVING (IADL)

The Lawton Instrumental Activities of Daily Living Scale (IADL) is an instrument developed to assess independent living skills<sup>26</sup>. These skills are considered more complex than the basic activities of daily living as assessed by the Katz Index of ADL. The instrument is considered

useful when seeking to identify how a person is functioning at present as well as detecting improvement or decline, as explained below.

IADL are defined as those activities whose accomplishment is necessary for continued independent residence in the community as they are more sensitive to subtle functional deficiencies than the ADL. It differentiates among task performance levels including the amount of help and time needed to accomplish each task. Eight domains of function are assessed with the Lawton IADL scale. Women are appraised on all areas of function, while, interestingly enough, men are assessed historically on five only which means that preparation of food, housekeeping and laundering<sup>26</sup> are excluded. The scores range from 0 (low function, dependent) to 8 (high function, independent) for women, and from 0 to 5 for men.

### GERIATRIC DEPRESSION SCALE (GDS)

The Geriatric Depression Scale (GDS)<sup>28</sup> is a 30-item self-report assessment used to evaluate depression in the elderly. The questions require either "yes" or "no" as an answer. Being so simple to answer, the scale can be used easily with individuals who are ill or moderately impaired from a cognitive point of view. One point is assigned to each answer and the cumulative score is rated on a grid. The grid sets a range of 0-9 as "normal", 10-19 as "mildly depressed", and 20-30 as "severely depressed". Compared with the pre-fracture period, 55% to 75% of H-F cases experience loss of some of their daily-life activities<sup>29 30</sup>. Although it is ignored in the case of the majority of elderly patients, depression is the most commonly found hip-fracture-related psychological co-morbidity disorder<sup>31</sup>. An independent relationship was found to exist between low functional capacity and depression symptoms in the elderly<sup>32</sup>. In elderly people who cannot walk well enough to perform daily living activities, social isolation often occurs and social isolation is in itself a risk factor for depression<sup>33</sup>. Therefore, we can say that a vicious circle of low ADL is created between pre-existing depression and an increase in depression that feelings of inadequacy when performing daily activities can produce. In a long-term study, functional healing was evaluated after 2 years in elderly cases with hip fractures, and depression was reported to have affected healing. A negative effect of depression on daily living activities at the end of a 6-month period emerged. A patient's active participation in the rehabilitation process has a positive effect on healing. However, the presence of depression due to reluctance, negative cognition and symptoms similar to psychomotor retardation will disrupt this process. Depression in elderly hip-fracture cases was found to have affected daily living activity negatively and was

observed more often in females and in those who had lost their spouses<sup>34</sup>.

### **PSYCHOLOGICAL GENERAL WELL-BEING INDEX (PGWBI)**

Initially developed in 1970-71, the Psychological General Well-Being Index (PGWBI) is one of the most venerable and widely used patient-reported outcome gauges.

The PGWBI targets peoples' self-representations of aspects of their general wellbeing.

It does not include evaluations of physical health. The 22-item instrument includes six dimensions: Anxiety, Depressed Mood, Positive Well-being, Self-Control, General Health and Vitality. The 22 items are frequently used to generate an overall Index or total score for general well-being<sup>35</sup>.

Psychological wellbeing is recognized as an important gauge of health status, shaped by individuals' perceptions and expectations that may be availed of for the purpose of evaluating disease and health-care services<sup>36</sup>.

Elderly patients with a hip fracture may present with a complexity of other problems, including physiological and social factors, which may be challenging to both them and their careers.

The level of family caregivers' mental health has been shown to be an important predictor of care recipients' institutionalization<sup>37</sup>, and a risk factor for care-recipient mortality<sup>38</sup>. The perspective that tends to dominate much of the relative literature is that care by family members is provided solely to older adults living at home. When caregivers are monitored over considerably long periods of time, it becomes evident that family caregiving responsibilities do not end with institutionalization of a disabled relative. Instead, this key transition appears to affect the type and intensity of the help provided. There is a lack of literature addressing family caregiving for frail elderly people and its consequences on the life quality of family caregivers. The subjective responses of individuals to the objective environments where he/she lives<sup>39 40</sup> play an important role in maintaining the status of care recipients in-home care. High levels of depressive symptoms and low levels of life satisfaction in caregivers may also be associated with the low quality of the care provided to their frail care-recipients and even with maltreatment of the elderly<sup>39</sup>. The concept of subjective well-being (SWB) is multi-component by nature. It is affected by positive (i.e., happiness), negative (i.e., depressive symptoms) and cognitive components (i.e., life satisfaction). Its multiple components are affected by different sets of social determinants and develop differently at successive stages of life<sup>41</sup>. Patterns of change in family caregivers' mental health

over time were also explored, while the relationships between family caregivers' mental health and recovery outcomes of elderly hip-fractured patients were also examined. The findings<sup>38</sup> suggest that, during the first year following patient discharge, family caregivers' mental health is a variable factor associated with patients' post-fracture recovery, including recovery of physical functionality, reduced pain, and better health-related outcomes. These results also suggest that, when estimating recovery times and health-related outcomes of patients who have suffered a hip fracture, health-care providers should also consider the mental well-being of family caregivers. An understanding of the relationships between caregiver-related predictors and the recovery of elderly persons after hip-fracture surgery might provide a more holistic view of recovery. Informal caregivers have, in fact, to cope with physical, psychological and social stressors that affect their health conditions and quality of life negatively<sup>11</sup>.

### **THE CAREGIVER BURDEN INVENTORY (CBI)**

The Multidimensional Caregiver Burden Inventory (CBI)<sup>42</sup> is a 24-item Likert-format scale (0-4) that measures 5 dimensions of the caregiver burden: time-dependence, developmental, physical, social, and emotional burden. The time-dependence burden emanates from the time demands and restrictions that caregiving can impose on caregivers, whereas the developmental burden describes the caregivers' feelings of being 'off-time' in their development with respect to their peers. The physical burden refers to the strain associated with demands on caregivers' physical health, strength, and energy. The social burden refers to 'caregivers' negative feelings toward their care recipients, which may also result from the patient's unpredictable and often bizarre behaviour.

The CBI comprises 24 closed questions. There are five items in each dimension except for physical burden, which has four. Each item is attributed a score between 0 (not at all descriptive) and 4 (very descriptive), where higher scores indicate greater caregiver burden; there are no cut-off points for classifying burden<sup>43</sup>.

Increasing numbers of studies have examined the caregiver-burden phenomenon, the lack of support given to caregivers and intervention focused on relieving the caregiver burden; this increase is probably due, in part, to greater evidence that caregiver burden is a determining factor of caregivers' Quality of Life (QoL)<sup>44 45</sup>. Social support has been associated with a diminution of caregiver burden<sup>44</sup>. High care-demand levels may affect multiple aspects of caregivers' lives, including their free time, social life, emotional and physical health, as well as their personal development. These subjectively defined stressors are also called caregiver



burden. Perceived caregiver burden may affect their self-esteem, sense of competency as caregivers and the degree of growth due to dealing with caregiving challenges, adversely<sup>39,46</sup>.

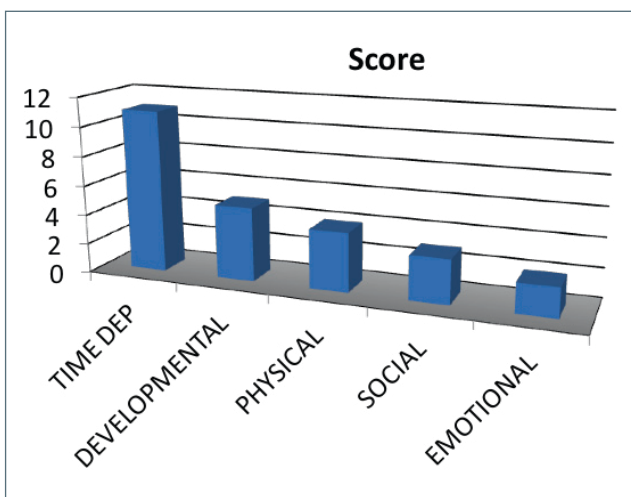
**STATISTICAL ANALYSIS**

SPSS 22.0 software was used to investigate the correlations between the CBI of caregivers and the PGWBI of patients and between patients' and the caregivers' PGWBIs, whilst also correlating the subscale scores obtained from the various tests administered.

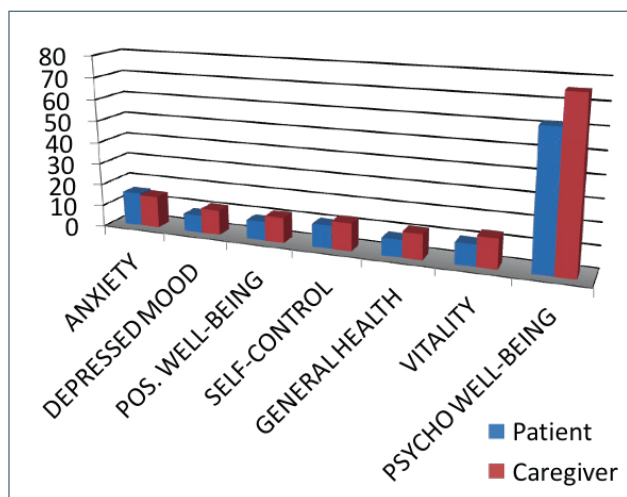
**RESULTS**

In the case of the caregivers, the mean score on the CBI was 25.2 +/- 18 and 73.89 +/- 19.5 on the PGWBI. Time-Dependence and Social are the CBI subscales that obtained the highest mean scores (see Figure 1). Patients' mean score for PGWBI was 60 +/- 19.7. The results revealed significant correlations between stress levels and the psychological well-being of the caregivers and the patients, as illustrated in Figure 2. In particular, the total CBI score is negatively related to the patient's PGWBI score (p < 0.05). The total CBI score is also negatively related to the PGWBI subscales of Anxiety (p < 0.05), Depressed Mood (p < 0.01), Positive Well-being (p < 0.05), General Health (p < 0.01) and with IADL (p < 0.05) in patients. Patients' PGWBI scores are related to caregivers' General Health subscales (p < 0.01), and negatively related to Time-Dependence (p < 0.05), Social-Burden (p < 0.05) and GDS scores (p < 0.05). The Patient-Anxiety subscale score is related to the Depressed-Mood (p < 0.05) and General-Health (p < 0.01)

subscales of caregivers' psychological well-being and negatively related to Social Burden (p < 0.05). The Patients' Depressed-Mood subscale score is related to the Depressed-Mood (p < 0.01) and General-Health (p < 0.05) subscales of caregivers' psychological well-being and negatively related to Time-Dependence (p < 0.01), Physical (p < 0.05) and Social (p < 0.01) burdens. Patients' Self-control subscale scores are related to caregivers' psychological well-being General-Health subscale (p < 0.05) Patients' General-Health subscale scores are related to the Depression-Mood (p < 0.05) and General-Health (p < 0.01) subscales for caregivers' psychological well-being and negatively related to their Physical (p < 0.01) and Social (p < 0.01) CBI Burden subscales and with their GDS scores (p < 0.05). Patients' Positivity and Wellness subscales are related to the ADL (p < 0.05) and IADL (p < 0.01) scores and negatively related to the GDS (p < 0.05) scores and with the Time-Dependence subscale of CBI (p < 0.01). Patients' Vitality subscale scores are related to ADL (p < 0.05) and IADL (p < 0.05) scores and negatively related to GDS scores (p < 0.05). Patients' PGWBI scores are also negatively related to caregivers' Time-Dependence Burden (p < 0.05) and with their developmental-burden scores (p < 0.01). Furthermore, results showed a significantly inverse relationship between dependence indices in activities of daily life and dependence in instrumental activities of daily living with Time Dependence (p < 0.01) of CBI. At the 2-month follow-up, the outcome of ADL scores was negatively associated to caregiver burden (p < .01). Follow-up functional ability was higher in patients whose caregivers reported lower burden during their hospitalisation (p = .03).



**Figure 1.** Caregiver's Burden subscales of patient with HF.



**Figure 2.** Caregivers' and patients' psychological well-being.

## DISCUSSION

Informal caregivers are an important resource for elderly patients with hip fracture because they play a key role in their recovery process. Moreover, they have the important task of motivating the patients to join the therapy programme. Caregivers often neglect their own needs and personal lives due to their assistance tasks; this may also prove to be a source of stress negatively affecting the caregiver's and patient's quality of life. The results confirm what has been described in literature, namely the greater presence of women among caregivers and the presence of caregiver burden also in instances of acute disease. Several studies have revealed an association between the characteristics of patients and caregivers and caregivers' QoL, with caregiver burden serving as an important predictor of QoL<sup>47 48</sup>. Caregiver burden has also been used as an outcome variable rather than as a predictor<sup>47</sup>, suggesting that caregiver burden and QoL are closely related. Thus, caregiver burden seems to be a potential moderator of associations between patients' and caregivers' characteristics and caregivers' QoL. Caregiver burden and its associated stress impact negatively upon caregivers' perceived general physical and mental health<sup>48 49</sup> and have been negatively correlated to the functional status of elderly family members 1 month after discharge following hip-fracture surgery<sup>45 51</sup>.

Our results confirm the conclusions reached by some studies that have shown that caregivers of elderly people suffering from hip fracture experienced multidimensional burden, including tiredness, emotional distress and conflicts of role<sup>49 50</sup>. We can confirm that family caregivers of hip-fractured patients were reported as experiencing moderate burden<sup>51</sup>. However, the burden of caregivers of patients with HF is less than that found in cases of other geriatric ailments, dementia, for example.

In literature, it emerges that caregivers tend to experience the greatest stress during the first 2 months after fracture, stress being associated with increased care demands and costs<sup>45 51</sup>. Furthermore, we have found that follow-up functional ability was higher in patients whose caregivers reported lower burden levels during their hospitalisation. One study has already underlined the fact that the caregiver burden was negatively related to the physical function of older patients with hip fracture<sup>45 51</sup>. Our results propose that rehabilitation may have a stronger correlation with caregiver burden than what was imagined heretofore. Future studies are needed, however, to identify the direction of these associations.

Caregivers who are members of the patient's family have less time for themselves and feel they have fewer

expectations and opportunities than their peers; the data provided by literature confirm the great difficulty of combining caregiving activities with other social roles. Interesting results regard the correlation existing between a patient's psychological well-being and his/her mood; greater psychological well-being corresponds, in fact, to lower likelihood of depression.

Moreover, it is important to report that there is a positive relationship between Positivity and Wellness, patient Vitality and dependence indices for activities of daily life and instrumental activities of daily living. These findings confirm the existence of a reflexive relationship between patients' psychological well-being and caregivers' burdens, highlighting once again the importance of a bio-psycho-social approach when addressing both patients and caregivers, because improvements in the state of health of the one boosts that of the other, and vice versa. These factors might cause caregivers to suffer from higher levels of depressive symptoms and become less satisfied with their lives. In other words, multidimensional caregiver burdens may play a mediatory role in the association between objective primary stressors and caregivers' SWB. In literature, it has already been found that objective primary stressors can affect various dimensions of burden differently: functional health has been found to be associated with time-dependent, physical and developmental burdens; cognitive status has been found to be associated with time-dependent burden<sup>41</sup>.

## CONCLUSIONS

The correlation emerging between patients' psychological well-being and their caregivers' burden confirms the importance of using a bio-psycho-social approach towards patients and caregivers. It is important to evaluate different negative and positive dimensions to assess patients' psychological status when following a bio-psycho-social approach. These patients risk much longer and more frequent hospital stays than other adults. Comprehensive discharge-planning programmes, including early identification of those at risk, can alter these statistics. Upon admission to care facilities, early multidimensional assessment can provide significant indications of how to address the entire course of patient treatment more efficiently.

Unfortunately, not all participants were assessed at the 2-month follow-up stage, and this is one of the limits of our study. Indeed, we consider very important to re-value patients and their caregivers, at 60-90 days from demission.

In Table II, we illustrate the different areas that we believe it is important to evaluate in order to obtain a complete

**Table II.** Areas to evaluate in order to carry out an integrative assessment of H-F patients and relative caregivers, with staging (1= admission; 2= 90 days follow-up; 3= 1 year follow-up; 4= 2 years follow-up).

Areas	Staging			
	1	2	3	4
<b>Patient</b>				
• Activities of daily living	X	X	X	
• Depression	X	X	X	X
• Cognitive status	X			
• Psychological wellbeing	X	X	X	
<b>Caregiver</b>				
• Psychological wellbeing	X	X	X	
• Caregiver burden	X	X	X	

assessment of H-F patients and relative caregivers, while also providing a suggested staging sequence.

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