Clinical Trial

Triage Tool for Screening Frail Patients in Emergency Department

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ABSTRACT

Urgent care for the elderly is a significant health problem, and despite efforts to restrain demand, many frail old people in need of urgent care must access hospital Emergency Department (ED). The prevalent ED model tends to be focused exclusively in the medical problem, but scientific evidence refers us to a holistic model for acute care of the elderly, led by interdisciplinary teams with geriatric competencies. International guidelines recommend an adaptation of EDs to the old patient.

Risk stratification in ED is a useful first step to identify a patient cohort susceptible to receive targeted care in the ED. But there are no robust tools to distinguish at-risk or vulnerable patients within the ED. The lack of evidence makes experts accept "own" tools based on reasonable patient selection.

This paper analyses the results of the use of a simple, self-constructed algorithm for the selection of frail patients in triage, that can be easily translated to other EDs. It is able to identify at triage a population with higher levels of urgency, higher admission rates and increased 30-day mortality rates, longer stays and a higher prevalence of delirium. Further research is needed in emergency geriatric care.

KEYWORDS: emergency department; older people; geriatric assessment; delirium; frailty; triage

BACKGROUND

Urgent care for the elderly is a significant health challenge, and despite efforts to restrain demand, many frail old people in need of urgent care must access hospital Emergency Department (ED) [1–4]. Furthermore, the prevalent model in EDs tends to be focused exclusively on the medical

problem, but scientific evidence refers us to a holistic model, led by interdisciplinary teams with geriatric competencies [5–8].

There are several difficulties related to acute care of the elderly. First of all, elderly patients present with different types of health problems (surgical or medical, emergencies or non-vital situations), atypical features, multiple comorbidities, polypharmacy and cognitive impairment and they also present hidden needs not obvious in initial assessment [9]. Second, the early detection (triage) of vulnerable patients who may benefit from adapted care is extremely difficult. Finally, there is scarce evidence on the benefits of useful geriatric interventions in ED and the paucity of standards and/or quality parameters for ED care [10,11].

In this sense, current knowledge agrees that Comprehensive Geriatric Assessment (CGA) is considered to be the most effective framework for providing urgent care to at-risk or frail elderly people, also in the ED [12–15]. In contrast, CGA to all older people (>65 years) in ED probably does not provide any benefit, but screening by age (>75, 80 or 85 years) excludes many frail older people. Scientific evidence suggests that cognitive status assessment in older patients with acute disease seems essential: there are short, sensitive, and validated tools to be used in the ED [16–18]. Also, interventions to prevent delirium help to avoid negative outcomes in the elderly. There is further evidence in the literature especially in prior cognitive impairment and surgical patients [19]. In addition careful pain management is associated with better outcomes and probably lower rates of delirium [20], and it is well known that improving geriatric skills in ED staff and developing tailored protocols brings benefits [21,22] and that availability of appropriate areas in ED to prevent geriatric complications within the ED itself is associated with greater comfort and probably lower rates of delirium [21,23]. Finally, networking, ensuring continuity of care, monitoring transfers and transfers between levels of care, especially when older persons return home, is useful in preventing re-entry.

Therefore, risk stratification in ED triage is a useful first step to identify a patient cohort susceptible to receive targeted care in the ED [24–26]. Triage selection is a critical issue as it defines the target population. The aim is to identify a vulnerable population that can receive adapted care and be placed in specific in- and out-patient procedures and circuits and not instead doing a full frailty assessment [27]. The great challenge is that there are no robust tools to distinguish risk or vulnerable patients within the ED triage. There are different ones but there are limited results on their applicability. Lack of evidence leads experts to accept 'own' choices based on reasonable patient selection [28].

Our ED in Hospital de la Santa Creu I Sant Pau is a 540-bed urban university hospital in Barcelona (Catalonia, Spain). While new scientific evidence appears, we have been making organizational changes since 2011, our Program of Care for Frailty (PCF). It is based on a progressive geriatrization of ED, establishing multidisciplinary teams and increasing our professionals' geriatric skills, maintaining routes with geriatric teams

in demand ("expert level") for selected patients. This programme is based on three main pillars. Firstly, the inclusion of Comprehensive Geriatric Evaluation procedures in the ED, on a population identified via triage and made by the ED professionals themselves, which guarantees their application 24 hours a day. Second, to provide an individualized care plan able to prevent geriatric syndromes in a senior area within ED. This is a setting where most vulnerable patients are in a safer and more comfortable environment [29]. Finally, a joint project has been developed with local health providers, enhancing networking between the ED and post-hospital care providers, allowing direct and early referral from the ED to post-acute care hospitals, home hospitalization, nursing homes and others. Therefore, PCF starts with triage screening of a vulnerable and higher risk population that will benefit from specific procedures and care in the ED.

This paper analyses the results of using a simple, self-constructed algorithm for the selection of frail patients in triage who will be subjected to our PCF. The objective is to analyze if it is capable of identifying a more vulnerable population, with higher prevalence of delirium, higher rate of admission, longer stays and higher 30-day mortality rate.

METHODS

Retrospective observational study. All patients over 65 years of age who came to the ED within a period of 15 days (1/1/2018–15/2/2018) were included.

Triage

In triage, following the standard protocol, frail persons (FP) are identified with a visible label at the computerized clinical workstation (Figure 1). Triage is done whenever possible with a family member or partner. Patients were identified as frail if they met any of the items showed in Figure 1. In addition, the triage nurse applies in all cases the standard triage system to determine the level of urgency (Andorran Triage Model, MAT, standard use in Catalonia EDs).

PCC/MACA CatSalut label, visible in triage*
Physical disability or dependence
Dementia
Active oncologicl disease
Intellectual disability
Advanced comorbidities
AIDS

Figure 1. Triage. Frail Patients (FP), triage tool: Ask family member. * PCC/MACA PCC: Chronic Complex Patient (Pacient Cronic Complex) and MACA: Patient with Advanced Chronic Disease (Malaltia Crònica Avançada).

In 2011, CatSalut (public insurance in Catalonia, Spain) named the Chronic Complex Patient (PCC, Pacient Crònic Com-plex) and the Patient with Advanced Chronic Disease (MACA, Malaltia Crònica Avançada). Catsalut powerws their primary care identification in the whole population. PCC refers to individuals with chronicity, multi-morbidity or a unique condition with complex management (approximately 2–3% of the population). MACA implies a limited prognosis of life, high-need health and palliative needs (1–2% of the population). This identification aims to develop proactive health care approaches at different levels of health care. Patients patients are marked in primary care medical records, wich are shared by all health care providers (Catalan Shared Medical Record, Història Clínica Compartida de Catalunya, HCCC). In 2014 ED triage modifications were included: (1) The ED computerized clinical workstation (CWS) was modified, creating an alert for patients marked in HCCC as PCC/MACA; (2) A "vulnerable or frail patient" mark is created on the ED CWS. The triage nurse makes an initial mark; (3) To ensure the selection of all vulnerable patients, a second step was added. Thus, patients who are not marked as PCC and/or MACA in HCCC, and who have advanced organ failure, dementia or cognitive impairment, dependence, visual or hearing impairment, psychiatric illness, active oncological disease must be also marked as vulnerable patients by the ED triage nurse.

Programe of Care for Frail Patients

The FP-branded patient is submitted to a standard protocol of tailored care: comprehensive geriatric assessment, preventive care plan for incidental geriatric syndromes (delirium and others), medication reconciliation, pain control (strict management and use of specific pain assessment scales for non-communicative patients) [29].

Patients Analysis

The differences found among frail and non-frail subjects are analyzed in relation to triage level, length of stay, admission rate, 30-day mortality, prevalence of delirium.

Descriptive analysis of all study variables. The continuous variables are summarized by the number of valid cases (N), mean, standard deviation (SD). Categorical variables are described by the number of valid cases and % of each category.

Variables with asymmetric frequency distributions are described using the geometric means and their 95% confidence intervals or the medians and their 25–75 percentiles. Group comparisons are made using parametric (*t*-test) or non-parametric (Mann-Whitney U) tests for continuous variables (depending on their normalcy shown or not by Kolmogorov-Smirnov or Shapiro-Wilk tests) and Chi-square or Fisher exact tests when appropriate for the remaining categorical variables. In all the analyses performed, a significance level of 5% ($\alpha < 0.05$) and a Power of 80% ($\beta = 0.20$) are used. In all cases, hypotheses are contrasted using a

bilateral approach (two-tailed) and in no case are missing values imputed or outliers substituted.

RESULTS

During the study period, 3421 patients were visited, 1419 were over 65 years old. We considered only the 460 patients with stays longer than 8 hours. Of these, 195 (42.4%) met vulnerability criteria for triage and were therefore candidates for tailored care (Figure 2).
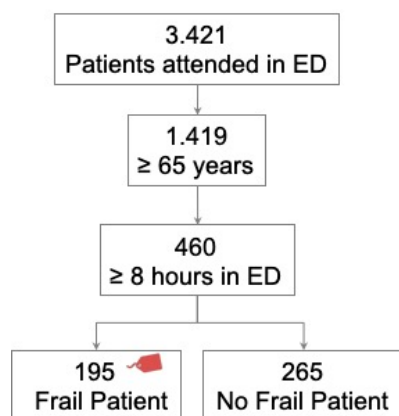

Figure 2. Patient selection.

Table 1 shows the data for the total population, with 58.6 per cent women. By triage level, 0.5% were level I (vital emergency), 58.9% level II, 42% level III, 18.7% levels IV and V, 6.9% not triaged. The average age of the population was 80.6 ± 8.7 years.

Table 1. Total population of the study period, description.

Variable	Definition	*N* (%)
Sex	Men	190 (41.3)
	Women	270 (58.6)
Triage	1	2 (0.5)
	2	167 (38.9)
	3	179 (42)
	4	75 (17.5)
	5	6 (1.4)
	Unknown	31
Frail Patient (Triage screening)	Yes (FP)	195 (42.4)
	No (NFP)	265 (57.6)

Table 2 shows how FP brand identifies an older population (83.2 ± 7.7 vs 79 ± 9 years), with greater comorbidity measured with Charlson's index, higher prevalence of cognitive impairment and dependency (independent 45.7% vs 62.1%). The triage level and therefore the level of urgent process was significantly higher in the FP population than in the non-NFP population, with 55.6% of FP with levels I and II vs 27.9% in the NFP.

Table 2. Comparison of frail and non-frail patient groups.

Variable	Definition	NFP *N* (%)	FP *N* (%)
Sex	Men	111 (41.9)	79 (40.5)
	Women	154 (58.1)	116 (59.5)
Age (years)**	Median	78	84
	Percentil 25	72	77
	Percentil 75	86	88
	Mean ± SD	79 ± 9	83.2 ± 7.7
Cognitive	Normal	202 (76.8)	124 (65.3)
	Unknown	13 (4.9)	17 (8.9)
	Impairment*	20 (7.6)	17 (8.9)
	Dementia*	28 (10.6)	32 (16.8)
Dependence*	Independent	161 (62.1)	86 (45.7)
Charlson Index**	Median	5	7
	Mean ± SD	5 ± 2.7	6,9 ± 2.8
Triage Level*	1	1 (0,4)	1 (0.6)
	2	68 (27.5)	99 (55.0)
	3	110 (44.5)	69 (38.3)
	4	64 (25.9)	10 (5.6)
	5	4 (1.6)	1 (0.6)
Delirium*	No	240 (90.5%)	159 (81.6%)
	Yes	20 (7.5%)	32 (16.4%)
	Unknown	5 (2%)	4 (2%)

* $p < 0.05$ X^2 Pearson bilateral; ** $p < 0.05$ U Mann Whitney Test.

As for delirium, delirium diagnosis in the ED (incident and prevalent) in the FP population reached 16.4% vs 7.5%, with statistical significance (Table 2).

Table 3. Length of stay and destination.

Variable	Definition	NFP *N* (%)	FP *N* (%)
Length of Stay* **(LOS, hours)**	Median	1.9	9.3
	Percentil 25	8.8	5.5
	Percentil 75	6.48	22.8
	Mean ± SD	7.62 ± 15	19.97 ± 21.3
Destination**	Hospitalization	39 (15.2)	50 (26)
	Home	193 (85.4)	107 (73.3)
	Intermediate Hospital	32 (14.2)	33 (22.6)
	Death	1 (0.4)	6 (4.1)
Death < 30 days**		9 (3.6)	15 (7.7)
Return ED < 30 days		40 (15.5)	33 (17.4)

* $p < 0.001$ U Mann Whitney Test; ** $p < 0.05$ X^2 Pearson bilateral.

From the evolutive point of view (Table 3), patients identified as frail in triage showed significantly longer stays in the emergency department (mean 19.97 ± 21.3 h vs 7.62 ± 15 h). Also, they showed a higher hospital admission rate (26% vs 15%), and referral to intermediate hospitals (22.6% vs 14.2%), and a higher rate of return to ED (27.6% vs 15.6%). Mortality during the urgent episode was higher (4.1% vs 0.4%), and 30-day mortality was also greater in the FP (7.7% vs 3.6%).

DISCUSSION

International guidelines recommend an adaptation of EDs to the old patient and different initiatives have been developed to promote this change, such as the Geriatric ED Accreditation Program (https://www.acep.org/geda) that the American College of Emergency Physicians (ACEP) has promoted in 2019 [7]. A recently review classifies the different organizational models to address this challenge [30]. However, they all share the problem of selecting patients who should receive adapted care with a geriatric approach.

Our model corresponds to a very specific ED organization, where target patient screening must be done in triage, in order to implement the established procedures in 100% of the selected population, no matter what time and day of the week. For this reason, physicians and nurses in our ED are responsible for selecting the target population and providing them a comprehensive geriatric assessment, medication reconciliation and specific care plan adapted to the old patient, in an adapted setting (elder friendly area). Social work consultancy is available (12 h per day), as well as a pharmacist (8 h per day) and a geriatric team (8 h per day on working days).

The selection process in triage is one of the challenges. As mentioned above, there is no validated tool for this purpose, and experts recommend a reasonable selection. It should be emphasized that the objective is to enable a simple, easily reproducible tool at the ED entrance useful to select a target population for appropriate care. Triage should be done in less than 2 min by non-geriatric professionals. It is not the aim in triage to perform an evaluation of frailty, which requires more time and training.

In this sense, ISAR scale seems able to detect older people at increased risk of adverse health outcomes after an emergency visit, but other works shows that the poor predictive ability of the ISAR in older people discharged from acute medical units makes it unsuitable as a sole tool in clinical decision-making [31]. On the other hand, there are simple frailty tests, which can be done in a short time by non-expert but trained personnel, like the Rockwood score. However, none of them are validated tools for triage. Instead, they can be introduced in the ED as a decision tool in therapeutic assessment.

So, we have achieved an internal algorithm based on literature recommendations, which is easily reproducible in other EDs. In Catalonia (Spain), the public and universal health system has incorporated an

identifier for patients with chronic diseases (PCC/MACA) that the insurance company CatSalut promoted and which can be displayed in the triage. For this reason we have developed a similar tool to TRST, but which uses the existing capabilities of our health system.

Our results are comparable to those obtained in similar works, which developed simple triage tools suited to their own population [9,32], using a triage tool can identify a population with a higher risk of further ED visits and hospitalization. In our work we observed that in those selected as FP in triage the time spent in ED was much longer, and the admission rate was higher (26% vs 15%). However, the most relevant data are higher hospital mortality rate among the screened frail group (4.1% vs 0.4%), and higher 30-day mortality (7.7% vs 3.6%). This is the greatest value of our work.

Evidence shows that delirium in EDs is correlated with a higher rate of admission, longer stays and death [33,18], as is also the case in our study. Delirium was more prevalent in FP (16.4% vs 7.5%). However, the admission rate among FP is lower than that reported in the literature for this population, where admission rates between 50–60% are reported [34,35]. We think that the low hospital admission rate is related to the high referral ratio to intermediate hospitals (IH), suggesting that IH is a useful alternative to hospitalization in a selected group of patients, from the point of view of hospital and ED management [36]. We also believe that the low rate of hospital admission is due to the fact that comprehensive geriatric care provided in ED allows for better case resolution, better definition of the patient that is a candidate to complete the stay in the HI, or allows for solutions that are more adjusted to the clinical, social and functional needs of each patient (home hospitalization, discharge under the control of residential care teams) [29].

Limitations of the study are diverse, since it is a unicentric, observational and retrospective study. In contrast, we must emphasize that in our work we no longer observe 30-day revisits in the vulnerable population. On this issue, studies often detect higher readmission rates in frail patients to the ED. Although it cannot be assured, it is possible that the absence of more readmissions among frail patients is due to more careful care and transfer to high quality, thanks to the shared connection and communication systems that have been developed with other health care providers in the region as a result of the program.

CONCLUSIONS

Our ED triage tool for screening at-risk or frail older people complies with international recommendations. It is a simple tool that can be easily adapted or translated to other EDs. It is capable of identifying a population with higher levels of urgency, a higher rate of admission and a higher 30-day mortality rate, with longer stays and a higher prevalence of delirium. Further research is needed in the field of emergency geriatric care [37,38].

COMPLIANCE WITH ETHICAL STANDARDS

The Hospital de la Santa Creu i Sant Pau ED reached in 2019 the **Geriatric ED Accreditation Program** (GEDA, https://www.acep.org/geda) that the American College of Emergency Physicians (ACEP) promotes.

ETHICAL APPROVAL

In this article, patient data do not appear. The clinical research ethics committee of reference (Ethics Committee Sant Pau Biomedical Research Institute, IIB Sant Pau, Barcelona) approved this study (IIBSP-AGI-2017-14). Informed consent for this type of study informed consent is not required.

AUTHOR CONTRIBUTIONS

All authors made substantial contributions to all of the following: concept and design of the study, acquisition of data, and analysis and interpretation of data; drafting the article or revising it critically for important intellectual content; and final approval of the version to be submitted.

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CONFLICT OF INTEREST

The authors state that there is no conflict of interest and that no commercial, financial, and other relationships exist.

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