Clinical Significance of Geriatric Conditions In Acute Hospitalization

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Abstract

Background: Geriatric conditions (GCs) are common in the elderly population, but their clinical significance in acute care is not well understood. In this study, we first investigated the cross-sectional associations of GCs with frailty and polypharmacy at the time of admission to an acute care geriatric ward. Then, to clarify the clinical significance of GCs in acute care, we prospectively examined the association of GCs with the incidence of hospital-acquired complications and consequences after discharge.

Methods: Participants were 184 patients (40.2% male; mean age, 85.0 ± 6.0 years) hospitalized in an acute care geriatric ward at a university hospital. We examined the cross-sectional associations of GCs with frailty and polypharmacy by multiple regression analysis, and then the associations of GCs with the incidence of hospital-acquired complications, falls, and death within 3 months of discharge by multiple logistic regression analysis.

Results: GCs were associated with frailty and use of polypharmacy, independent of multiple morbidity. GCs were also associated with re-admission within 3 months of discharge; however, there was no significant association with the incidence of hospital-acquired complications, falls, or mortality after discharge.

Conclusions: These findings suggest that GCs are clinically significant in the hospitalized elderly and further research on GCs is warranted.

Introduction

Geriatric conditions (GCs) are a complex set of clinical signs and symptoms in older adults that do not fit into a discrete disease category. Dizziness is a typical GC and may be caused by a variety of pathological and/or age-related functional deficits in the elderly population. However, dizziness is often attributed to a single pathology, for example, inner ear disturbance, in the same way as in the younger population. GCs are multifactorial and occur when the accumulated effects of impairment of multiple systems render older adults vulnerable to situational challenges [1]. The concept of GCs, also known as geriatric syndrome, has been widely adopted, although its constituents have not been clearly defined.

The clinical significance of GCs has been investigated in several situations, and many studies have shown that they are a risk factor for hospital admission and mortality in community-dwelling elders [2-6]. Some studies have also found that GCs are associated with re-admission after an acute hospitalization [7-9]. However, the clinical significance of GCs in the acute care setting has not been as well investigated as it has in community-dwelling elders.

Hospital admission in older adults is often accompanied by hospital-acquired complications (HACs), which are an obstacle to safe and effective treatment and should be avoided as far as possible. HACs include delirium, falls, functional decline, decubitus, and incontinence [10], which can be considered GCs

if they occur for the first time after a hospital admission. There is as yet limited information on the association between GC at admission and the incidence of HACs during hospitalization. Moreover, little is understood about the association of GCs with frailty and polypharmacy, both of which are recognized risk factors for adverse outcomes in a wide range of situations and are attracting increasing interest in the geriatric field.

In this study, we sought to clarify the clinical significance of GCs in acute care, first by investigating the cross-sectional association between GCs and frailty/polypharmacy at the time of admission to an acute care geriatric ward and then by prospectively investigating the association of GCs with the incidence of HACs and consequences after discharge.

Methods

Data from a prospective observational cohort in a geriatric ward at a university hospital were analyzed. The study protocol was approved by the Ethics Committee of Nagoya University Graduate School of Medicine (approval no. 2019-0260) and conducted in accordance with the principles of the Declaration of Helsinki and its later amendments. Written informed consent was obtained from all participants. In the case that participants were unable to provide consent, family members provided informed consent on their behalf.

1. Eligibility criteria

Patients aged ≥ 65 years who were admitted to the geriatric ward of Nagoya University Hospital were recruited between October 2019 and September 2021. The following exclusion criteria were applied: discharge from hospital within 48 h; inability to secure written informed consent; estimated life expectancy less than 1 month at the time of admission in the opinion of the attending physician; readmission within 3 months after discharge and enrolled in the study at the time of the previous admission; transfer from another hospital department; and any other reason deemed to preclude participation; and any other reason deemed to preclude participation by the investigators.

2. Data collection

Data were collected at the time of admission (within the first 48 h) and HACs during the hospitalization period were recorded. The attending physicians obtained information on the occurrence of falls, readmission to any hospital, emergency room (ER) visits, and death by telephone interviews with each patient or caregiver who provided informed consent at 3 months after discharge.

2.1 At admission

Demographic data, including age and sex, were obtained from the clinical records. A comprehensive battery of geriatric assessments was performed in each case by the attending physician. The assessments included the Charlson Comorbidity Index (CCI) score [11], Clinical Frailty Scale (CFS) score

[12], and Mini-Nutritional Assessment-Short Form (MNA-SF) score for nutrition [13]. Functional status was assessed using the Barthel Index (BI) [14] at baseline (2 weeks before admission).

2.2 Geriatric conditions

GCs were defined as symptoms of pain, mood disturbance, anxiety, incontinence, dizziness, constipation, impairment of vision or hearing, and malnutrition. They were assessed by the attending physician at the time of admission. Malnutrition was defined as an MNA-SF score below 7.

2.3 Hospital-acquired complications

HACs were defined as the occurrence of delirium, functional decline, incontinence, fall, pressure injury, or nosocomial infection during hospitalization [10]. Delirium was evaluated daily by the attending physician based on Diagnostic and Statistical Manual of Mental Disorders, Fifth Edition. Functional decline was defined as a BI score at discharge that was lower than that at admission (2 weeks before admission). Incontinence was included if described as newly recognized in the medical records. Falls were also evaluated from the medical records, as were newly recognized pressure injuries. Nosocomial infections were evaluated by the attending physician.

2.4 Consequences after discharge

The attending physicians collected information on falls, readmission, ER visits, and death within 3 months of discharge from hospital by telephone interviews with patients or their caregivers.

3. Statistical analysis

Multiple regression analysis was performed to explore the association of the number of GCs with CFS score or the number of prescribed medications at admission with adjustment for age, sex, and CCI score. The association of GC with the occurrence of HACs was investigated by multiple logistic regression analysis with adjustment for age, sex, CFS score, CCI score, and number of medications. The association of GCs with fall, re-admission/ER visit, and mortality was evaluated by multiple logistic regression analysis. Data are shown as the mean and standard deviation or as the number and/or percentage as appropriate.

Results

Table 1 shows the background characteristics of the 184 patients included in this study (40.2% male; mean age 85.0 ± 6.0 years). Overall, 84.8% had ≥ 1 GC at admission (mean number of GCs, 1.9 ± 1.5). The mean CCI score was 2.3 ± 1.9 , the mean CFS score was 5.0 ± 1.4 , and 33.5% of the patients had an MNA-SF score < 7 . The mean number of prescribed medications was 6.3 ± 3.6 (62.5% were taking ≥ 5 medications). Seventy-five patients (40.7%) had records of an HAC: functional decline in 57, delirium in 37; fall in 12, infection in 7, incontinence in 3, and decubitus in 1.

Table 1

Background characteristics of the participating elders hospitalized on a geriatric ward

Patients, n (male %)	184 (40.2)
Age (years)	85.0 ± 6.0
Charlson Comorbidity Index score	2.3 ± 1.9
Clinical Frailty Scale score	5.0 ± 1.4
MNS-SF score ≤7 (%)	33.50
Patients with GC (%)	84.80
Mean number of GCs	1.9 ± 1.5
Mean number of medications	6.3 ± 3.6
Patients prescribed > 5 medications (%)	65.50
Basic Activities of Daily Living	76.7 ± 28.2
Mean number of HACs per patient	0.6 ± 0.9
Patients with any HAC (%)	40.50%

HAC, hospital-acquired complications; MNA-SF, Mini-Nutritional Assessment-Short Form Of the various main causes of admission recorded, the most frequent was infection, followed by central nervous system disorder (Table 2).

Table 2
Main causes of admission

Infection, n (%)	51 (27.7)
CNS disorder*, n (%)	30 (16.3)
Loss of appetite/weight loss/dehydration, n (%)	26 (14.1)
Immune system disorder, n (%)	11 (6.0)
Heart failure, edema, n (%)	10 (5.4)

*Includes stroke, transient ischemic attack, dementia, and impaired consciousness. CNS, central nervous system

The cross-sectional associations of the number of GCs with the CFS score and the number of prescribed medications are shown in Table 3.

Table 3
Association of geriatric conditions, Clinical Frailty Scale score, and number of prescribed medications

	Standardized beta coefficient	p-value
Clinical Frailty Scale score	0.329	< 0.001
Number of prescribed medications	0.139	0.44

Multiple regression analysis adjusted for age, sex, and Charlson Comorbidity Index score

Multiple regression with adjustment for age, sex, and CCI score showed significant associations with both variables. Multiple logistic regression analysis revealed no significant association of GCs with HACs or any constituents of HACs (Table 4).

Table 4
Association of geriatric conditions with hospital-acquired complications

	Odds ratio	95% CI	p-value
HAC	1.015	0.809-1.274	0.896

Multiple logistic regression analysis adjusted for Clinical Frailty Scale score, Charlson Comorbidity Index score, age, sex, and number of prescribed medications. CI, confidence interval Furthermore, GCs were significantly associated with the consequences of readmission/ER visit, but not with fall or mortality at 3 months after discharge (Table 5).

Table 5
Association of geriatric conditions with consequences of discharge within 3 months

	Odds ratio	95% CI	P-value
Readmission/ER visit	1.346	1.022-1.771	0.034
Fall	1.292	0.925-1.803	0.133
Mortality	1.234	0.711-2.140	0.455

Multiple logistic regression analysis adjusted for Clinical Frailty Scale score, Charlson Comorbidity Index score, age, sex, and number of prescribed medications. CI, confidence interval; ER, emergency room

Discussion

This study found associations of GCs with frailty and polypharmacy that were independent of multimorbidity. GCs were also associated with an increased likelihood of re-admission within 3 months of discharge from an acute care ward. However, GCs were not significantly associated with incidence of HACs, fall after discharge, or mortality.

We found that GCs were significantly associated with the level of frailty at the time of admission. Frailty occurs due to an age-related decline in physiological reserve. GCs are also age-related, so an association between frailty and GCs seems reasonable. We also found that this association was independent of any multimorbidity reflected in the CCI score, which suggests that the clinical significance of GCs differs from that of discrete diseases. The cross-sectional design component made it possible for us to see this association and confirm a cause-effect relationship between frailty and GCs. The symptoms of GCs may be a phenotype of frailty caused by an age-related decline in physiological reserve, or accumulation of age-related symptoms of GCs may contribute to the development of frailty.

There was also an association of GCs with the number of prescribed medications at admission, which was independent of multimorbidity. This finding suggests that physicians should be watchful for symptoms of GCs instead of only treating specific diseases in elders. Although relief of symptoms is important in the elderly population, medications prescribed to alleviate symptoms tend to be continued even when no longer necessary [15]. While medications prescribed for management of symptoms of GCs result in polypharmacy, the association between GCs and polypharmacy may be bidirectional. Many commonly prescribed medications could trigger or exacerbate GC symptoms [16, 17], which in turn increase the number of medications prescribed.

In this study we found that GCs were associated with readmission or an ER visit within 3 months of discharge, which is in agreement with previous studies [8]. Readmission or an ER visit was reported to be associated with high costs [18], was burdensome for patients and caregivers, and resulted in diminished quality of life. Although these consequences are avoidable in some cases [19], we suggest that it is clinically important that patients with GCs are at high risk of readmission and/or a subsequent ER visit. Doctors should be cognizant of this, particularly as they tend to focus on the treatment of diseases, especially in acute medical care settings, and can overlook GCs. Although we did not look into the causes of a readmission or ER visit, the mechanism of this association should be explored further to ascertain how the risk of readmission or an ER visit could be reduced. In the present study, the association between GCs and readmission or an ER visit was independent of polypharmacy, which was previously identified as a risk factor for readmission [20]. However, it could be attributed to specific medications that are potentially inappropriate for frail elders. For example, the adverse effects of the benzodiazepines commonly used to treat insomnia could contribute to the risk of readmission or an ER visit.

We found that GCs at the time of hospital admission did not predict either the incidence of HACs or falls during the 3 months after discharge. GCs commonly include falls and delirium, which we included in the HACs examined. Therefore, it could be presumed that the symptoms included in GCs in this study and falls/delirium constitute a “geriatric syndrome”. Broadly speaking, a syndrome refers to “a group of signs

and symptoms that occur together and characterize a particular abnormality”. [21]. However, our findings did not necessarily confirm that the symptoms included in GCs and falls/delirium make up a “syndrome”. Research involving larger numbers of elderly patients is needed to determine whether or not GCs constitute a syndrome.

GCs were not associated with mortality in this study. We only followed our patients for a relatively short period of time (3 months) after an index discharge though, and therefore the effects of disease were more pronounced than those of the symptoms. The effects of GCs over the longer term should be investigated.

This study has several limitations. The information collected on the consequences after discharge was obtained during telephone interviews after 3 months and thus relied mainly on recall. Some misclassifications, especially with regard to falls, would have been unavoidable, and the follow-up period was short. Finally, the research was performed at a single institution, and the extent to which its findings can be generalized to other situations is unclear.

In conclusion, we found that GCs were associated with frailty and polypharmacy at the time of hospital admission and with the likelihood of readmission or an ER visit in the 3 months after discharge. GCs are prevalent in elderly patients but are likely to be overlooked. Our findings underscore the clinical significance of GCs in elderly hospitalized patients and warrant further investigations.

Declarations

Ethics approval and consent to participate

The study protocol was approved by the Ethics Committee of Nagoya University Graduate School of Medicine (approval no. 2019-0260) and conducted in accordance with the principles of the Declaration of Helsinki and its later amendments. Written informed consent was obtained from all participants. In the case that participants were unable to provide consent, family members provided informed consent on their behalf.

Consent for publication

Not applicable

Data availability

The data that support the findings of this study are not publicly available due to the research group policy. Data are however available from the authors upon reasonable request and with permission of Nagoya university.

Competing interests

The authors declare that they have no conflict of interest

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Author's contributions

HU formed the research question. MN coded the data. HU conducted the analysis with input from MN, HK, KW, YY, TS and TT. HU wrote the manuscript and MN, HK, 1KW, YY, TS and TT reviewed the article. All authors approved the final draft.

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