Characteristics and Mortality of Older Adults Presenting to the Emergency Department With Generalized Weakness

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Abstract

Background

Worldwide aging of the population leads to an increased number of older, more complicated patients attending emergency departments (ED). Presenting symptoms of various conditions can be vague in this population, leading to delayed and potentially missed diagnoses. In the current study, we sought to characterize the demographics, final diagnoses, and outcomes of older patients who are referred to the ED for generalized weakness.

METHODS

We conducted a retrospective observational study in an urban tertiary hospital ED. Participants were patients aged 65 years or older who were referred to a geriatric evaluation in the ED. A total of 2,226 patients met study eligibility criteria and were enrolled between April 1, 2010 and March 31, 2013. Data on physical characteristics, discharge diagnoses, and vital status were obtained from an electronic medical database and the Ministry of the Interior.

RESULTS

There was no significant difference between the “weakness” and “non-weakness” groups for patients who were discharged from the ED. For admitted patients, statistically significant differences (although of no clinical significance) were noted for white blood cells (WBC) and sodium levels. Both statistically and clinically significant differences were observed for functional level. The main discharge diagnosis for admitted patients was an infection (24%), followed by “nonspecific diagnoses” (22%). Social issues as the main diagnosis were attributed to < 1% of the patients. Patients who were hospitalized for weakness were less likely to survive during the following year compared with patients hospitalized for non-weakness, but that was not the case for patients who were not admitted.

CONCLUSIONS

Patients admitted due to weakness were significantly more dependent on others for carrying out their daily activities. They were also more likely to die during and following hospitalization. Most of them were diagnosed during the hospitalization as having a specific medical condition.

Background

Aging of the population is a well-recognized trend and one expected to increase globally. In parallel, older patients comprise a substantial part of emergency department (ED) visits, reportedly ranging between 12–24% of all ED visits^{1–3}. The proportion of geriatric patients with multimorbidity disease states is

increasing as well⁴, and they tend to present to the ED with more severe medical conditions⁵. In Israel, patients older than 65 years comprised 19.1% of the ED visits in 2017⁶ While being 11.6% of the population⁷. Although they undergo disproportionately more diagnostic procedures, their ED diagnoses tend to be less accurate than those for younger patients⁸. This discrepancy can be explained by the high frailty rate among them and by their tendency to suffer from more coexisting disease states that present with a combination of symptoms of acute and chronic medical conditions. Moreover, older patients tend to present with an atypical manifestation of infections^{9,10}. A blunted fever response is common¹¹, and cognitive disturbances or falls may be the only signs for an active infection. Imaging and laboratory results may be less conclusive in older patients.

The presence of cognitive and mood disturbances may also impair the ability of older patients to characterize and communicate the specific symptoms they feel during an acute medical event. ED physicians often define those patient's complaints as "nonspecific" (defined by Nemec as "the entity of complaints not part of the set of specific complaints for which evidence-based management protocols for emergency physicians exist"¹²) or as "unexplained complaints" (defined by Van Bokhoven as "complaints that, after a proper history taking and physical examination, do not seem to be explained by either somatic or psychiatric diseases, nor by the patient's psychosocial context"¹³). The vague nature of these patients' presentations can lead to underestimation of their medical condition. While their medical state may be seen as less serious than they are, their mortality rate during and following hospital admission is higher than that for patients who present with specific complaints¹⁴. Indeed, general weakness is a common "nonspecific" complaint. A recent report¹⁵ analyzed a sample of the National Hospital Ambulatory Medical Care Survey (NHAMCS) ED visits (181,786 visits out of 575 million ED visits), and "weakness and fatigue" was the fifth most common reason for ED visits of older patients. There is a wide range of diagnoses which may present as a state of general weakness, unlike localized weakness which is usually attributable to neurological states¹⁶.

In the current study, we sought to characterize the demographics, final diagnoses, and outcomes of a population of patients referred to the ED for generalized weakness.

Methods

Study participants

The study took place in an urban tertiary hospital. Inclusion criteria were age ≥ 65 years and referral to a geriatric evaluation in the ED by ED physicians. A total of 2,226 patients met eligibility criteria and were enrolled between April 1, 2010 and March 31, 2013. The study was approved by the ethics committee of the hospital ("Tel Aviv Medical Center": approval number TLV0020-16). Patient consent was waived.

Outcomes and measurements

The primary outcome was all-cause mortality over one year following the initial ED visit. Vital status data were obtained from the Ministry of the Interior database.

The secondary outcome was the diagnostic list for all hospitalized patients. Data for the diagnostic list and baseline characteristics (demographic, social, functional, medical, laboratory) were collected by the investigators from the medical center's electronic medical database, including the findings of the geriatric evaluation in the ED.

Statistical Analyses

Comparisons between patients with/without generalized weakness were conducted with T-tests for continuous parameters and the chi-square test for categorical parameters.

Survival analysis was conducted and presented as Kaplan-Meier estimate, using R "Survminer" package¹⁷.

Results

Baseline characteristics of 2,226 patients who were enrolled in the study, including demographics, laboratory findings, and functional levels, are provided in Table 1. For patients who were admitted, six of the nine variables did not differ significantly between the weakness and non-weakness groups. There was a statistically significant difference in WBC counts and sodium levels, yet these differences were not clinically significant. Patients who were admitted tend to present with reduced functional level compared with patients who were discharged from the emergency room. While there was no statistically significant difference between patients who present with weakness and those who presented with other complaints, patients who were admitted with weakness were statistically significantly more dependent in daily functions than non-weakness patients who were admitted ($P < .01$). Over one-fifth of the study patients (491/2,226, 22%) were diagnosed with weakness, and 318 (65%) of them were hospitalized. A total of 1,735 patients were assigned a non-weakness working diagnoses, and 1051 (61%) of them were hospitalized.

Table 1
Participants' characteristics according to admission and weakness status.

	Admitted			Discharged		
	Weakness	Non Weakness	P Value ^a	Weakness	Non Weakness	P Value ^a
Age, mean $\pm$ SD	82.7 $\pm$ 6.8	83.4 $\pm$ 6.9	0.102	82.5 $\pm$ 7.0	83.3 $\pm$ 6.5	0.16
Gender (Female)	0.56	0.61	0.073	0.65	0.64	0.89
Length of stay in admission (days), mean $\pm$ SD	10.0 $\pm$ 12.4	9.5 $\pm$ 0.4	0.55	-	-	-
Hgb, mean $\pm$ SD	12.0 $\pm$ 2.0	12.1 $\pm$ 1.9	0.23	12.4 $\pm$ 1.4	12.5 $\pm$ 1.4	0.21
WBC, mean $\pm$ SD ^b	10.0 $\pm$ 4.8	9.4 $\pm$ 3.4	0.028	8.2 $\pm$ 2.7	8.5 $\pm$ 2.6	0.29
Sodium, mean $\pm$ SD	136.6 $\pm$ 5.9	137.3 $\pm$ 5.2	0.04	137.7 $\pm$ 3.8	138.0 $\pm$ 3.6	0.38
Potassium, mean $\pm$ SD	4.17 $\pm$ 0.7	4.13 $\pm$ 0.57	0.25	4.10 $\pm$ 0.47	4.16 $\pm$ 0.50	0.21
Creatinine, mean $\pm$ SD	1.50 $\pm$ 1.16	1.40 $\pm$ 0.87	0.13	1.3 $\pm$ 0.72	1.24 $\pm$ 0.59	0.31
Function						
Independent	0.21	0.3		0.42	0.45	
Partially dependedt	0.35	0.31		0.37	0.33	
Fully dependent	0.44	0.39	0.007	0.21	0.22	0.80
^a Student's t test was used for continuous variables (age, length of stay in admission, hemoglobin [Hgb], white blood count [WBC], sodium, potassium, creatinine). The chi-square test was used for categorical variables (gender, function)						
^b Outliers (WBC count > 3 SD of mean count) were removed						

The discharge diagnoses for patients hospitalized for weakness are outlined in Fig. 1. Specific discharge diagnosis was available for 297 of those 460 patients. The main diagnosis was infection (24%), followed by "nonspecific diagnoses" (22%). Various diagnoses were made for 160/297 admissions (64%), ranging in a frequency from 8% to < 1%. Notably, social issues were relevant to fewer than 1% (4 patients). Patients who were admitted for weakness were less likely to survive throughout the following year compared with patients hospitalized due to non-weakness causes (Fig. 2a). That was not the case for patients who were not admitted (Fig. 2b).

Discussion

ED physicians encounter more and more geriatric patients as life expectancy increases in the developed world. Those patients present with distinctive features, including increased frailty, multiple morbidities, functional and cognitive impairment, and a high medication burden, rendering them more complex to evaluate and treat. "Generalized weakness" or "nonspecific" complaints are frequent causes for their referral to the ED. In this work, we addressed this important issue by studying the older adult characteristics and outcomes in a tertiary hospital ED setting.

While no significant difference was found for demographic, clinical, and laboratory variables between the weakness and non-weakness groups for patients who were discharged from the ED, for patients who were admitted, functional level differed significantly. Patients admitted due to weakness were more likely to be functionally dependent than patients admitted for other diagnoses. This observation links "weakness", a poorly defined diagnosis with reduced functionality. Though not evaluated in the current study, frailty and cognitive decline are correlated with the level of dependency¹⁸⁻²⁰. Frail patients might present with subtle and less "typical" features of various medical diagnoses. Cognitively impaired patients may experience difficulties communicating their specific symptoms.

An important observation in this work is the finding of an increased risk for mortality during and following hospitalization of older adults admitted to the ED for "weakness". Several explanations may be given to this observation. As indicated earlier (Table 1), functional level differed significantly for admitted patients. Patients admitted due to weakness tend to be more dependent in their daily activities. This may provide a partial explanation to the increased mortality rate of this group, as functional level was previously linked with risk of all-cause mortality^{21,22}. An additional possible explanation may be the erroneous perception that, lacking a specific diagnosis, these patients' condition is better than it really is. This approach may lead to slower performance of diagnostic procedures and less extensive investigation for the etiology of their weakness, thus perhaps resulting in delayed treatment and increased risk of complications.

Infections were the main specific etiology for the "weakness" group admissions to the ED (24%). This finding can be explained by blunted and atypical inflammatory responses to infections of older adults^{9,10}. A less expected result was the high proportion of patients hospitalized for weakness who were discharged from the hospital without a clear diagnosis of the condition that was responsible for the acute state which leads to their admission (22%). Another unexpected finding was that social issues, such as neglect and loneliness, were the basic etiology to the final diagnosis of "weakness" in less than 1%. We had expected that "weakness" or vague symptoms of malaise or apathy might be expressions of loneliness or neglect, but our findings did not support our expectations.

This work has several limitations that bear mention in addition to its retrospective design. One is that the older patients who were not referred to the on-call geriatrician at the ED were not included in the study. This may confer a selection bias by excluding the patients with severe or life-threatening medical issues for which they were rapidly admitted and transferred to medical wards. This bias may have contributed to the finding of more serious prognoses of the "weakness" patients compared to those of the "non-weakness" patients. Another limitation is that the final diagnosis at discharge from hospitalization is

chosen from a “discharge diagnoses” list. This list might be inaccurate because of an inherent difficulty to specify a single clear-cut cause for an older, fragile patient’s acute deterioration (e.g., identifying specific diagnosis for an infectious event, identifying one factor responsible for the delirious state of a patient).

Conclusions

This large-scale, single-center data-driven study sheds light on an important issue involving the geriatric population attending the ED. The results revealed that patients who were diagnosed as suffering from “weakness” were more likely to die during and following the hospitalization period. Importantly, almost all of the patients diagnosed with weakness who were referred to hospitalization from the ED had a “true” medical diagnosis. Only a small minority were eventually diagnosed as suffering from underlying social or psychiatric issues.

Abbreviations

ED – Emergency department

WBC - White blood cells

Declarations

- **Ethics approval and consent to participate:**

The study was approved by the ethics committee of the hospital (“Tel Aviv Medical Center”: approval number TLV0020-16). Patient consent was waived.

- **Consent for publication**

Not applicable

- **Availability of data and materials**

The datasets used and/or analysed during the current study are available from the corresponding author on reasonable request.

- **Competing interests**

The authors declare that they have no competing interests

- **Funding**

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- **Authors' contributions**

***OB**– Conceptualization, Investigation, Data Curation, Writing - Original Draft, Writing - Review & Editing.

***RC**- Conceptualization, Formal analysis, Data Curation, Writing - Original Draft, Writing - Review & Editing

PH – Conceptualization, Writing - Review & Editing

YL - Conceptualization, Writing - Review & Editing

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- Authors' information (optional)

Not applicable

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Figures

Figure 1

Discharge diagnoses for patients admitted to the emergency department for weakness. Abbreviations: CHF - Congestive heart failure, PD – Parkinson’s disease, ADE – Adverse drug events. AF – Atrial fibrillation.

Figure 2

Kaplan–Meier survival curves for patients admitted to the emergency department (ED) due to weakness (green line) or other working diagnoses (pink line). Survival data are provided for 400 days post-admission.

Figure 3

Kaplan–Meier survival curves for patients who were discharged from the ED with a diagnosis of weakness (green line) or other working diagnoses (pink line). Survival data are provided for 400 days post-ED admission.

Supplementary Files

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