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CLINICAL TRIAL

Geriatric team support in the emergency department—a randomised trial investigating the effects on hospital admission and community care in older adults (GerED-21)

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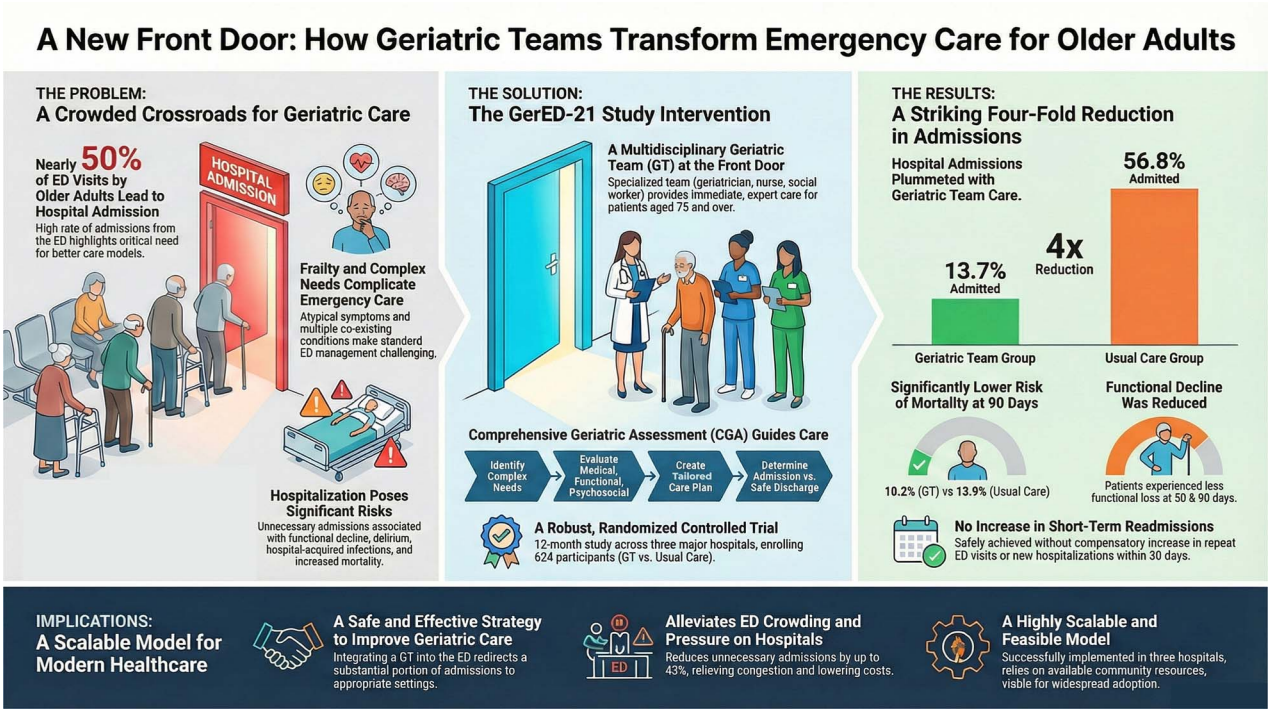
Abstract

Background: The Emergency Department (ED) is a 'strategic crossroads' for geriatric care, as older adults represent nearly 50% of ED visits resulting in hospital admissions. It is therefore essential to integrate geriatric expertise within the ED to address their complex needs and improve outcomes.
Aims: This study evaluated whether implementing a Geriatric Team (GT) comprising geriatricians, nurses, social workers, tasked with conducting Comprehensive Geriatric Assessment and delivering tailored interventions in the ED, could reduce unnecessary hospital admissions and repeated ED visits compared to standard practice.
Materials and methods: A multicentre, parallel, unblinded, superiority randomised study was conducted on people aged 75 years or older who scored ≥2 on the Triage Risk Stratification Tool upon ED admission. Randomisation was computer-generated and applied to calendar weeks. The primary outcome was hospital admission at the index ED visit. The secondary outcomes were ED readmissions; hospitalisations; mortality at 7, 30 and 90 days; and functional status at 30 and 90 days.
Results: The study included 624 participants, 314 (50.3%) in the GT group and 310 (49.7%) in the usual care group. Hospital admissions at the index ED visit were 13.7% in the GT and 56.8% in the usual care group. ED readmission and hospitalisation rates were similar across groups. All-cause 30-day mortality was similar across groups, while 90-day mortality was lower in the intervention group. Functional decline was attenuated at both 30 and 90 days in the GT group.

Conclusions: By relieving pressure on inpatient services, the GT integration into ED workflows represents a scalable strategy for health systems facing demographic shifts and rising demand for age-sensitive care.

Graphical Abstract



Keywords: older adults; frailty; emergency department; hospital admissions; comprehensive geriatric assessment

Key Points

- The ED is a key access point for older adults, requiring integrated geriatric expertise.
- In the GerED-21 project, a multidisciplinary Geriatric Team delivered structured CGA to guide ED decision-making.
- Hospital admissions were substantially lower with the Geriatric Team intervention (13.7% vs. 56.8%) than with usual care.
- Safety outcomes (ED visits, hospitalisations, 90-day mortality, functional decline) were favourable for the intervention group.
- Integrating a geriatric team into the ED is a feasible strategy for helping health systems adapt to an ageing population.

Introduction/background

The global rise in the ageing population presents major challenges for emergency care systems. Older adults account for a disproportionate share of Emergency Department (ED) attendances, with hospital admission rates approaching 50% [1, 2]. As a result, the ED has become a 'strategic crossroads' for geriatric care, particularly in the context of fragmented outpatient services and the heightened vulnerability of older adults to adverse events during care transitions [3–6]. Atypical symptom presentations and geriatric syndromes further complicate clinical management [7], underscoring the need for integrated geriatric-emergency care models [8–12].

Recent literature describes several models of geriatric intervention in the ED, including structured Geriatric Emergency Departments [5, 13], ED-based Comprehensive Geriatric Assessment pathways [14], geriatric co-management or consultative models [15] and frailty-focused screening and care bundles [16, 17]. These approaches show potential benefits for functional outcomes and care transitions, although the evidence remains inconclusive. Frailty, a multidimensional state of reduced physiological reserve and resilience to stressors [18, 19], is highly prevalent among older adults accessing ED. The multicentre Frailty in European Emergency Departments (FEED) study reported rates of up to 40% across European EDs and demonstrated that structured frailty screening combined with embedded geriatric input improved functional outcomes and reduced hospital admissions without prolonging ED length of stay [20].

Frailty assessment in the ED has become an important component of geriatric emergency care, enabling the early

identification of older adults at risk of adverse outcomes, beyond chronological age [18, 21]. In this context, several rapid frailty and risk-screening tools have been validated for ED use, including the Clinical Frailty Scale (CFS) [22], the Identification of Seniors at Risk (ISAR) [23] and the Triage Risk Screening Tool (TRST) [24]. The TRST, in particular, enables early risk stratification and identification of older adults who may benefit from a Comprehensive Geriatric Assessment (CGA), with a validated cut-off score of ≥2 commonly used to define high risk [25, 26]. Integrating such tools into ED workflow provides a structured mechanism for triggering CGA, when clinically appropriate. Unlike brief risk-screening tools, the CGA offers a multidimensional and multidisciplinary evaluation across medical, functional and psychosocial domains, which inform the development of genuinely individualised care plans.

CGA has shown the strongest and most consistent effectiveness in acute medical wards and acute geriatric units, improving functional outcomes and increasing the likelihood of discharge alive and at home [27, 28]. Clear benefits from the CGA are also documented in orthogeriatrics [29], perioperative care [30], community settings [31, 32] and geriatric oncology [33]. By contrast, evidence from emergency departments remains heterogeneous and inconclusive. Recent studies report contrasting effects on admissions, ED length of stay, reattendance and short-term functional outcomes, reflecting substantial differences in patient selection, staffing models and the feasibility of delivering full CGA in time-pressured environments [34–36].

A recent randomised controlled trial reported that CGA can reduce ED length of stay in frail older adults and improve functional outcomes at both 30 days and 180 days follow-up, providing an evidence base for similar experience in this setting and supporting the need for multicentre studies to confirm the external validity of their findings [36].

Despite these challenges, CGA remains a key strategy for identifying and managing high-risk older adults in emergency care settings [37].

To address the persistent lack of evidence on structured multidisciplinary geriatric teams embedded within the ED—and the limited data on team-based delivery of CGA during the index ED visit—we implemented and tested a multidisciplinary Geriatric Team (GT) operating into routine ED care. The GT included geriatricians, transitional care nurses and social workers, reflecting the core domains of care needs in older adults.

In this model, the CGA was designed as a targeted, rapid and setting-appropriate format, specifically adapted to the time constraints of the ED, the acute clinical presentations and the complex profiles of older adults.

We hypothesised that this integrated model—combining a dedicated multidisciplinary team with an ED-tailored CGA—would improve care quality while reducing admissions from the index ED visit, readmissions and adverse outcomes during care transitions. This study aims to contribute to ongoing efforts to redesign emergency care for older adults by enhancing clinical outcomes, promoting more efficient resource allocation and advancing an older-adult-centred approach to emergency medicine.

Methods

Study design

The GerED-21 study is a multicentre, cluster-randomised controlled trial, in which calendar weeks, rather than individual participants, were randomised. The primary outcome was the disposition from ED to an emergency medicine or medical/surgical ward versus discharge to home, a facility or a nursing home. Secondary outcomes included, for participants not admitted during the index visit, ED readmission within 7 and 30 days, and for all participants, hospital admission within 30 days, mortality within 30 and 90 days, and functional status at 30 and 90 days.

[Written informed consent for participation and follow-up was obtained from the patient or, when appropriate, from a proxy. The trial received ethics approval from the Area Vasta Emilia Centro (CE-AVEC) Ethics Committee 43/2022/Sper/AOUBo.] The trial was registered on ClinicalTrials.gov with ID: NCT06788210 https://clinicaltrials.gov/study/NCT06788210, after the start of participant enrolment; full protocol details are available in the registry.

The study lasted 24 months, including a 6-month run-in phase, 12 months of enrolment, 3 months of follow-up and 3 months dedicated to data analysis. During the run-in phase, each hospital established a multiprofessional geriatric team that received training on core procedures, jointly developed the electronic case report form and organised ED logistics to support subsequent study implementation.

Setting

The study was conducted in the Emergency Departments of three major hospitals in the Emilia-Romagna region of northern Italy—two university hospitals and one general hospital—with an annual volume of ∼20 000 older adults (≥75 years) each, based on pre-pandemic data (2019). The recruitment period was set at 12 months to capture seasonal variation in ED presentation and took place between May 2023 and May 2024.

Study population

Participants were eligible for inclusion if they were aged 75 years or older, had a TRST score of ≥2—using the validated threshold identifying individuals at higher risk—and provided informed consent. The TRST was administered at triage by trained ED nurses.

There were no predefined criteria for documenting proxy consent. Investigators applied shared training on assessing decision-making capacity, and the decision to obtain proxy consent relied on clinical judgement at the time of recruitment.

Exclusion criteria included acute conditions requiring immediate management in the intensive care area (e.g. major

trauma, urgent surgical emergencies) and presentations routed through dedicated clinical pathways (ST-Elevation Myocardial Infarction, stroke, hip fracture, patients with highly contagious disease).

The required sample size was determined by a power analysis, using a cluster randomised design for a two-sample proportion test. This task was carried out using Stata v.15.1. The expected effect size was a reduction in hospitalisation rate from 45% to 39%, and this required an overall study size of 624 participants (208 for each ED). Randomisation was performed by calendar weeks, assigning each week to either the geriatric team intervention or standard care, to ensure easier and more efficient organisation of the multiprofessional team in the ED. The study statistician generated a randomisation list for each centre using a 1:1 allocation ratio and a fixed block size of two, without stratification, employing the ralloc user-written Stata package [38]. The randomisation lists were made available to each centre at the commencement of the enrolment phase to facilitate the timely organisation of the geriatric team. Consequently, neither the participants nor the professionals involved in the study were blinded to the assignment.

Study intervention

During intervention weeks, the multiprofessional geriatric team—comprising a geriatrician, a nurse specialised in transitional care and a social worker—was present in the ED on Monday to Friday from 8.00 to 17.00. The intervention aimed to (i) identify participants requiring inpatient care; (ii) determine those who could be safely discharged; and (iii) outline the most appropriate post-acute care pathway, which was then shared with the emergency department team.

A list was developed *ad hoc* for the study to support clinical decision-making and contained a range of typical clinical profiles that did not usually require hospital admission. (See Appendix 1 in the Supplementary Data for full details.)

A streamlined CGA was administered using validated instruments covering functional, cognitive, psychological and clinical domains. Functional status was assessed using the Katz Index for Activities of Daily Living (ADL) [39] and the Lawton and Brody Scale for Instrumental Activities of Daily Living (IADL) [40]. Cognitive status and the presence of delirium were evaluated using the Short Portable Mental Status Questionnaire (SPMSQ) [41] and the 4AT tool [42, 43]. Psychological wellbeing was assessed with the 5-item Geriatric Depression Scale (GDS-5) [44]. Clinical complexity was characterised using the Charlson Comorbidity Index [45] and the CFS [46]. Additional information on polypharmacy and falls occurring in the previous 12 months was collected. The ADL and IADL scores were collected with discrete values ranging from 0 to 6 for ADL, and from 0 to 5 for IADL in males, and from 0 to 8 for IADL in females, with higher values indicating greater independence.

The CGA-based intervention followed an interprofessional collaborative practice model. Each participant received a multidimensional assessment, which was subsequently reviewed in a structured team meeting where geriatricians, transitional care nurses and social care workers jointly interpreted the findings to identify key vulnerabilities and priorities for care. Responsibilities for targeted actions were then assigned, including medical optimisation and medication review, monitoring of neurocognitive and functional stability, and activation of community-based services. While the diagnostic process followed a standardised framework, the resulting care plan was individually tailored. See Appendices 2 and 3 in the Supplementary Data for full details of the interventions.

The main potential harm was the risk of inappropriate discharge. This was monitored by assessing ED returned visits or hospital admissions within 7 days of the index visit.

During the control weeks, participants who met the inclusion criteria and provided informed consent received standard ED care. Researchers trained during the run-in phase performed the CGA solely for data collection, without influencing clinical management, and conducted telephone interviews for follow-up.

Statistical analysis

The study population characteristics were summarised as mean ± standard deviation (SD), median and range, or as frequencies and percentages according to the type and distribution of variables. Groups were compared using the Student's *t*-test for unpaired data, Mann–Whitney U test or Pearson's chi-square test, and Fisher's exact test when appropriate. The main outcome, i.e. the difference in hospital admissions at the ED index access between the study groups, was expressed in terms of rate difference and risk ratio, and was tested using the chi-square test. The median ED length of stay (LOS) was calculated and compared between the study arms, overall as well as by the main outcome, by centre and diurnal or nocturnal time of access. A test for the difference in medians was carried out using a chi-square with continuity correction from a table with the number of subjects with an ED LOS above and below the median time of stay.

Among the secondary outcomes, the rates of ED readmission, hospitalisation and mortality were compared between groups using rate differences and risk ratios; for functional status, the mean group differences in values of ADL and IADL observed at index access and after 30 and 90 days were compared using a *t*-test for independent populations. All outcomes were analysed for all participants. ED readmission outcomes, however, were evaluated only among participants who were not admitted to hospital during the index ED attendance or within the subsequent 30 days. The main outcome was also assessed using multiple logistic regression with robust standard errors adjusted for centres to confirm the main result in the event of an imbalance between the groups. In this regression, confounders related to multidimensional geriatric assessment (polypharmacy, comorbidity index, motor, cognitive, frailty, and social frailty indices, ADL, IADL) and demographic factors of the assessed subjects were included.

Firth's logistic regression [47] was used when the number of events was small (<20).

Comparison of mortality at 90 days from ED access was assessed also using Kaplan–Meier curves and log-rank tests. A multivariable Cox model was carried out, which included robust standard errors adjusted for participants' clustering in hospitals, and as confounders the same variables used in the logistic regression of 30-day hospitalisation plus the binary indicator of hospitalisation at the ED index access. For this model, the proportional hazard assumption was verified using the Grambsch and Therneau test based on Schoenfeld residuals [48]. In the case of violation of the assumption, we allowed baseline hazards of the covariates responsible for violation to be different by stratifying on the covariates. The functional status at follow-up, as measured by the ADL and IADL, was first analysed by obtaining the difference in score between the usual care group and the GT group, and then verifying the hypothesis that this difference would be zero. A multivariable linear regression analysis was then carried out for each functional status score at follow-up, adjusting for the baseline value of the score and the previously indicated confounders. In these analyses, the reported linear coefficients indicate the average difference in score variation between the intervention and usual care groups. A descriptive analysis of the number and type of interventions and health services activated at the ED index access was carried out on participants seen by the geriatric team and discharged. Finally, we analysed the participants' transitions between health states (event-free, accessed ED, admitted to hospital and deceased) at first ED access and after 7, 30 and 90 days graphically by alluvial plots [49]. A complete-case analysis was undertaken because, owing to the study design, no data were missing for the main outcomes (hospitalisation at the index ED attendance and within 30 days, ED readmission and mortality). All analyses were performed using Stata v.18.5.

Results

From 1 May 2023 to 13 May 2024, a total of 632 participants were enrolled in the study and assigned to a trial group: 319 to geriatric team intervention and 313 to usual care. After the data quality check, 8 (1.3%) were removed because they did not fulfil the participation criteria or lacked essential data. Thus, the study was conducted on 624 participants, 314 (50.3%) in the geriatric team intervention group and 310 (49.7%) in the usual care group (Figure 1). The three hospitals contributed evenly to enrolment: 210 (33.7%), 209 (33.5%) and 205 (32.9%).

It was observed that 20 participants (3.2%) were allocated to a study arm that did not correspond to the planned assignment. The majority of these subjects attended the ED on Sundays (16/20) or Saturdays (2/20) and were evaluated on the following Monday, at which point the study arm had transitioned to the new week. No participants withdrew from the study; however, the ADL scale was not administered to 38/624 individuals at the 30-day follow-up and to 77/624 individuals at the 90-day follow-up, mainly due to death.

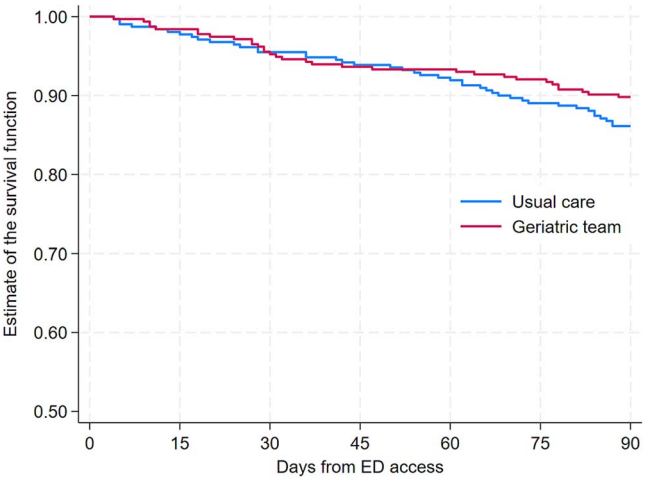


Figure 1. Kaplan–Meier curves of 90-day mortality.

Most participants' characteristics were balanced between groups after randomisation. In the entire study population, the mean age was 85.3 years, and 60.3% were female; most lived at home without active public healthcare services (Table 1). The main reasons for ED access were: falls or trauma (28.4%), cardiovascular conditions (16.0%) and neurological conditions (13.6%). According to the CFS, 36.4% of participants were designated as persons with frailty and 26.9% as disabled; 44.9% were independent in walking and 56.6% had a history of falls in the previous year; 29.8% were totally dependent (ADL score 0–2) and 49.5% were independent (ADL score 5–6). An imbalance between groups ($P < .05$) was found for three variables, all of which indicated worse conditions for participants in the intervention group: living alone (35.5% vs. 26.9%), presence of cohabiting caregiver support (16.9% vs. 23.2%) and GDS (1.85 ± 1.55 vs. 1.40 ± 1.57). Therefore, multivariable analyses were also conducted.

The rate of hospital admission at the index ED visit was 13.7% in the geriatric team intervention group and 56.8% in the usual care group (Table 2), with a risk ratio of 0.24 [95% confidence interval (CI), 0.18 to 0.32]. A lower risk of hospitalisation was confirmed by multivariate logistic regression analysis (OR = 0.10, $P = .023$). Among participants who were not hospitalised, ED readmission within 7 days from the index ED visit occurred in 7.0% and 6.0% of the geriatric team intervention and usual care groups, respectively. ED readmission for the same reason as index ED visit occurred in 6 vs. 1 participant, with a risk ratio of 2.97 (95% CI, 0.36 to 24.39). The ED readmission rates after 7 days and within 30 days were lower in the geriatric team intervention group (5.9% vs. 9.5%), risk ratio 0.62 (95% CI, 0.30 to 1.28).

Hospitalisations rates within 30 days were 17.4% in the geriatric team intervention group and 15.7% in usual care group (risk ratio, 1.11; 95% CI, 0.69 to 1.78).

Table 1. Demographic and clinical characteristics of participants at ED index access.

Characteristic	Geriatric team $N = 314$	Usual care $N = 310$	All participants $N = 624$
Age, years, mean (SD)	85.3 (5.4)	85.3 (5.6)	85.3 (5.5)
Male sex, *n* (%)	119 (37.9)	129 (41.6)	248 (39.7)
Education, years, mean (SD) ($n = 608$)	7.5 (3.9)	7.6 (4.2)	7.5 (4.1)
Status before ED access ($n = 621$), *n* (%)			
In facility	16 (5.1)	22 (7.1)	38 (6.1)
At home with services	65 (20.8)	43 (13.9)	108 (17.4)
At home without services	231 (74.0)	244 (79.0)	475 (76.5)
Lives alone ($n = 622$), *n* (%)	111 (35.5)	83 (26.9)	194 (31.2)
Supported by, *n* (%)			
Spouse	74 (23.6)	84 (27.1)	158 (25.3)
Relatives	214 (68.2)	191 (61.6)	405 (64.9)
Cohabiting caregiver	53 (16.9)	72 (23.2)	125 (20.0)
Neighbours or friends	8 (2.5)	13 (4.2)	21 (3.4)
Volunteers	3 (1.0)	1 (0.3)	4 (0.6)
Reason to access ED, *n* (%)			
Cardiovascular	50 (15.9)	50 (16.1)	100 (16.0)
Dermatological	2 (0.6)	2 (0.6)	4 (0.6)
Gastrointestinal	37 (11.8)	45 (14.5)	82 (13.1)
Genitourinary	13 (4.1)	17 (5.5)	30 (4.8)
Otolaryngologic	6 (1.9)	4 (1.3)	10 (1.6)
Neurological	54 (17.2)	31 (10.0)	85 (13.6)
Psychiatric	14 (4.5)	15 (4.8)	29 (4.6)
Ophthalmic	0 (0)	1 (0.3)	1 (0.2)
Respiratory	28 (8.9)	36 (11.6)	64 (10.3)
Fall, trauma	89 (28.3)	88 (28.4)	177 (28.4)
General diseases	14 (4.5)	14 (4.5)	28 (4.5)
Social problems	7 (2.2)	7 (2.3)	14 (2.2)
Triage code ($n = 622$), *n* (%)			
White-green	73 (23.4)	98 (31.6)	171 (27.5)
Blue	208 (66.7)	182 (58.7)	390 (62.7)
Orange	31 (9.9)	30 (9.7)	61 (9.8)
Polypharmacy, *n* (%)	234 (74.5)	216 (69.7)	450 (72.1)
ADL score, mean (SD)	3.70 (2.1)	3.83 (2.0)	3.76 (2.03)
ADL score (groups), *n* (%)			
Totally dependent (0–2)	99 (31.5)	87 (28.1)	186 (29.8)
Partially dependent (3–4)	60 (19.1)	69 (22.3)	129 (20.7)
Independent (5–6)	155 (49.4)	154 (49.7)	309 (49.5)
IADL score in males, mean (SD) ($n = 238$)	2.63 (1.9)	2.47 (1.9)	2.55 (1.94)
IADL score in females, mean (SD) ($n = 363$)	3.11 (2.8)	3.62 (2.8)	3.36 (2.82)
4AT score, mean (SD)	2.17 (2.5)	2.20 (2.7)	2.18 (2.61)
Charlson Comorbidity Index, mean (SD)	6.15 (1.9)	6.30 (1.8)	6.22 (1.85)
GDS score, mean (SD) (0–5, $n = 537$)	1.85 (1.5)	1.40 (1.6)	1.62 (1.58)
SPMSQ score, mean (SD) ($n = 586$)	3.67 (3.1)	3.27 (2.6)	3.47 (2.84)
CFS (Rockwood) score, mean (SD)	5.27 (1.6)	5.15 (1.6)	5.21 (1.58)
CFS score (groups), *n* (%)			
Fit (1–3)	55 (17.5)	64 (20.6)	119 (19.1)
Pre-frail (4)	55 (17.5)	55 (17.7)	110 (17.6)
Frail (5–6)	115 (36.6)	112 (36.1)	227 (36.4)
Disable (7–8)	89 (28.3)	79 (25.5)	168 (26.9)
Falls in the previous 12 months, *n* (%)			
None	136 (43.3)	135 (43.5)	271 (43.4)
At least one fall	178 (56.7)	175 (56.5)	353 (56.6)
Deambulation, *n* (%)			
Independent without walking aids	142 (45.2)	138 (44.5)	280 (44.9)
With aids	133 (42.4)	139 (44.8)	272 (43.6)
Does not deambulate	39 (12.4)	33 (10.6)	72 (11.5)

Mortality rates at 30 days were similar across groups: 4.8% in the geriatric team intervention group vs. 4.5% in usual care group (risk ratio, 1.06; 95% CI, 0.52 to 2.15). At 90 days, mortality was lower in the geriatric team intervention group (10.2% vs. 13.9%; risk ratio, 0.73; 95% CI, 0.48 to 1.13). Kaplan–Meier survival curves (Figure 1) overlapped until ~50 days after the index ED visit and then started to diverge in favour of the geriatric team intervention, although not

Table 2. Trial outcomes.

Outcome	Geriatric team $N = 314$	Usual care $N = 310$	Risk ratio (95% CI)	P value	Multivariable analysis[e]
	No. of participants/total no. (%)				
Assignment to hospital ward	43/314 (13.7)	176/310 (56.8)	0.24 (0.18 to 0.32)	<.001[c]	0.10 (0.01–0.73)[f]
ED readmittance within 7 days[a]	19/271 (7.0)	8/134 (6.0)	1.17 (0.53 to 2.61)	.69[c]	1.06 (0.43–2.61)[g]
ED readmittance within 7 days with the same reason[a]	6/271 (2.2)	1/134 (0.1)	2.97 (0.36 to 24.39)	.29[c]	2.54 (0.33–19.55)[g]
ED readmittance within 30 days and after 7 days[b]	15/254 (5.9)	12/126 (9.5)	0.62 (0.30 to 1.28)	.20[c]	0.51 (0.25–1.04)[g]
New hospitalisation within 30 days[a]	47/270 (17.4)	21/134 (15.7)	1.11 (0.69 to 1.78)	.66[c]	1.04 (0.45–2.41)[f]
Mortality at 30 days	15/314 (4.8)	14/310 (4.5)	1.06 (0.52 to 2.15)	.88[c]	1.10 (0.72–1.71)[h]
Mortality at 90 days	32/314 (10.2)	43/310 (13.9)	0.73 (0.48 to 1.13)	.16[c]	0.72 (0.53–0.98)[h]
	Mean (standard deviation)				
Reduction of ADL at 30 days ($n = 586$)	−0.42 (1.25)	−0.68 (1.47)	–	.018[d]	0.11 (−0.66/0.88)[i]
Reduction of ADL at 90 days ($n = 547$)	−0.46 (1.26)	−0.80 (1.57)	–	.005[d]	0.12 (−0.80/1.04)[i]
Reduction of IADL (males) at 30 days ($n = 196$)	−0.30 (0.92)	−0.44 (0.96)	–	.30[d]	0.04 (−0.44/0.52)[i]
Reduction of IADL (males) at 90 days ($n = 178$)	−0.24 (1.05)	−0.67 (1.14)	–	.010[d]	0.21 (−0.90/1.32)[i]
Reduction of IADL (females) at 30 days ($n = 297$)	−0.45 (1.21)	−0.63 (1.38)	–	0.23[d]	−0.21 (−0.97/0.54)[i]
Reduction of IADL (females) at 90 days ($n = 295$)	−0.62 (1.49)	−0.99 (1.67)	–	0.047[d]	0.06 (−0.12/0.25)[i]

In all multivariable models, adjustments were made for age, sex, living arrangement, polypharmacy, status, ADL score at ED index access, 4AT score at ED index access, Charlson Comorbidity Index at ED index access, Rockwood score at ED index access, falls in the previous 12 months, locomotion, and reason for ED access. In the models at 30 and 90 days, the ED index access outcome (admitted/discharged) was added. [a]Percentages were calculated using as the denominator the number of participants not assigned to the hospital ward. [b]Percentages were calculated using as the denominator the number of participants not assigned to the hospital ward and not hospitalized within 30 days. [c]Chi-square test [d]*t*-test for independent populations [e]Effect of CGA team vs. usual care [f]Multivariable logistic regression, odds ratio (95% CI) [g]Multivariable Firth's logistic regression, odds ratio (95% CI) [h]Multivariable Cox regression, hazard ratio (95% CI) [i]Multivariable linear regression, linear coefficient (95% CI)

significantly (log-rank test, $P = .17$). The initial multiple Cox model did not satisfy the proportional hazards assumption, specifically due to CFS, ADL score and reason for index ED visit, which were subsequently included in the model as strata. The final Cox model (Table 3) showed that the geriatric team intervention group had a significantly lower risk of mortality: HR = 0.72 (95% CI, 0.53 to 0.98; $P = .037$).

Functional loss was lower among participants in the geriatric team intervention group (Table 2); in particular, all scales measured at 90 days (ADL, IADL for males and for females) showed a significant unadjusted difference compared to the usual care group. However, multivariable analyses attenuated these differences and rendered them not statistically significant, estimating low positive differences in functional outcome for participants in the geriatric team intervention group (i.e. a smaller decrease in functionality from the baseline), except for the males' IADL at 30 days.

The median LOS during the ED index access was overall longer among participants in the intervention group (16.5 vs. 14.5 hours, $P = .101$). This was observed especially for those who were admitted after accessing the ED in a diurnal time (26 vs. 16 hours). Notably, the median LOS was 8 hours regardless of the study arm for participants discharged without being held in the ED for further checks, which account for the majority of those seen by the GT (182/314, 58.0%). Compared to those treated with usual care, LOS was longer for older adults in the GT study arm who were admitted and who were held for further checks without leaving the ED (see Appendix 4 in the Supplementary Data).

Among participants seen by the GT and discharged home at the ED index access, 165/271 (60.9%) had at least one intervention activated, with an average of 1.45 services.

Table 3. Multiple Cox regression of 90-day mortality.

Covariate	Hazard ratio (95% CI)	P value
CGA team	0.72 (0.53 to 0.98)	.037
Hospital admission at ED index access	1.20 (0.99 to 1.45)	.055
Age (5 years)	1.07 (1.04 to 1.10)	<.001
Males	1.08 (0.79 to 1.47)	.63
Lives alone	1.08 (0.38 to 3.04)	.89
Polypharmacy	0.81 (0.48 to 1.37)	.44
Status at ED index access		
Lives in a facility	1.00 (0.79 to 1.26)	.97
Lives at home with services	1.18 (0.67 to 2.06)	.57
Lives at home without services	Ref.	
4AT score classes		
Delirium or severe cognitive impairment unlikely	Ref.	
Possible cognitive impairment	1.43 (0.81 to 2.51)	.22
Possible delirium +/− cognitive impairment	2.04 (0.76 to 5.48)	.16
Charlson Comorbidity Index	1.25 (1.06 to 1.47)	.008
Fallen at least once	0.93 (0.68 to 1.28)	.66
Deambulation		
Independent without walking aids	Ref.	
With aids	0.92 (0.31 to 2.78)	.88
Does not deambulate	1.96 (1.13 to 3.41)	.017

This model also includes variables reporting the Rockwood score, ADL score and reason for ED index access that were used as strata.

The most frequently intervention (see Appendix 5 in the Supplementary Data) was counselling on the service network ($n = 103$, 38.0%), followed by activation of community health services ($n = 83$, 30.6%) and referral to social services ($n = 68$, 25.1%).

The analysis of transitions between states (Figure 2) showed that a similar number of older adults required

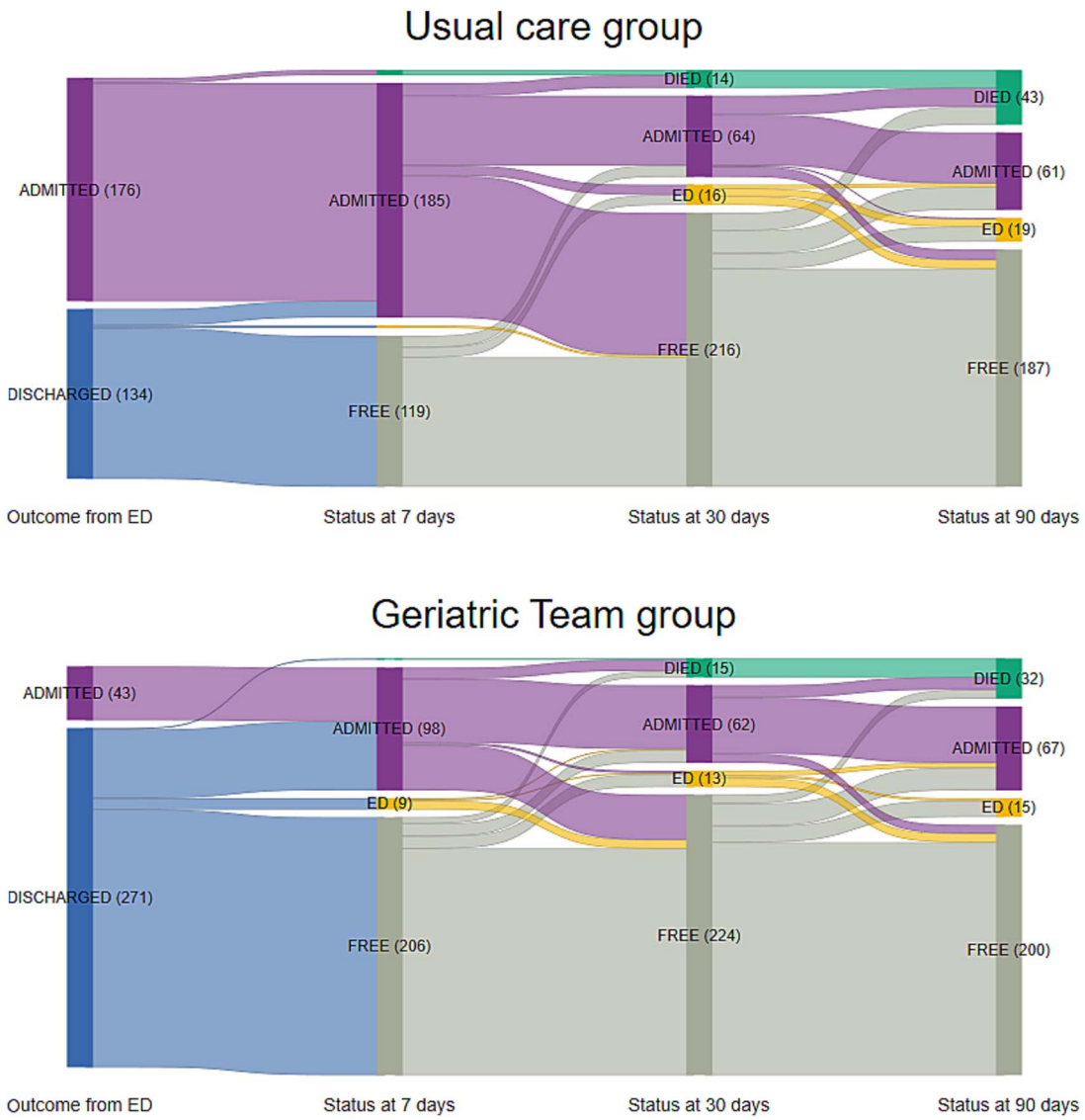


Figure 2. Alluvial plot: analysis of the participants' transition between health states.

hospitalisation or ED readmission at 30 and 90 days in both groups, while a larger number of event-free participants was present in the geriatric team intervention group at all times, thus highlighting an unnecessary number of hospitalisations at the index ED visit in the usual care group.

Discussion

In this multicentre randomised trial, front-door management by a dedicated multiprofessional geriatric team in the ED was associated with a striking, four-fold reduction in hospital admissions among older adults with frailty (13.7% with geriatric team intervention vs. 56.8% with usual-care). Early return to the ED within 30 days was numerically lower among older adults managed by the geriatric team compared with usual-care (5.9% vs. 9.5%). Furthermore, the intervention group exhibited preserved functional decline at both 30 and 90 days. Notably, all-cause 90-day mortality was lower in the intervention group, indicating that avoidance of hospital admission did not compromise outcomes and may have contributed to improved survival.

These findings demonstrate that embedding a multiprofessional geriatric team within the ED provides a safe and effective strategy to redirect a substantial portion of hospital admissions toward coordinated transitions to home or intermediate care. This approach did not increase short-term readmissions and helped preserve functional independence, and strengthened continuity between acute and community settings.

Although two decades of observational reports and small trials [5, 11, 35, 50, 51] have suggested that multidisciplinary geriatric input may reduce escalation of care from the ED, meta-analyses have reported modest and heterogeneous effects on admission rates, with uncertain impact on

functional outcomes or return visits [8, 52, 53]. The GerED-21 trial advances these evidences in several ways. First, the reduction in index admissions was substantially larger than previously reported, likely due to rigorous participants selection and a proactive 'front-door' model in which geriatric evaluation occurred immediately upon ED arrival. Second, the 90-day follow-up, demonstrated preserved functional status without a compensatory increase in new hospitalisations, addressing concerns that early discharge might lead to repeated ED visits and hospitalisations. Third, randomisation by calendar week, rather than by individual, minimised contamination, and preserved real-world feasibility across varying levels of ED crowding and seasonal fluctuations.

The geriatric team implemented two complementary frameworks: the evidence-based 5Ms (what Matters to me, Medication, Mentation, Mobility, Multimorbidity) [54] and transitional care. CGA clarified goals and facilitated timely dispositions to home health services, intermediate-care facilities or multimorbidity pathways, often before ED boarding. Real-time collaboration with emergency physicians supported by the co-design of the protocol and visible endorsement from departmental leadership, helped overcome the cultural barriers that had hindered previous attempts.

From the perspective of older adults, it is crucial to avoid unnecessary hospital admissions, as they are strongly associated with functional decline, delirium, nosocomial infections and mortality. Although the study endpoints are mostly process outcomes, our findings suggest that the underlying person-centred CGA intervention translated into clinically meaningful benefits. By supporting more appropriate decision-making and enabling tailored care pathways, the intervention not only reduced unnecessary admissions but was also associated with improved functional trajectories and more favourable mortality patterns.

In our study, overall emergency department length of stay was high in both groups and slightly longer in the intervention group. By contrast, most older adults discharged by the geriatric team did not undergo further diagnostic work-up and had LOS comparable to usual care. This pattern suggests that the intervention may have introduced a more stratified approach to decision-making: individuals with lower complexity were managed efficiently without prolonging ED stay, whereas those requiring further detailed assessment received a more comprehensive evaluation, which naturally entailed additional time. Rather than indicating inefficiency, these differences may reflect the intended function of the geriatric team—namely, to support more deliberate and individualised clinical decisions for older adults with frailty. In this context, a slightly longer LOS for selected patients may represent an acceptable trade-off if it contributes to safer dispositions and more appropriate care pathways. Future studies should explore operational strategies, such as dedicated frailty units adjacent to the ED, that could preserve the benefits of comprehensive geriatric input while mitigating potential delays in patient flow.

Although this finding contrasts with studies primarily designed to reduce ED waiting times [36], it should be interpreted in light of our different objective: to ensure appropriate admission or safe discharge for older adults.

Reducing unnecessary admissions—by up to 43%—has the potential to lower healthcare costs and improve outcomes for older adults, highlighting the value of models that optimise decision-making at the front door of the ED. Within this framework, the GerED-21 intervention required the redeployment of geriatricians, transitional care nurses and social workers to the ED, meaning that its implementation in routine practice depends on integrating dedicated, trained personnel into emergency workflows. Despite this requirement, the model shows high scalability: it builds on community resources already available in most high-income countries and was successfully experimented across three hospitals with different staffing structures and electronic health record systems. Notably, only 6 months were needed for staff training and workflow integration, indicating that the organisational adjustments required can be achieved within standard operational processes.

This study has some limitations that may influence the model's feasibility in real-world settings. First, the protocol allowed only a small number of weekly enrolments at each site. While this ensured consistent delivery of the intervention, it also constrained the geriatric team's ability to identify all eligible older adults and limits the assessment of the model's real-world feasibility, particularly in EDs with higher patient volumes and more variable operational pressures. Second, randomisation by calendar week introduced predictable allocation patterns; however, we consider the impact on internal validity to be minimal, given the overall balance of baseline characteristics and the direction of the observed imbalance. Finally, the protocol did not include a cost analysis related to personnel or community-based interventions, precluding a formal cost-effectiveness evaluation. Nonetheless, considering the average cost of hospitalisation in this age group, the reduction in admissions observed in this study is likely to translate into substantial savings for the healthcare system.

Conclusions

In this multicentre study, the implementation of a front-door multiprofessional geriatric team significantly reduced hospital admissions among older adults with frailty by more than four-fold, while preserving their functional status. Importantly, this intervention did not lead to increased short-term mortality or ED revisits and new admissions. By relieving pressure on inpatient services, the multiprofessional geriatric team integration into emergency department workflows may represent a scalable strategy for health systems facing demographic shifts and rising demand for age-sensitive care.

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