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Hospital-associated complications in frail older adults

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ABSTRACT

As the Japanese population continues to age steadily, the number of older adults requiring healthcare has increased. Evidence demonstrates that hospitalization for acute care has a negative impact on the health outcomes of older adults. Frail older adults tend to have multifactorial conditions collectively known as "geriatric syndromes." When those with these premorbid conditions are hospitalized for acute care, they tend to develop new problems such as delirium and new functional impairments. Adverse consequences of hospitalization include the risk of loss of functional independence and chronic disability. In 2019, the new concept of "hospital-associated complications" (HACs) was proposed to describe these new problems. HACs comprise five conditions: hospital-associated falls, delirium, functional decline, incontinence, and pressure injuries. This review discusses the important issues of HACs in relation to their classification, prevalence, risk factors, prevention, and management in older adults hospitalized for acute care. Robust prevention and management are imperative to address the serious consequences and escalating medical costs associated with HACs, and a multidimensional and multidisciplinary approach is key to achieving this goal. Comprehensive geriatric assessment (CGA) is the cornerstone of geriatric medicine and offers a holistic approach involving multidisciplinary and multidimensional assessments. Considerable evidence is accumulating regarding how CGA and coordinated care can improve the prognosis of hospitalized older adults. Further research is needed to understand the occurrence of HACs in this population and to develop effective preventive measures.

Keywords: frailty, geriatric syndrome, multimorbidity, polypharmacy

Abbreviations:
HACs: hospital-associated complications
LOS: length of stay
CGA: comprehensive geriatric assessment

INTRODUCTION

As Japan's population continues to age steadily, there has been a notable increase in the number of older adults requiring health care. Multiple chronic health conditions often accompany aging in a phenomenon referred to as multimorbidity. The coexistence of multiple medical

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conditions exacerbates the severity of symptoms and complications of each condition, making medical management complex and challenging.

Older adults with multimorbidity tend to require multiple medications to address various diseases and symptoms, a phenomenon known as polypharmacy. However, the aging process is accompanied by a functional decline in several vital organs, including the liver and kidneys. These physiological changes alter drug metabolism and increase the susceptibility of older adults to drug reactions. Notably, adverse drug reactions have emerged as one of the main causes of hospitalization in older adults.[1] Together, multimorbidity and polypharmacy contribute to a reduction in physiological reserve, commonly referred to as frailty, which is associated with susceptibility to acute diseases such as infections and exacerbates non-communicable diseases.

Given the intricate involvement of multimorbidity, polypharmacy, and frailty, older adults, especially frail older adults, tend to have increased medical needs, particularly for hospitalized care. Although such care can provide more specialized and intensive treatments with close monitoring and observation, frail older patients are prone to complications during hospitalization, which can lead to unfavorable outcomes. Thus, the advantages and disadvantages of hospitalization care should be carefully considered to minimize unnecessary hospitalization in this population. This review discusses complications associated with hospitalization in frail older adults.

HOSPITAL-ASSOCIATED COMPLICATIONS

Older adults with multimorbidity and polypharmacy tend to be frail and vulnerable and, thus, are more at risk of hospitalization for the treatment of acute conditions. However, there is considerable evidence of negative effects on the health outcomes of older adults receiving such care. Frail older adults tend to have "geriatric syndromes," which are multifactorial conditions. When hospitalized with these premorbid conditions for acute care, they tend to develop new conditions, such as delirium, and new functional impairments, including loss of functional independence and chronic disability.[2-7] In particular, they are at high risk of delirium and/or falls.

To encompass the five conditions that are often newly seen in frail older adults when hospitalized, Mudge et al proposed the term hospital-associated complications (HACs).[8] These conditions are hospital-associated falls, delirium, functional decline, incontinence, and pressure injuries (Table). Findings showed that 44% of geriatric patients who were hospitalized for acute care developed one or more HACs, and the number of HACs was positively associated with the length of hospital stay (LOS) and with a 6-month mortality rate.[8]

Table Hospital-associated complications

Functional decline
Delirium
Falls
Incontinence
Pressure ulcers

Functional decline

Hospitalized frail older adults sometimes experience functional decline caused by non-disabling

conditions such as pneumonia. Pre-hospital and in-hospital functional decline should be differentiated for prognostic reasons. In one study, the lack of functional regain at discharge was found to be associated with higher mortality rates at 6- and 12- month intervals.[9] Hospital-associated disability (HAD) is an important concern because it can have short- and long-term adverse consequences, including prolonged LOS, increased healthcare costs, decreased quality of life, higher risk of readmission, and additional rehabilitation or support services post-discharge.

Delirium

This acute condition is characterized by confusion and changes in mental status. Older adults often experience delirium when hospitalized for acute care. Risk factors for delirium include age, multimorbidity, cognitive impairment, functional decline, alcohol abuse, depression, sensory impairment, and medications.[10] Delirium can initiate a cascade of adverse events, including functional decline and an increased risk of death or institutionalization.[11]

Falls

The association between falls and hospitalization is well established. Falls in hospitals often lead to serious injuries such as hip fractures, which can result in a further decline in activities of daily living and increased medical costs.

Incontinence

Urinary incontinence is distressing and can limit social activities and interpersonal relationships. Incontinence in hospitalized older adults may lead to pressure injuries and be associated with falls.

Pressure ulcers

These localized injuries to the skin and/or underlying tissues result from prolonged pressure or pressure in conjunction with shear and/or friction forces, during extended bed rest. Pressure ulcers are associated with low mobility and activity. Other predisposing factors are poor nutrition, poor sensation, urinary and fecal incontinence, and poor overall physical and mental health. They are associated with increased mortality risk and prolonged LOS in geriatric patients, as well as with reduced quality of life and high medical costs.

PREVALENCE OF HACS

Functional decline

A meta-analysis published in 2020 reported a 30% prevalence of HAD in older adults (≥ 65 years of age) hospitalized for acute care.[12] Surprisingly, these findings reveal that the prevalence of HACs has not changed over 30 years despite significant changes in standards of care.[12]

Delirium

Delirium has been reported to occur in 15.2% of geriatric patients (> 60 years of age) treated in emergency departments.[13]

Falls

Fall rates are reported to be 2–8 per 1,000 bed days in acute geriatric wards.[14-16]

Incontinence

Several studies have estimated the prevalence of incontinence in hospitalized patients. One reported that approximately 24% and 48% of patients aged 65–74 years and ≥75 years, respectively, had at least one episode of incontinence during hospitalization.[17] Another found the age-standardized prevalence for hospitalized women aged ≥65 years was 16.8 and 9.7 per 10,000 population per year for White and Black women, respectively.[18] Notably, incontinence is often overlooked in hospitalized older adults.[19] According to an analysis of administrative data for American veterans treated at Department of Veteran Affairs (VA) hospitals, although 43% of the veterans discharged to a VA nursing home were incontinent, only 3.4% of them had incontinence listed as a discharge diagnosis.[20]

Pressure ulcers

A study of hospital-acquired pressure ulcers at an American acute care hospital reported a decreased prevalence over a 10-year period (2005–2014) due to improved medical practices and care. However, they still occurred in just over 1% of hospitalized patients as of 2014.[21]

THE J-HAC STUDY

To clarify the prevalence of HACs in acute geriatric care wards in Japan, the J-HAC study was initiated at four institutes in Japan; registration for the study is currently ongoing. The physical, functional, cognitive, and social health statuses of the participating patients are being recorded on admission. Data are being collected on HACs observed during hospitalization, status at discharge, and prognosis three months after discharge.

Preliminary findings indicate that one or more HACs have been recorded in more than half of the patients registered to date. The most common form of HAC, thus far, is functional decline, followed by delirium. The occurrence of HAC was significantly associated with the 3-month mortality at this stage (Fig). The primary results of the J-HAC study will be published in the near future and should help increase the quality of care for frail older adults during hospitalization for acute care.

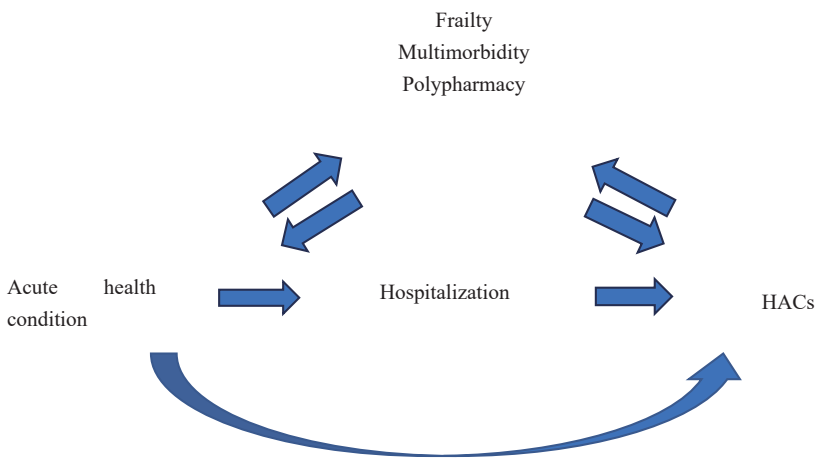

Fig. The mechanism of hospital-associated complications
HACs: hospital-associated complications

In Nagoya University Hospital, one of the four institutions participating in the J-HAC study, we also collected ultrasonic muscle data from the patients registered with the study, as the echo intensity of muscle is considered to reflect muscle quality.[22] In an analysis of the relationship between muscle data and the occurrence of HACs, we found that the echo intensity of muscle on admission was significantly associated with the occurrence of HACs.[23] The mechanism underlying this association is unclear but may involve inflammation and disuse syndrome, both of which can induce changes in the echo intensity of muscles. Evaluation of muscles using ultrasonography might be a useful means to predict the occurrence of HACs, although further research is warranted to elucidate the underlying mechanism.

RISK FACTORS FOR HACS

LOS

A cross-sectional study revealed associations between HACs and LOS: the longer the hospital stay, the more HACs occurred, whereas the occurrence of an HAC tended to prolong the hospital stay.

Cognitive impairment

Cognitive impairment is a known risk factor of HACs.[24] It is associated with falls,[25] delirium,[26] and functional decline.[27]

Nutritional status

Poor nutritional status on admission is a risk factor for HACs, especially functional decline.[28] Poor reserve function owing to poor nutrition is naturally associated with the development of HACs. Poor nutrition may be associated with the development of hospital-acquired infections or poor functional recovery during rehabilitation. Adequate nutritional support is important for hospitalized patients.

Polypharmacy

Although polypharmacy is often required to manage multiple health conditions in older adults, it can lead to several adverse events. Polypharmacy is associated with an increased incidence of falls and fractures because it can cause impaired balance, dizziness, and drowsiness. It is also associated with adverse drug reactions (ADRs) when drugs interact with each other. Frail older adults are susceptible to ADRs because of age-related decreases in drug metabolism and clearance. In addition, the occurrence of ADR sometimes extends LOS.

To mitigate these problems, healthcare providers must regularly review and assess the need for and appropriateness of each medication in the patient's regimen. Simplifying medication regimens, promoting patient education, and involving pharmacists in medication management can help reduce the risk of HACs associated with polypharmacy in older adults.

PREVENTION AND MANAGEMENT OF HACS

The serious consequences and escalating medical costs associated with HACs underscore the need for robust prevention and management strategies in older adults. A multidimensional and multidisciplinary approach is the key to such strategies. Comprehensive geriatric assessment (CGA), which is the cornerstone of geriatric medicine, is a holistic approach that involves both

multidisciplinary and multidimensional assessments.[29] A CGA-specific approach is planned and followed for the management of individual patients, accounting for their individual medical, functional, and social needs. Findings show that CGA and coordinated care can improve the prognosis of hospitalized older adults.[30] In the United States, evidence has accumulated on the prevention and management of HACs in acute geriatric units (ACEs),[31] which were established to offer a specialized environment to implement CGA. The occurrence of HACs, especially functional decline, has been reduced using this approach.[32, 33]

Numerous interventions have been explored to prevent HACs. Most of these interventions have focused on single HACs, especially delirium[34] and falls[35] to date. In a randomized controlled trial to reduce HACs in Australia (ie, the Collaboration for Hospitalised Elders Reducing the Impact of Stays in Hospital [CHERISH] trial), 539 older patients in acute care wards at four hospitals were enrolled to participate in the structured Eat Walk Engage Program aimed at nutritional improvement and early rehabilitation.[36] Although the program did not reduce the number of incidences of any HAC as one of the primary outcomes, it did significantly reduce that of delirium as a secondary outcome.

Multi-component interventions reported to be effective generally follow the fundamental principles of age-friendly care, focusing on mobility, cognitive and social activities, nutrition and hydration, sleep, and pain management. Strengthening the multidisciplinary teamwork in the ward would facilitate such an intervention.

Older hospitalized patients tend to have multimorbidities, and polypharmacy is often required to manage these conditions. However, because polypharmacy is associated with ADRs and falls in this population, prudent management with various medications may help prevent HACs. Thus far, several interventional trials for deprescribing have been conducted in the acute hospital care setting.[37] These trials have primarily shown that deprescribing could be implemented safely but did not reduce the occurrence of HACs.[38] These findings suggest that deprescription itself can be performed safely but that its beneficial effects, such as reducing ADRs or the occurrence of HACs, may require a longer duration to become evident. An extended LOS is a risk factor for HACs; therefore, early discharge planning facilitated by a multidisciplinary team should also be a crucial component of the CGA.

In sum, the abovementioned approaches to prevention and management could help mitigate the burden of HACs in frail older adults during hospitalization.

CONCLUSION

Providing care for older adults in the hospital setting presents both dynamic and multifaceted challenges. Older adults, with their unique needs and susceptibilities, have an increased risk of hospitalization, which, in turn, can lead to the occurrence of HACs during hospitalization and serious short- and long-term consequences for patients. Therefore, it is important to understand HACs and develop effective preventive measures. Previous studies and experiences in ACE units suggest that implementing CGA and age-friendly care can improve patient outcomes. Hopefully, the J-HAC study will add to the evidence on the prevention and management of HACs and help provide the best medical care for frail older adults in today's aging societies.

CONFLICT OF INTEREST

The author declares that there is no conflict of interest.

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