

## Homecare after ICU-Discharge: The World Differences

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### Abstract

Post-ICU and post-hospital patient's period are marked by physical and neuropsychiatric disabilities, reduced quality of life and increased consumption of healthcare resources. The follow-up of these patients is mainly focused on a clinic-based model in which the patients have to attend a health establishment to benefit from the rehabilitation programs; however, it may deprive the most disabled patients of appropriate care, thereby contributing to health inequalities. Home-based care affords social support and assistance for individuals with various health care needs to live as independently as possible in their own homes and communities. This model is a viable option for post-ICU care, as it promises greater cost-efficiency and respects the preferences of an increasing number of people to remain in their own homes rather than move to residential care facilities for support.

**Keywords:** *Post-ICU; Disabilities; Homecare*

### A global new problem

The quantity [1] and quality [2-4] of life of patients who survive acute critical illness is a current concern of the intensivists and government authorities of certain countries of the world [5,6]. The traditional and historical focus of intensive care has been on reducing mortality in the short term, but the survivors present significant mortality in the medium and long terms and can also experience a series of physical morbidities, cognitive dysfunction, depression, and sexual dysfunction after discharge from the intensive care unit (ICU) [6-10]. In addition, post-discharge evolution of these patients presents with frequent hospital readmissions and with the use of many health resources, along with a high consumption of financial resources related to health [11-13].

Shorter inpatient stays and financial challenges have condensed the time and resources available for nurses and other hospital personnel to prepare patients and caregivers for transitioning home and continuing necessary care protocols. Many patients who leave the hospital or ICU are unprepared to manage their health; they are uncertain of what to do and how to get help if their health worsens after discharge [14]. Likewise, their caregivers are often not fully prepared to manage patients' prescribed treatment regimens and lifestyle modifications. Patients may be unclear on how to seek help for questions concerning care or are unable to fully evaluate subtle changes in health status before the emergence of overt symptomatology [15,16]. Besides that, these patients have a high risk of hospital readmission. Around 15 - 20% of Medicare hospitalized patients are readmitted in the hospital 30 days after hospital discharge [17,18], and in septic patients it can reach up to 25 - 30% [19]. These patients are today called: hospital-dependent patients [20]. Many reasons have been identified, including poor transitions from the hospital or ICU setting, lack of medication reconciliation, inadequate access to medical services after discharge (e.g. timely post-discharge appointments with primary care physicians and specialists), and lack of accountability regarding which clinician is responsible after discharge. The problem has been conceptualized as a failure of the health care system

to fulfill its responsibility to provide comprehensive, coordinated, and continuous care, and hospitals and health systems are responding with innovations such as care coordinators, post-discharge pharmacists, care transition coaches, and after-hours clinics. However, no success has been achieved so far [21-23].

However, these patients are readmitted not because of inadequate hospital discharge, care transitions, or post-hospital care, but because their medical problems cannot be managed outside the hospital. The amount of medical and instrumental support that can be mounted is simply not enough. It is tempting to conclude that these patients are discharged to the wrong location and that they should be sent to skilled nursing facilities (SNFs), but most SNFs cannot or do not provide the needed level of treatment and support for them, and the readmission rates from SNFs are similar to those from home [17]. These patients are often relieved to be back in the hospital because they feel more secure than they do at home or in nursing facilities. Many have established relationships with hospital staff and clinicians who remember them from prior admissions and these familiar faces provide reassurance.

### Post-discharge interventions

Despite an increasing body of evidence on hospital discharge care, providers remain challenged by the appropriate types and timing of discharge interventions. These interventions, initiated by the hospital, expose patients to interventions soon after they leave the hospital; examples include planned follow-up phone calls, home visits, and clinic visits.

The patient- and surrogate-education interventions can include disease- and non-disease-specific teaching about medications, healthy diet, disease self-management, physical activity, and follow-up care [24]. The interventions can involve paper and electronic materials, toolkits, and health “logs” to continue to assist patients after discharge. They are designed to help patients adhere to their discharge plan and identify and address emerging health issues. The goals of hospital-initiated post-discharge interventions are to mitigate disease burden, prevent hospital readmissions, and ultimately improve patient and caregiver quality of life [25,26].

Although the severity of a patient’s disabilities after a critical illness are plausible impediments for attending appointments, the post-ICU follow-up is mainly focused on a clinic-based model in which the patients must attend a health establishment to benefit from the rehabilitation programs [27]. Ironically, this model may deprive the most disabled patients of appropriate care, thereby contributing to health inequalities [28].

It makes sense that close contact and follow-up with patients after discharge may play a vital role in supporting patients’ health and safety once they leave the hospital.

This contact can help patients to

- Avoid health pitfalls,
- Get the medical treatments and attention that they need,
- Detect worrisome signs and symptoms before they become unmanageable.

Hopefully, most outpatient and community clinicians are equipped to make the contact that their patients need after discharge - in person, by phone, or through other modes - to help address post-discharge issues that might influence their patient’s health.

However, in some situations, hospital clinicians may be better suited to do it - or help with it - especially when they are directly involved in the inpatient care of the patient or have better access to hospital health records that could be used to help the patient after discharge. Such contact made by hospital staff may be difficult to arrange; it has not been historically reimbursed in standard fee-for-service payment agreements with payers. It might be more efficient and effective for existing home care providers to make the visits. Regardless of who does it, perhaps this contact will be increasingly encouraged in arrangements of shared financial risks or savings between inpatient

and outpatient/community clinicians. By visualizing the patient's home environment, opportunities to assess and address barriers of discharge care may arise that would be otherwise undetectable.

Furthermore, for many patients, a home visit can lead to stronger connections with nurses and other hospital personnel, possibly promoting both a greater sense of trust between patients and providers and increased likelihood of continued communication after discharge.

### Home health care services

Home-based care affords social support and assistance for individuals with various health care needs to live as independently as possible in their own homes and communities. This model is a viable option for policy makers, as it promises greater cost-efficiency and respects the preferences of an increasing number of people to remain in their own homes rather than move to residential care facilities for support [29]. From a global perspective, home health care programs in countries such as the U.K., Australia, Germany and Canada possess certain common features [30]. These programs are typically: publicly funded; comprehensive (offering post-acute, supportive and end of life home care in one program); use a need-based, rather than income-based, eligibility criterion; and have a single point of entry [30]. It is important to consider that home care is a healthcare intervention that requires qualified professionals, because it is known that this type of care demands the use of specific competencies, mainly linked to interpersonal relationships, in order to work with users, family members, and multi-professional teams. It also demands autonomy, responsibility, and technical and scientific knowledge that are inherent to the field. Thus, it is understood that home-care work has a multitude of actions and specific complexities that demand professional experience and the search for home practice qualification [31].

In USA, Medicare home health care consists of skilled nursing, physical therapy, occupational therapy, speech therapy, aide services, and medical social work provided to beneficiaries in their homes. To be eligible for Medicare's home health benefit, beneficiaries must need part-time (fewer than eight hours per day) or intermittent skilled care to treat their illnesses or injuries and must be unable to leave their homes without considerable effort. In contrast to coverage for skilled nursing facility services, Medicare does not require a preceding hospital stay to qualify for home health care.

Also, unlike for most services, Medicare does not require copayments or a deductible for home health services. In 2016, about 3.4 million Medicare beneficiaries received home care, and the program spent \$18.1 billion on home health services. Medicare spending for home health care more than doubled between 2001 and 2016, and this care currently accounts for about 4.6 percent of fee-for-service spending [32].

The Australian Federal Government administered Home Support Program is the mainstay for older Australians requiring home-based care. Around 5% of older Australians utilize basic home care services through the "Home Support Program". This program offers support to people aged 65 years or older, or for Indigenous Australians aged 50 years or older with chronic illnesses, disability, or physical and cognitive decline [29]. The Home Support Program funds basic services that complement independent living in the community - including meal preparation, domestic assistance, and personal care. In contrast to aged care, Australian home-based disability support has different funding and administrative structures [29]. Precise data about Australian home care recipients and their care needs are not always available. What is known, however, is that an aging Australian population is associated with an increase in chronic illnesses such as depression, which is often undetected in the elderly (Table 1).

The way home care works in Canada is as follows: a client is referred to receive home care services, at which point a case manager is assigned to the client. The case manager meets with the client and any potential caregiver to conduct an assessment, and then coordinates care, authorizes services, and provides ongoing monitoring and evaluation. Home care service providers typically are a personal support worker and or a nurse, either public employees and or agency employees. A personal support worker assists with basic daily living needs

- Frail aged (i.e., over 65 years if non-Indigenous, over 50 years if Indigenous Australian) access bulk of home care services;
- Disability—e.g., intellectual, physical or psychiatric;
- Any combination of frail aged, chronic illness, and disability;
- - Indigenous Australians.

**Table 1:** Australian home care recipients (29).

whereas a nurse provides clinical care. The home care team may also include occupational therapists, physiotherapists, pharmacists, nurse practitioners, social workers, dietitians, and physicians. Most clients (50% - 69%) across Canada are receiving home care services provided by personal support workers [33].

**In Brazil (a middle-income country), the “Best at Home Program” is a public home care program that aims to:**

- Promote the dehospitalization of stable patients, who may have their health care continued at home, whose level of care complexity is greater than that of care primary is able to offer;
- Avoid hospitalization of patients coming from primary or emergency care; and
- Avoid hospital readmissions. The program serves patients classified into levels of care AD2 and AD3, according to the Ordinance of Home Care of the Brazilian Ministry of Health (Table 2).

AD2	AD3
<p>Demand for more complex procedures that can be performed at home, such as:</p> <ul style="list-style-type: none"> <li>• Complex dressings (levels 3 and 4) and abscess drainage, among others;</li> <li>• Dependence on frequent monitoring of vital signs unstable conditions;</li> <li>• Frequent and systematic need for less complex laboratory tests;</li> <li>• Adaptation of the user and or caregiver to the use of the tracheostomy device;</li> <li>• User adaptation to the use of orthoses or prostheses;</li> <li>• Adaptation of users to the use of probes and ostomies;</li> <li>• Postoperative home follow-up, as indicated by the surgical team;</li> <li>• Rehabilitation of people with permanent or transient disabilities who need frequent care until they can attend rehabilitation services;</li> <li>• Use of airway aspirator for bronchial hygiene;</li> <li>• Need for permanent or transient nutritional attention;</li> <li>• Frequent care in terminal patients or pain relief measures;</li> <li>• - need for intravenous or subcutaneous medication.</li> </ul>	<p>Existence of at least one of the situations accepted as inclusion criteria for care in AD2 modality and the need to use at least one of the following equipment procedures:</p> <ul style="list-style-type: none"> <li>• Noninvasive ventilatory support (Continuous Positive Airway Pressure [CPAP] or Bi-Level Positive Airway Pressure [BIPAP]);</li> <li>• Peritoneal dialysis;</li> <li>• Paracentesis;</li> <li>• Use of total parenteral nutrition.</li> </ul>

**Table 2:** Indications for “Best at Home Program” based in Brazilian home care classification criteria [34].

The program is a service suitable for people who have temporary or definitive difficulties to leave the space of the house to reach a health unit, or for people who are in situations where home care is the most suitable for your home treatment. Home care aims to provide the patient with care that is closer to the family routine, avoiding unnecessary hospitalizations and reducing the risk of infections, as well as maintain patients with your love ones at home. In cases where the patient needs to be visited weekly or more, they may be accompanied by specific Home care teams. The service is provided by multidisciplinary teams, consisting primarily of doctors, nurses, nursing technicians and physical therapist or social worker. Besides that, other professionals (speech therapist, nutritionist, dentist, psychologist, occupational therapist and pharmacist) may make up the support teams. Each team can attend, on average, 60 patients simultaneously. Home care teams are hired by states and cities. The service organizes the work in the format of horizontal (diarist) care from Monday to Friday, working 12 (twelve) hours per day, and ensures health care during weekends and holidays, based on call. Only the city and state managers with qualified teams registered in the National Register System and who regularly send information about the attendances to the Primary Health Care Information System will receive funds from the Ministry [34]. Outcomes of this program were not published until now.

Interesting, home health care is often the patient and family's first choice of care options. Most home health care agencies expect family members, significant others and patients to be capable of learning the necessary skills to take over at least some of the skilled care. This is particularly true of personal care, wound care and administration of intravenous medications. Home health care can lower the more obvious health care costs associated with hospitalization or long-term institutional care. However, home health care may also heighten the personal cost to family members' emotional, social, physical and financial well-being. Home health care arrangements may collapse if the patient's informal support network becomes unable to handle the increased burden resulting from disease progression, treatment intensity or depletion in available resources. Home health care for insured patients is not necessarily a cost saving for patients and family. It may have higher immediate personal costs compared with inpatient hospitalization when additional family-member caregiving and non-reimbursed expenses are considered. The information that staff members are able to glean regarding patient and family concerns and the physician's one-on-one talks with family members play an important role in the overall quality of care.

A recent meta-analysis of 20 clinical trials suggests that these interventions are associated with a lower likelihood of hospital readmission [24]. Interventions including home visits and or follow-up phone calls seemed to have the largest impact on hospital readmissions. Having two or more home visits was associated with a lower likelihood of readmission (OR, 0.6 [95% CI, 0.4 - 0.7]), whereas having one home visit was not (OR, 1.0 [95% CI, 0.8 - 1.1]). Readmission rates were 24% (95% CI, 16 - 34%) in hospitalized patients with 2 or more post-discharge home visits compared with 36% (26 - 48%) in patients without a home visit [24]. Having two or more follow-up phone calls made from providers to patients was associated with a lower likelihood of readmission (OR, 0.7 [95% CI, 0.6 - 0.8]), whereas having one phone call was not (OR, 0.9 [95% CI, 0.7 - 1.1]). Readmission rates were 23% (95% CI, 15 - 35%) in hospitalized patients with 2 or more post-discharge phone calls compared with 31% (20 - 45%) in patients without a phone call [24]. After controlling for the duration of follow-up, patient diagnoses, and exposure to discharge education, patients with the lowest likelihood of readmission were exposed to multiple home visits and multiple follow-up phone calls (OR, 0.5 [95% CI, 0.4 - 0.7]). In conclusion, conducting multiple home visits or calling patients multiple times after discharge had a substantial effect. In addition, exposure to a discharge education intervention was associated with a lower likelihood of readmission (OR, 0.7 [95% CI, 0.6 - 0.8]). Readmission rates were 27% (95% CI, 19 - 36%) in hospitalized patients exposed to the intervention compared with 34% (95% CI, 26 - 45%) among those not exposed [24].

### Comparison with other patients care programs after hospital discharge

In USA, post-acute care providers offer important recuperation and rehabilitation services to Medicare beneficiaries after an acute care hospital stay. Post-acute care providers include, in addition to home care service, skilled nursing facilities (SNFs), hospice services, and long-term acute care facilities (LTACs). However, there are many patients who are treated in the inpatient and, in view of their high medical needs and acuity, they cannot return to their homes or nursing homes. Therefore, there should be a transition toward an institution that can accommodate those new needs [35,36].

### Skilled nursing facilities

SNFs provide short-term skilled nursing care and rehabilitation services to beneficiaries after a stay in an acute care hospital, such as physical and occupational therapy and speech-language pathology services. Examples of SNF patients include those recovering from surgical procedures such as hip and knee replacements or from medical conditions such as stroke and pneumonia. In 2016, almost 1.6 million fee-for-service (FFS) beneficiaries (4.3 percent of Part A FFS users) used SNF services at least once; program spending on SNF services was \$29.1 billion (about 8 percent of FFS spending) (Boards of Trustees 2017, Office of the Actuary 2017b). Medicare's median payment per day was \$470 and its median payment per stay was \$18,321.1. In 2015, about one-fifth of hospitalized beneficiaries were discharged to SNFs [32].

### Hospice services

Hospice benefit covers palliative and support services for beneficiaries who are terminally ill with a life expectancy of six months or less if the illness runs its normal course. In 2016, more than 1.4 million Medicare beneficiaries (including nearly 50 percent of decedents) received hospice services from more than 4,380 providers, and Medicare hospice expenditures totaled about \$16.8 billion [32].

### Long-term acute care facilities

Patients with chronic critical illness-hose who exhibit metabolic, endocrine, physiologic, and immunologic abnormalities that result in profound debilitation and often ongoing respiratory failure - frequently need hospital-level care for extended periods. In USA, LTACs were created during the 1980s, to facilitate prompt discharge of medically complex patients from acute care hospitals, to curtail Medicare spending [35,36]. In addition, these institutions should be in compliance with accreditations of acute care hospitals; physician-supervised interdisciplinary medical teams who provide care for this complex population with an average length of stay of more than 25 days should meet specific admission and patient stay criteria-patients were required to have 'medically complex' diagnoses [36-40]. Currently the criteria for admission to LTACs include a stay of at least 3 days in the ICU or the discharge assigned MS-LTCDRG is based on mechanical ventilation care to patients for at least 96 h during those admissions [35].

LTACs represent a rapidly growing category of Medicare providers [37,41,42] and in 2002, on the basis of increase of Medicare expenditure for LTACs, the payment-per-service fee was then created to decrease expenses. Patients been admitted to LTACs setting were then be assigned admission diagnosis codes that Medicare reimbursed based on the calculation associated to the costs, rather than based on actual expenditures during hospitalization [35,36]. Despite the changes made on reimbursement, LTACs continued to multiply. Consequently, Medicare expenses grew exponentially, resulting in a 3-year moratorium on LTAC creation [35,36]. More recently, the LTACs grew from 2007 to 2013 at the rate of 1.1%, but growth decreased after 2013 [35].

The initial patient population to be served is patients who require prolonged weaning from mechanical ventilation [34]; however, the diagnosis panel has significantly extended to different entities. The patient population admitted to LTACs had multiple comorbidities and acute medical needs including acute respiratory failure weaning from mechanical ventilation, recent surgeries, decubitus ulcers, and indwelling catheters (vascular, gastrointestinal, bladder, etc.) [35,43,44]. Additionally, these patients already experienced prolonged hospitalization in the acute care facilities, including stays in the ICUs [35,36]. It will be critical to identify which ICU admissions will require discharge to LTACs facilities. Predictors of ICU-patients needing discharge to LTACs are hypoalbuminemia, cardiovascular and neurosurgical ICU admissions, old age (> 65 years), extended length of stay before ICU admission (> 10 days), presence of stage 3 or higher pressure ulcers, ICU admission from skilled nursing facility, LTACs or another hospital, and early dependency of mechanical ventilation [45]. Patients who are on long-term mechanical ventilation and undergo tracheostomy might benefit in mortality reduction from early referral to the LTACs facilities [46].

Cost savings for the acute care hospitals are of paramount importance. This includes the use reduction of high resource consuming units, like the ICUs [35]. The reduction of costs per patient at LTACs (\$36,626) was less than the cost per patient at an acute care hospital

(\$59,103). Nonetheless, LTAC costs are higher than the cost at other types of long-term facilities including skilled nursing facilities, rehabilitation facilities, etc. [47]. Besides that, the average length of stay in acute care facilities has progressively declined with an increase in patients discharged to LTACs. However, significant quality gaps could potentially produce hospital readmissions. These readmissions are reported as adverse events in long-term facilities, which could involve as high as 22% of Medicare beneficiaries [48].

In conclusion, patients who are served by LTACs are some of the most vulnerable patients with moderate-to-severe medically complex diseases, high utilization of resources, and a high-risk of rehospitalization that will result in negative long-term health outcomes. Additional interventions to prevent complicated transitions between acute care and LTACs are needed. Additionally, the poor short- and long-term outcomes of this population are of great concern, and there should be more of a focus on quality of life [35].

### Conclusion

The impact of post-ICU disabilities on adherence to clinic-based post-ICU follow-up is unknown. However, the burden of disability after critical illness appears to associate with the inability to attend a clinic-based follow-up [49]. The model of care based on post-ICU clinics does not seem to adequately cover a large group of patients who would, theoretically, benefit more from this intervention. Alternative models, including home care, telemedicine and the use of remote tele monitoring tools, may be of important value to address the needs of this population and reduce inequalities.

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