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RAPID REPORT

Resource consumption increased for older ED patients presenting with nonspecific complaints

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Abstract

Nonspecific complaints (NSC) are common in older emergency department (ED) patients. They are usually defined as the lack of a specific complaint such as fever. Negative ED outcomes are higher in this patient group. It is not known whether NSC patients have a greater need for intensive care admission or if they require more ED resources than other ED patients. The primary objective here was to compare intensive care admissions and resource consumption between NSC patients and patients presenting with specific complaints (SC). This was a descriptive, retrospective study from three EDs. All ≥65-year-old patients admitted to EDs within the study period were included. There were 224 NSC patients (median age 83, 44.1% male) and 4907 SC patients (median age 78, 44.1% male). Diagnostic testing in the ED was greater for NSC patients; blood tests were taken more often (Odds ratio (OR)) 1.88 (95% confidence interval (CI) 1.43–2.45). ED length of stay was longer (median 436 for NSC *vs.* 302 minutes for SC patients; $p < 0.001$). Admissions to high-dependency or intensive care units were not higher (OR 1.15 (0.70–1.89)). Three- and 30-day mortality were higher (OR 4.65 (1.78–12.30)) and 2.15 (1.33–3.47), respectively, as were hospital admission rates (OR 2.74 (2.02–3.72)). NSC patients were less often triaged as high acuity (OR 0.11 (0.03–0.46)). In conclusion, resource consumption for older adults presenting with nonspecific complaints was higher. There was no difference in high dependency unit/intensive care unit admission rates.

Keywords

Geriatric; Emergency department; Older adults; Nonspecific complaints

1. Introduction

Nonspecific complaints (NSC) are common presentations in older emergency department (ED) patients, and prevalence rates as high as 14% have been reported [1]. Changes related to aging affect the physiological capacity of the patient and they respond to illness and injury differently than younger patients [2]. It is important for clinicians to acknowledge the association of adverse outcomes associated with the condition.

Many definitions for the term NSC have been presented; it has also been called generalized weakness, acopia (inability to cope at home), and decreased general condition [3–7]. All suggested definitions mention the lack of specific complaint such as fever.

Negative ED outcomes are more common for NSC patients compared to patients presenting with specific complaints (SC): in-hospital mortality is higher; proportion of patients admitted to hospital is higher, and undertriage is more frequent. Both ED and hospital lengths of stay might be longer [8]. It is not known whether NSC patients have a higher rate of intensive care admissions [1, 9]. They seem to require more ED resources than SC patients, but current evidence is insufficient [1, 8–10].

In this short report, we aim to confirm previous abovementioned findings reporting adverse outcomes after ED admissions related to NSC. We present ED outcomes, including high dependency unit/intensive care unit (HDU/ICU) admission and resource consumption, *i.e.*, ED length of stay (ED LOS) and need for diagnostic testing. We hypothesize that patients with NSCs are still undertriaged in many institutions, and confirmatory studies may be helpful for adjusting triage systems if bias in the triage system is identified.

2. Methods

This was a descriptive, retrospective, observational cohort study in three separate EDs—one at Tampere University Hospital, Finland and two separate EDs at Helsinki University Hospital, Finland. Tampere University Hospital has an annual census of 100,000, and the two EDs at Helsinki University Hospital have annual censuses of 50,000 (Vantaa) and 60,000 (Espoo). All three EDs are university-hospital level.

All patients aged ≥65 who were admitted to the three EDs between 01–28 February 2018 were screened for inclusion.

Patients who were dead on arrival and patients who were not seen by an ED physician were excluded from the study.

The following data regarding the included patients were collected from electronic health records: date of birth, gender, time and date of arrival and departure from the ED, date of death (if within 3 or 30 days from visit), triage category, hospital admission, HCU/ICU admission, presenting complaint, and use of diagnostic testing[1] (including any blood sample, electrocardiogram (ECG), or a blood gas analysis (arterial, venous, or capillary)). Mortality data were acquired from the Digital and Population Data Services Agency of Finland [11].

Nonspecific complaint was defined as lack of specific complaint at ED admission, *i.e.*, the recorded presenting complaint was along the lines of "generally unwell, nonspecific complaint, not coping, home care impossible, decreased mobility". If the presenting complaint included nonspecific presentations together with a specific complaint, such as fever or injury from a fall, it was categorized as specific. Example presentations such as "generally unwell, fever" or "decreased mobility, difficulty breathing" were considered specific. These definitions were a synthesis of previous definitions [3, 4]. If a nonspecific complaint was recorded together with a long-term pre-existing condition, such as cancer, the complaint was still recorded as nonspecific, providing that the reason for the visit was not an exacerbation of the pre-existing condition.

The presenting complaints were pre-screened by one author and cases were then reviewed by two other independent authors to reach a consensus on their classification.

Patients from all triage categories were included. The two centres use different triage methods: Tampere University Hospital utilizes the Emergency Severity Index (ESI), and Helsinki University Hospital (HUH) uses a local three-level method ("red", "yellow", "green") [12]. For the purposes of our analysis, we regarded ESI levels 1–2 and the HUH "red" triage category as high acuity. ESI 3 and the HUH "yellow" triage categories were regarded as mid-acuity. The three-level HUH triage is described in **Supplementary Table 1**.

Outcomes for the NSC and SC patient groups were compared. The data were analysed with SPSS version 25.0 (IBM Corp., Armonk, NY, USA) and Medcalc software [13, 14]. Odds ratios were calculated for binary outcomes. The Mann-Whitney U test was used to compare groups for continuous outcomes. p values below 0.05 were considered significant.

Baseline and outcome data are considered descriptive for the differences between cohorts of NSC and SC patients. As NSC and SC patients are expected to be different in baseline characteristics, we did not adjust for baseline data.

3. Results

3.1 Demographics

A total of 15,207 patients attended the three EDs within the predefined time period. The inclusion criteria were met by 5131 patients (excluded patients: dead-on-arrival (n = 36), triage category not recorded (n = 383), seen at the fracture clinic or by the triage nurse only (n = 1412), presenting complaint not recorded (n = 816), and age less than 65 years (n = 7429)). Of the included patients, 2370 were from Tampere University Hospital and 2371 (1468 from Espoo and 1293 from Vantaa) from Helsinki University Hospital.

The median age was 78 years (interquartile range (IQR) 71–85), and 44.1% of the included patients were male. NSC patients were older on average; the median was 83 years (IQR 74–87) for NSC patients and 78 years (IQR 71–85) for SC patients ($p < 0.001$). Gender distribution was similar in both groups (44.2% and 44.1% male in NSC and SC groups, respectively; $p = 0.99$).

There were 67 patients with more than one recorded complaint. The most common nonspecific complaints were "generally unwell" (n = 153), "decreased mobility" (n = 40), "generalized weakness" (n = 20) and "not coping" (n = 40) (Table 1).

3.2 Main outcomes

Diagnostic testing was higher in the NSC patient group. NSC patients had blood samples taken more often than SC patients (OR 1.88 (95% CI 1.43–2.45)). They also had ECG (OR 3.44 (2.42–4.90)) and blood gas analysis (OR 1.72 (1.11–2.67)) taken more frequently compared to SC patients. Detailed results are shown in Table 2.

ED LOS for NSC patients was longer in comparison to SC patients regardless of hospital admission status. For admitted patients, the median ED LOS was almost two hours longer (462 min (IQR 309–692) *vs.* 352 min (252–492); $p < 0.001$). For patients who were discharged from the ED, the median ED LOS was just over two hours longer (371 min (IQR 246–566) *vs.* (251 min (167–369); $p < 0.001$).

3.3 Secondary outcomes

Overall hospital admission rate was 52% (Table 2). NSC patients were more often admitted to a hospital ward than SC patients (OR 2.74 (95% CI 2.02–3.72)). HDU/ICU admission rate was 7.1%, and there was no difference in HDU/ICU admissions between NSC and SC patient groups (OR 1.15 (0.70–1.89)). NSC patients were more likely to die within 3 and 30 days of ED presentation (OR 4.65 (1.78–12.30) and 2.15 (1.33–3.47), respectively).

4. Strengths and limitations

This study involved three EDs with relatively large numbers of patients. The data from the electronic health records were comprehensive (99.8%) for all outcomes. This was a convenience sample; however, it included all eligible patients within a fixed time period to reduce the risk of selection bias. The STROBE (Strengthening the reporting of observational studies in epidemiology) checklist was completed to assess the risk of bias (**Supplementary Table 2**).

One limitation of the study include is that the study cohort was collected retrospectively. The baseline data did not include background data of morbidities, frailty status, or other factors that might contribute to whether the presentation of a condition is specific or NSC. Therefore these factors likely act as likely confounders for the association of NSC and

[1] Data for medical imaging were originally collected as well, but due to a technical issue this was deemed unreliable and therefore not included in the study.

TABLE 1. Frequencies of presenting nonspecific complaints.

Presenting complaint	Primary n = 224	Secondary n = 67	Tertiary n = 8	Total n = 226
Generally unwell	144 (64.3 %)	6 (2.7 %)	1 (0.4 %)	153 (67.4 %)
Decreased mobility	16 (7.1 %)	22 (9.8%)	2 (0.9 %)	40 (17.9 %)
Not coping	24 (10.7 %)	12 (5.4 %)	4 (1.8 %)	40 (17.9 %)
Generalized weakness	14 (6.3 %)	6 (2.7 %)	0 (0.0 %)	20 (8.9 %)
Prone to falls	5 (2.2 %)	4 (1.8 %)	0 (0.0 %)	9 (4.0 %)
Found on the floor	10 (4.5 %)	1 (0.4 %)	0 (0.0 %)	11 (4.9 %)
Appears slow	1 (0.4 %)	2 (0.9 %)	1 (0.4 %)	4 (1.8 %)
Feeling unwell	3 (1.3 %)	2 (0.9 %)	0 (0.0 %)	5 (2.2 %)
Nonspecific feeling	2 (0.9 %)	0 (0.0 %)	0 (0.0 %)	2 (0.9 %)
Social admission	2 (0.9 %)	0 (0.0 %)	0 (0.0 %)	2 (0.9 %)
Fatigue	0 (0.0 %)	2 (0.9 %)	0 (0.0 %)	2 (0.9 %)
Other	3 (1.3 %)	8 (3.6 %)	1 (0.4 %)	12 (5.4 %)

TABLE 2. Outcome comparison between patients presenting with nonspecific and specific complaints.

	All (n = 5131)	Nonspecific complaints (n = 224)	Specific complaints (n = 4907)	OR (95% CI)
Blood sample taken	2305 (44.5%)	134 (59.8%)	2171 (44.2%)	1.88 (1.43–2.45)
ECG taken	2063 (40.2%)	186 (83.0%)	2882 (58.7%)	3.44 (2.42–4.90)
Blood gas analysis	344 (6.7%)	24 (10.7%)	320 (6.5%)	1.72 (1.11–2.67)
Median ED LOS in minutes (IQR) for admitted patients	357 (255–500)	462 (309–692)	352 (252–492)	
Median ED LOS in minutes (IQR) for discharged patients	253 (169–372)	371 (246–566)	251 (167–369)	
Admitted to hospital	2667 (52.0%)	166 (74.1%)	2501 (51.1%) *	2.74 (2.02–3.72)
Admission to HDU/ICU facility	363 (7.1%)	18 (8.0%)	345 (7.0%) **	1.15 (0.70–1.89)
Triaged as high-acuity	361 (7.0%)	2 (0.9%)	359 (7.3%)	0.11 (0.03–0.46)
Triaged as high- or mid-acuity	2795 (54.5%)	98 (43.8%)	2697 (55.0%)	0.64 (0.49–0.83)
3-day mortality	29 (0.6%)	5 (2.2 %)	24 (0.5 %)	4.65 (1.78–12.30)
30-day mortality	233 (4.5%)	20 (8.9 %)	213 (4.3 %)	2.15 (1.33–3.47)

**Missing 9 data points from the SC group. **Missing 11 data points from the SC group. HDU High dependency unit. ICU Intensive care unit. ED LOS Emergency department length of stay. IQR Interquartile range. OR Odds ratio. ECG Electrocardiogram.*

poor outcomes. However, in this study, the objective was to form a perspective of presented complaints; background characteristics are not expected to be similar between patients with specific and nonspecific complaints.

Another limitation is that we were not able to include imaging test data in this study, which might affect the result concerning resource allocation. There is a difference in how Tampere University Hospital and Helsinki University Hospital operate, which might affect ED length of stay, as well as triage category allocation. There is a chance of classification bias in the screening process; however, the screening was done by three individual researchers to reduce the risk.

Lastly, some patients may have had laboratory tests taken before ED arrival, and therefore their resource utilization may not have reflected their clinical condition. However, because the hospitals did not use same laboratory record systems as primary care at the time, and in most cases any required tests were performed at the ED admission regardless of any tests taken outpatient clinics.

5. Discussion

Our results confirm findings of previous studies showing that NSC is a serious condition in older ED patients. The higher 30-day mortality and hospital admission rates we observed in NSC patients are similar to previous studies [8]. The use of diagnostic testing was higher in patients with NSCs, albeit with a lower rate compared to previous studies [10]. NSC patients were less often triaged as urgent, which, in combination with outcome data, suggests there is undertriage in this patient

group. Similar results regarding triage have been described before [1, 3, 15].

NSC patients also had longer ED LOS, which might have negative implications in this vulnerable patient group. A longer ED LOS has been associated with increased mortality, hospital LOS, and hospital-induced delirium [16–18]. This is consistent with previous studies [1, 9]. Longer ED LOS also implies increased resource consumption, as the patient requires ED care for longer. This finding is not explained by ED exit block, *i.e.,* waiting for a bed in the ED, given that the two-hours-longer ED LOS was similar for both admitted and discharged patients. It is also possible that the increased need for testing might have affected the length of stay.

HDU/ICU admission rates for NSC patients were not higher in our population, which is in keeping with previous studies [1, 9]. It is possible that patients with NSCs more often had multiple background morbidities, declined functioning and frailty, and may have more often had advanced care plans limiting intensive care. However, whether some patients from the high-risk NSC group would benefit from more intensive interventions remains an open question.

Our results support previous findings that NSC is a serious condition that warrants further attention. We see a need for guidelines on this condition regarding the most appropriate triage, assessment, and treatment for these vulnerable patients, perhaps initially as a benchmarking study. There is a need for a consensus definition of NSC, which would assist the comparison of any further studies. More detailed studies are needed to analyse which background characteristics and conditions predispose a person to nonspecific presentations of some conditions, and why.

6. Conclusions

Patients with NSCs have higher mortality and hospital admission rates. Older adults presenting to the ED with nonspecific complaints require more resources than older ED patients with specific complaints. HDU/ICU admissions are not higher in this patient group. Results suggest that NSC patients are more frequently undertriaged.

ABBREVIATIONS

ED: Emergency department; ED LOS: Emergency department length of stay; ECG: Electrocardiogram; ESI: Emergency Severity Index; HDU: High Dependency Unit; HUH: Helsinki University Hospital; ICU: Intensive Care Unit; IQR: Interquartile range; LOS: Length of stay; NSC: Nonspecific complaint; OR: Odds ratio; SC: Specific complaint; STROBE: The Strengthening the Reporting of Observational Studies in Epidemiology.

AVAILABILITY OF DATA AND MATERIALS

The datasets are not publicly available due to national juridical restrictions that protect pseudonymized research data and limitations in study permission acquired from the ethical board. Further description or analysis of data are available from the authors upon reasonable request.

AUTHOR CONTRIBUTIONS

KK, JA, RM, LL and MC—Study concept and design, critical revision of the manuscript for important intellectual content. KK and RM—data acquisition. KK, RM and JA—analysis and interpretation of the data. KK and JA—drafting of the manuscript, statistical expertise. KK, LL and MC—acquisition of funding. All authors read and approved the final manuscript.

ETHICS APPROVAL AND CONSENT TO PARTICIPATE

The study protocol and data collection were approved by the Ethics Committee of Helsinki University Hospital (reference number HUS/2678/2017). Data collection was approved by Helsinki University Hospital (reference number HUS/280/2019) and Tampere University Hospital (reference number RI8602). The ethical board did not demand that consent be obtained from patients for this observational study.

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CONFLICT OF INTEREST

The authors declare no conflict of interest.

SUPPLEMENTARY MATERIAL

Supplementary material associated with this article can be found, in the online version, at https://oss.signavitae.com/mre-signavitae/article/1684475855351234560/attachment/Supplementary%20material.docx.

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