

CLINICAL INVESTIGATION

THE PREVALENCE OF GERIATRIC SYNDROMES AND THEIR EFFECT ON THE CARE AND OUTCOME OF PATIENTS AGED 75 YEARS OF AGE AND OLDER PRESENTING TO AN EMERGENCY DEPARTMENT

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Background: The prevalence of geriatric syndromes (confusion, fall, incontinence, caregiver stress, or failure to thrive) was examined in persons ≥ 75 years presenting to the emergency department (ED). The effect of such syndromes on subsequent assessment, care and outcomes was explored.

Methods: Retrospective cohort study of 300 consecutive ED patients aged 75+ at Foothills Hospital in Calgary. Each patient was classified by standardized chart review as having a geriatric syndrome (GS), questionable geriatric syndrome (QGS) or non-geriatric syndrome (NGS).

Results: There were 74 patients (24.7%) with GS, 14 (4.7%) with QGS and 212 (70.1%) with NGS. There was a trend ($P=0.083$) for fewer GS admissions to critical care and significantly fewer GS admissions to medical subspecialties ($P=0.010$). Length of stay was significantly greater ($P<0.001$) in the GS group. The GS group was approximately half as likely to be discharged back to independent community living as the NGS group ($P=0.001$). Hospital admissions, ED consultations, lab/radiology use, social work consultations, triage time, disposition time, rate of return to the ED and 1-year mortality were unaffected by group classification.

Conclusion: GS patients seem to represent a more severely ill and/or functionally-impaired group of patients, yet received the same level of attention and treatment in the ED.

Key words: Emergency department presentation, elderly, geriatric syndrome

Abbreviations: ED, emergency department; FMC, Foothills Medical Centre; GS, geriatric syndrome; QGS, questionable geriatric syndrome; NGS, non-geriatric syndrome; MI, myocardial infarction; SE, standard error

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INTRODUCTION

It is frequently stated that older patients, when afflicted with disease, are more likely to present with a "geriatric syndrome".¹ Geriatric syndromes are defined by Tinetti et al² as "multifactorial health conditions that occur when the accumulated effect of impairments in multiple systems renders a person vulnerable to situational challenges". Regardless of the underlying precipitating disease process, seniors are more likely than younger adults to present with confusion, incontinence, falls, or "failure to thrive".³⁻⁵ Aging has been associated with a diminished physiologic reserve resulting in symptoms at an earlier stage of disease than normally expected.⁶ It can often be difficult to separate symptoms caused by a new illness from those due to chronic co-morbid illnesses associated with aging;⁶ common conditions such as cardiovascular disease, infections, hyperthyroidism, depression and surgical problems can have seemingly unusual manifestations.¹

Previous studies in the emergency medicine literature have shown, for example, that acute cholecystitis,⁷ depression,⁸ and bacteremia⁹ tend to present in fashions that lend themselves to misdiagnosis. Of older patients discharged from the emergency-room, 28% were shown to have a missed diagnosis that was later detected during day hospital attendance.¹⁰ These issues are not a trivial concern, because 15% of total emergency-room visits are made by patients ≥ 65 years,¹¹ and persons ≥ 75 years have the highest rate of visits to ambulatory care.¹²

Numerous studies have shown that patients 65+ are treated differently in the emergency department

(ED). They have longer ED stays, have higher hospital in-patient admission rates, have higher rates of use of laboratory and radiological investigations,¹³ tend to be triaged as more acutely ill than younger patients, and are more likely to be referred for a consultation.¹⁴ Presenting to the ED with unusual symptoms of an acute myocardial infarction (MI) has been shown to predict subsequent 5-year mortality.¹⁵ In patients aged 65+, this could be due to the fact that some acute MI patients may be presenting as a geriatric syndrome, resulting in an average longer time to thrombolysis.¹⁶

Past work has shown that 14% of patients aged 65+ admitted to a general medicine service¹⁷ and 38% of patients admitted to a geriatric assessment unit¹⁸ present with a geriatric syndrome. No previous studies have examined the prevalence of geriatric syndromes in older patients presenting to the ED. As well, there has been no examination of how these presentations affect emergency-room triage, admission likelihood, choice of admitting service, the use of investigations, the use of consultation services, and the probability of having to return to the emergency-room after discharge. In this study, by devising an operational definition of the “geriatric syndrome” as conceptualized by Tinetti et al,² we examined the prevalence of geriatric syndromes among seniors and how these presentations impacted on the care provided and on patient outcomes.

METHODS

This observational cohort study took the form of a review of 300 consecutive ED visits of patients age ≥ 75 years presenting to the Foothills Medical Center (FMC) ED during the month of January 1998. FMC is a 700-bed tertiary care teaching hospital in Calgary. There were no exclusion criteria. As we examined consecutive visits, it was possible for individual patients to appear more than once in the study data.

Each chart was reviewed by one of the authors (KMM), to determine the nature of the patient’s presentation. This was determined by the ED physician’s diagnosis and/or the information contained in the ED note. Patients were divided into the following **three groups** according to their presentation:

a) **Geriatric Syndrome (GS):** Subjects had a primary presentation of delirium/confusion, incontinence, fall, “failure to thrive,” or “social admission” (Table 1).

b) **Questionable Geriatric Syndrome (QGS):** The separate category of QGS was created to allow for situations which did not fit clearly into either the

Table 1. Criteria for Dividing Patients into Atypical Presentation (GS), Questionable Atypical (QGS) and Typical Presentation (NGS) Groups

Category:	Description:
Geriatric Syndrome	Patient classified as
Delirium/Confusion	Delirious/Confused if one of the following was included in the emergency department history and physical. - if the diagnosis box contained “delirium NYD”, “confusion NYD” or “disorientation NYD” - if the primary presentation was described as “confusion”, “disorientation”, “delirium” or “drowsy” (even if a more specific diagnosis or no diagnosis was made)
Fall(s)	Any unintentional movements to the floor or ground as described in the history or in the diagnosis box (Fall NYD). These falls could not be due to syncope (as determined by the diagnosis or history) or unusual activity (eg. climbing a ladder).
Incontinence	A primary complaint/presentation of incontinence of urine or stool. The patient did not have a positive urine culture.
Caregiver Stress/ Social Admission	The words “caregiver stress”, “care-giver burnout”, “social admission”, “respite admission” in the diagnosis box or in the description of the patient’s primary presentations.
Failure to Thrive	“Failure to Thrive”, “not coping”, “the dwindles” in the diagnosis box or in the description of the primary presentation. Any description of a slow decline in activities of daily living or instrumented activities of daily living over the past several months as a primary complaint/presentation.
Questionable Geriatric Syndrome	
Elder Abuse	“Elder abuse” or “abuse” in the diagnosis box, or a description of this as the primary presentation.
Incontinence with a Positive Urine Culture	A primary complaint/presentation of incontinence of urine with a positive urine culture.
Fall Due to Syncope or Unusual Activity	Fall is defined as above. Diagnosis box or history and physical describe syncope or unusual activity (such as climbing stairs, skiing, etc.).
Non-Geriatric Syndrome	All remaining cases.

GS or non-GS groups. Each patient was classified as QGS if they presented with elder abuse, urinary incontinence with a positive culture or a fall due to syncope or unusual activity. Elder abuse may but does not necessarily indicate caregiver stress, and was therefore placed in this category. Similarly, urinary incontinence with a positive urine culture might be a GS but might also be a “typical” presentation of a urinary tract infection. Falls due to syncope or during unusual activity could represent a non-GS presentation or a GS, and was therefore placed in this category.

c) **Non-geriatric Syndrome (NGS):** This group consisted of all the remaining subjects. These subjects did not meet criteria for either GS or QGS.

For each chart, data on demographics (age and sex), triage time, time to ED discharge or in-patient admission, admission location, number of consultations in the ED and rate of return to the ED within 30 days were recorded. Disposition location was categorized as admission to a medical subspecialty (eg. cardiology), admission to a medical teaching unit, admission under a family physician, admission to general surgery, admission to a surgical subspecialty (eg. orthopedics), admission to a critical care unit or discharge home. ED activities (ie. laboratory tests, radiology tests, or quick response team consultations) were also recorded. The quick response team at FMC permits early social work involvement to eliminate unnecessary admissions to hospital.¹⁹ If a patient was admitted, a review of the hospital chart was performed to obtain the length of hospital stay and discharge location. Provincial (Alberta) databases were used to determine utilization of hospital resources and survival data for 1 year following the first presentation to the ED. Endpoints examined were mean number of admissions to hospital, mean bed-days per patient, mean number of admissions to the ED, and mortality.

Statistical Analysis

Sample size calculations were based on the projected admission rates, as this had been studied previously in the ED setting. It has been found that for all patients aged 65+ seen in the ED, the admission rate is approximately 30%.¹⁰ Of the 300 patients, we estimated that 120 would present atypically and 180 would present typically.¹⁷ Assuming a rate of admission among the typical group of 25% and an alpha value of 0.05, this study had a power of 0.87 to detect a difference in admission rates between

typical and atypical presentations of 10%. Between-group comparisons were made by chi-square testing for categorical data and one-way analysis of variance for continuous variables.

The reliability of the categorization as to GS, QGS and NGS was examined by comparing the initial assignments with an assessment performed independently in a blinded fashion by the second author (DBH) in 50 patients. The kappa was 0.86.

The study received ethical approval from the Conjoint Medical Research Ethics Board of the University of Calgary.

RESULTS

Categorization of Patient Presentations

Of the 300 75+ patients reviewed, there were 74 GS (24.7%, 95% confidence interval (CI) 19.8-29.5%), 14 QGS (4.7%, 2.3-7.1%), and 212 NGS (70.7%, 65.5-75.8%). The most common primary diagnoses for NGS presentations were as follows: ischemic heart disease 23 (7.7%, 4.7-10.7%), lower respiratory tract infection 18 (6.0%, 3.3-8.7), exacerbation of chronic obstructive pulmonary disease 16 (5.3%, 2.8-7.9%), and cerebrovascular event 16 (5.3%, 2.8-7.9%).

Of the GS patients, 37 (50.5%, 95% CI 38.4-61.6%) presented with a fall, 19 (25.7%, 15.5-35.8%) with confusion, 13 (17.8%, 8.7-26.4%) with failure to thrive, 4 (5.4%, 0.3-10.6%) with incontinence, and 1 (1.4%, -1.3- 4.0%) presented with caregiver stress. Of the QGS patients, 13 (92.9%, 79.4-106.4%) presented as a fall due to syncope or unusual activity, and 1 (7.1%, -6.4-20.6%) presented as elder abuse.

Patient Demographics

The mean age (\pm standard error, SE) of all patients was 81.4 (\pm 0.3) years. The proportion of the subjects that were female was 56.3% (50.7 to 61.9%, 95% CI). There was no significant difference between the three groups in age or proportion of female patients.

Emergency Department Activities

The mean time to assessment by a ED physician was 1.7 hours (1.5 to 2.0 hours, 95% CI), with a range from 0.0 to 7.0 hours. The mean time to final disposition (ED discharge or in-patient admission)

was 5.8 hours (5.1 to 6.7 hours, 95% CI), with a range from 0.3 to 23.3 hours. There was no significant between-group difference in the time to assessment ($P=0.550$), time to final disposition ($P=0.180$), rate of social work consultation ($P=0.473$), laboratory use ($P=0.180$), radiological investigation ($P=0.201$) or mean number of ED consultations ($P=0.089$) (Table 2).

Hospital Admissions

There were no significant differences ($P=0.306$) in the admission rates among the GS, QGS and NGS groups (Table 3). Of those patients admitted to hospital, there were no significant differences between the GS, QGS and NGS groups with respect to the proportion admitted to neurosciences, family practice, general surgery, critical care, internal medicine, or a surgical subspecialty (other than orthopedics). There was a nonsignificant trend for fewer GS patients to be admitted to a critical care unit compared to the NGS group (1 versus 15, 2 versus 13%, $p=0.08$). Six GS patients (13%) were admitted to orthopedics, compared to 3 patients (3%) in the NGS group ($P=0.012$). In addition, significantly fewer GS patients were admitted to a medical subspecialty compared to the NGS group (1 versus 13, 2 versus 11%, $P=0.01$).

The mean length of stay for all admitted patients ($n=167$) was 10.6 days (8.9 to 12.3 days, 95% CI). The admitted patients in the GS group had a mean hospital stay of 16.7 days (11.6 to 21.7 days) which was significantly longer ($P<0.001$) than the mean

length of stay of the other groups. Both the GS and the QGS groups had a significantly greater number of in-hospital physician consultations than in the NGS group ($P=0.031$) (Table 3).

Patients in the GS group were more likely to be transferred to another acute care facility ($P=0.024$), less likely to return to independent community living ($P=0.001$) and were more likely to be discharged to continuing care ($P=0.022$). In fact, only 47.4% (31.5-63.3%, 95% CI) of GS patients returned to community living, compared to 80.6% of the NGS group (73.0-88.2%, 95% CI). There were no between-group differences with respect to the likelihood of death in hospital (Table 4).

7 (9%) GS patients, 30 NGS patients (14%) and 4 (29%) QGS patients returned to the ED within a 30-day period, with no significant between-group difference ($P=0.081$).

One-Year Hospital Utilization and Survival Data

Of the 300 ED contacts examined, 19 were repeat visits by patients (14 NGS, 4 GS, 1 QGS). The total number of patients was 281. For the purposes of this analysis, all utilization data and mortality data covered a 1-year period after the first ED contact. There was a nonsignificant trend ($P=0.060$) for an increase in the mean number of hospitalizations in the NGS group (0.97, 0.82 to 1.12, 95% CI), compared to the GS (0.64, 0.55 to 0.73) and QGS (0.69, 0.52 to 0.86) groups. The mean total bed-days per patient for the NGS (17.1, 14.6 to 19.6 days), GS

Table 2. Data for All Emergency Department Activities for All Patients, and for Patients in the Geriatric Syndrome (GS), Questionable Geriatric Syndrome (QGS) and Non-geriatric Syndrome (NGS) Groups. Time to assessment and time to outcome are both given in hours \pm SE. Represented also are the number of patients receiving a social work consultation, laboratory blood work, and radiological investigations. Mean consultation rate \pm SE is also shown

	All Patients (n=300)	GS (n=74)	QGS (n=14)	NGS (n=212)	P-Value (between groups)
Mean Time to Assessment (hours \pm SE)	1.7 \pm 0.1	1.7 \pm 0.2	1.3 \pm 0.3	1.7 \pm 0.1	0.550
Mean Time to Outcome (hours \pm SE)	5.8 \pm 0.2	5.9 \pm 0.4	4.2 \pm 0.6	5.9 \pm 0.2	0.180
No. Receiving Social Work Consultation	14 (5%)	5 (7%)	0 (0%)	9 (4%)	0.473
No. Having Blood-Work Drawn	229 (76%)	51 (69%)	10 (71%)	168 (79%)	0.180
No. Having Radiological Investigations	199 (66%)	55 (74%)	10 (71%)	134 (63%)	0.201
Mean No. of Specialist Consultations \pm SE	0.4 \pm 0.03	0.3 \pm 0.2	0.6 \pm 0.1	0.4 \pm 0.04	0.089

Table 3. Rates of Admission, Admission Location, Length of Stay ± SE and Mean No. of In-hospital Consults ± SE for Patients that were Hospitalized. Patients that were not discharged from the ED were classified as being transferred to another acute care facility, dying in the ED, or being admitted to 1 of the 8 in-hospital services. Medical Sub, medical subspecialty; Surgical Sub, surgical subspecialty; LOS, length of stay

	All Patients (n=300)	GS (n=74)	QGS (n=14)	NGS (n=212)	P-Value (between groups)
No. Admitted	167 (56%)	46 (62%)	6 (43%)	115 (54%)	0.306
Admission Location					
Neurosciences	7 (4%)	1 (2%)	0 (0%)	6 (5%)	0.645
Family Practice	69 (41%)	21 (46%)	1 (17%)	47 (41%)	0.194
General Surgery	7 (4%)	2 (4%)	0 (0%)	5 (4%)	0.827
Critical Care Unit	18 (11%)	1 (2%)	2 (33%)	15 (13%)	0.083
Medical Sub	17 (10%)	1 (2%)	3 (50%)	13 (11%)	0.010*
Internal Medicine	17 (10%)	5 (11%)	0 (0%)	12 (10%)	0.605
Orthopedics	9 (5%)	6 (13%)	0 (0%)	3 (3%)	0.012*
Surgical Sub	4 (2%)	1 (2%)	0 (0%)	3 (3%)	0.905
Transfer	18 (11%)	8 (17%)	0 (0%)	10 (9%)	0.103
Death in ED	1 (0%)	0 (0%)	0 (0%)	1 (1%)	0.812
Hospitalized Patients					
LOS (days)	10.6±0.9	16.7±2.5	6.5±1.3	7.3±0.7	<0.001*
Mean No. of Consults	1.3±0.1	1.9±0.3	2.0±0.4	1.1±0.2	0.031*

*P <0.05 between groups

(16.8, 14.2 to 17.4 days) and QGS (12.2, 11.1 to 13.3 days) groups were not significantly different ($P=0.870$). There was, however, a significantly larger mean number of subsequent ED visits in the NGS group (1.6, 1.4 to 1.8) compared to the GS (1.2, 1.1 to 1.3) and the QGS (1.4, 1.3 to 1.5) group ($P=0.040$).

There was no effect of sex or group on the 1-year survival data. The mortality rate was 23.2% in the NGS group, 23.2% in the GS group and 16.7% in the QGS group.

DISCUSSION

This study defined “geriatric syndrome” as a patient that presented in one of five ways: confusion, fall(s) not due to syncope or unusual activity, culture-negative urinary incontinence or stool incontinence, caregiver stress or failure to thrive. We found that fully one-quarter of all patients 75+ presented to the ED in this fashion. A previous study of Geriatric Assessment Unit patients¹⁸ found a prevalence of atypical illness presentations of 38%, but selection bias accounts for the higher prevalence of GS presentations seen. Approximately half of our patients

Table 4. Discharge Data for Admitted Patients. No. of admitted patients who had unavailable discharge records, died, transferred or were discharged back to community, back to continuing chronic care, or newly admitted to continuing care is shown.

	All Patients (n=167)	GS (n=46)	QGS (n=6)	NGS (n=115)	P-Value (between groups)
New Placement in Continuing Care	9 (5%)	5 (11%)	0 (0%)	4 (4%)	0.099
Return to Continuing Care	11 (7%)	5 (11%)	0 (0%)	6 (5%)	0.258
New Placement or Return to Continuing Care	20 (12%)	10 (22%)	0 (0%)	10 (9%)	0.022*
Return to Community Living	104 (62%)	18 (39%)	4 (67%)	82 (71%)	0.001*
Death in Hospital	14 (8%)	6 (13%)	0 (0%)	8 (7%)	0.249
Transfer to another Acute Care Facility	5 (3%)	3 (7%)	1 (17%)	1 (1%)	0.024*
Data not Available in Chart	24 (14%)	9 (19%)	1 (17%)	14 (12%)	0.096

*P <0.05 between groups

in the GS group presented with a fall, while 95% of all GS presentations were due to a fall, confusion or failure to thrive.

What is the significance of the high prevalence of GS presentations in the ED? If admitted patients presented with a GS, patients had a decreased likelihood of being discharged to independent living in the community. Presenting in this fashion likely is a marker for illness severity and/or baseline frailty (Jarret et al²⁰ define frailty as a combination of medical, physiologic, social and environmental influences that decreases an older person's ability to respond to stress). Despite the fact that the GS patients had a worse prognosis and were likely more diagnostically confusing, the duration of their stay in the ED was no different than the other two groups. The time to assessment/disposition, rate of admission, likelihood of laboratory and radiological investigations, and demand for ED consultations for the GS group were identical to that of the NGS patients. There was a nonsignificant trend towards fewer critical care service admissions and significantly lower use of medical subspecialty services (such as pulmonary medicine, gastroenterology, and cardiology) by the GS group, but this was most likely due to the fact that most patients presenting with confusion, falls, incontinence, failure to thrive or caregiver stress do not require admission to these services. Surprisingly, the quick response team was infrequently used and was not involved more often with the GS group. In fact, none of the QGS group received any ED social work involvement, despite the fact that this group included a patient with suspected elder abuse. In general, the relatively low prevalence of social work involvement in this older population raises a concern that appropriate community support for the aged is not being accessed in the ED.

We also found that the GS group received significantly more specialist consultations once admitted to hospital than the NGS group. This may indicate either diagnostic confusion or that the admitting physicians were discovering new medical issues that could not be found during a short ED assessment. This suggests that GS patients may benefit from an earlier geriatric assessment to help accurately identify important issues that otherwise will not be addressed until well after the patients are admitted to hospital.

This study also found that patients in the GS group had a trend towards lower hospitalization

rates and had significantly fewer ED visits over the year following the initial GS presentation. Since significantly more of the GS group admitted to hospital was discharged to continuing care, we think the most likely explanation for this is a substitution of continuing care resources for the management of illnesses that otherwise would have resulted in a trip to the ED or in possible hospital admission. This is supported by previous work on the utilization patterns of long-term care clients. Elencwieg et al²¹ showed that patients admitted to continuing care facilities showed a 20% decrease in hospital admission rates, and that 1 year after continuing care admission there was significantly less use of acute care hospital services.²²

Previous studies have suggested that presenting with one of the "geriatric syndromes" is a marker of frailty. A previous study of an ED geriatric consultation service showed a high prevalence rate of falls, incontinence and acute confusion in patients referred to this service. In addition, this study showed a 2-year mortality rate of 33.7% and a 2-year risk of institutionalization of 52% for evaluated patients.²³ This supports the hypothesis that the GS patients differed from the NGS patients by having a higher degree of baseline frailty, potentially explaining the longer hospital stays and the lower likelihood of returning to independent community living.

Being aware that GS patients represent a significant proportion of ED presentations and tend to be more diagnostically challenging (and more physiologically fragile) may allow ED physicians to more effectively deal with these patients. The concept of the geriatric syndrome could be utilized to identify this numerically large and vulnerable group that could potentially benefit from a more comprehensive and timely approach to their care.

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