Evaluation of first Older People's Emergency Department in England – a retrospective cohort study

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Abstract

Background

The complexity of older patients along with trends in poorer outcomes in the Emergency Department has prompted research into how Emergency Departments can adapt to meet the needs of an ageing population. A separate Older People's Emergency Department has been proposed to improve care at the front door.

Objective

Compare patient flow in a dedicated Older People's Emergency Department at a University Hospital in Norfolk, United Kingdom, against that of the main Emergency Department.

Methods

We carried out a retrospective cohort study to compare older patients attending the Emergency Department in 2019 against those attending the newly-formed Older People's Emergency Department service in 2020.

Multivariable logistic regression was performed to estimate adjusted odds ratios (emergency admissions, meeting England's four-hour national target, re-admissions, all-cause 30-day mortality, clinical frailty screening, and discharge to original place of residence).

Results

Clinical assessment in the Older People's Emergency Department did not significantly lower the proportion of patients admitted to hospital (aOR 0.84 (95% CI 0.61-1.16). There were significant reductions in overall time spent in the department, time to initial clinician review and time to frailty screening. Patients seen in the Older People's Emergency Department were more likely to meet the national four-hour target and more likely to be discharged to their original place of residence.

Conclusions

Assessment in the Older People's Emergency Department was not associated with a significantly reduced likelihood of hospitalisation. However, patients had a shorter wait for clinical assessment with concomitant reduction in department length of stay.

Key words: frailty, older people, emergency department

Introduction

The reality of an ageing population and surging need for healthcare is upon us(1-3) . Recent statistics show that 18.6% of the UK population is aged ≥65 years, and 40% of them have a limiting chronic illness (4, 5). Older patients, especially those with frailty, have an increased risk of emergency admissions, extended wait times and longer inpatient stays compared to younger patients (6) (7).

The complexity of older patients along with trends in poorer outcomes in the emergency department (ED) has prompted research into how EDs can adapt to meet the needs of our changing society. The concept of a separate Older People's Emergency Department (OPED) has been proposed as a means to improve care at the front door. It includes adaptations in staffing, physical infrastructure, and care delivery interventions, all of which aims to combine multidisciplinary staffing and early frailty assessment within an environment tailored to benefit older frail patients. Studies from the US and Italy evaluating OPEDs have been published over the last 15 years.

The [blinded for review] in England provides a full range of acute clinical services with over 1200 acute beds. It provides care for over 820000 people from Norfolk and neighbouring counties. Between 2015-2020 the hospital has seen ED attendances in the over 80s increase by 35%, accounting for nearly 20% of total emergency attendances (8).

In 2016, [blinded for review] recognised the need to identify frail patients who would benefit from multi-disciplinary team and comprehensive geriatric assessments at the front door. This early work resulted in reduced admissions, shorter length of stays for those who were admitted and more older patients were able to be discharged to their original place of residence (8). As a result of this early success, in 2017, [blinded for review] formed the first OPED in England operating initially five days per week between 2017-2019, and then seven

days per week from 2020. [blinded for review] OPED staff consists of Advanced Clinical Practitioners, Community Access Team, Nurses, Geriatricians and junior doctors.

Patients over 80 are taken straight to OPED where they are assessed by team of geriatricians and advanced clinical practitioners specialising in the care of older people. There are a few conditions where older patients are immediately directed to the hospital's surgical or interventional procedures pathways rather than OPED. These pathways cover patients with clinical presentations such as myocardial infarction requiring primary percutaneous coronary intervention, stroke, acute abdomen, serious head injury, as well as anyone needing immediate resuscitative measures. Patients with 'walk-in' ambulatory minor illnesses or injuries (ie not a medical emergency) are seen separately in a 'Minors' unit which are not included in our analysis.

The multi-disciplinary team are also supported by the Community Access Team who can arrange packages of care or home visits, if needed. The specific aims of [blinded for review] OPED include plans for patients to be seen by a clinician within one hour, a consultant within two hours, comprehensive geriatric assessment (CGA) within two hours, and finally to avoid admission where possible.

Here, the CGA aims to serve as a "multi-dimensional, multi-disciplinary diagnostic and therapeutic process conducted to determine the medical, mental, and functional problems of older people with frailty so that a co-ordinated and integrated plan for treatment and follow-up can be developed" (9). We chose to implement CGA as one aspect of our OPED because there is evidence suggesting that older patients are more likely to be alive and in their own homes at 3-12 months follow-up if they received CGA on admission to hospital (9).

In addition to providing earlier access to specialists, the unit was designed to improve patient experiences - natural lighting, orientation aids, large print signs and large clocks all introduced with the aim of reducing confusion in patients with delirium and dementia (8). Each trolley has seats next to them, to facilitate assessments and enable transfers to a chair for comfort. Older people are assessed in a more quiet and calmer area of the hospital, in contrast to the busy and often noisy main ED.

On average the number of patients seen in OPED each month pre-Covid was 500. At the time of the study, [blinded for review] OPED consisted of six trollies, including two side rooms, and three bathrooms within easy access for patients. In addition, there is a separate private room to facilitate conversations between relatives and staff.

At weekends in OPED, there is one consultant and two Advanced Clinical Practitioners, (allied health professionals, typically from nursing or therapist backgrounds having completed a three-year training course). Some weekends there can also be a junior doctor working on OPED.

In 2019-20, the main ED saw approximately 130,000 patients. The entire staffing includes up to 15 consultants and more than a dozen junior doctors and non-medical Advanced Clinical Practitioners, although the day-to-day and weekend staff numbers fluctuate for all levels of healthcare professionals.

Initial studies evaluating the efficacy of OPED have been promising - rapid triage and assessment, implementation of management plans within four hours and increased CGA implementation compared to main ED (10) (11). However, these studies have been small in scale and lacking effective comparison groups. Other studies evaluating similar OPEDs were performed outside the United Kingdom (12) (13) (14) (15) (16). The need for UK-based

evaluative research has been highlighted as highly important, with The Royal College of Emergency Medicine and The James Lind Alliance identifying this as the second most important research topic currently in the emergency medicine field (17).

Our study seeks to address the research gap by evaluating the first OPED in England.

Methods

We performed a retrospective cohort study (historical control design) covering patients attending the [blinded for review] Emergency Department.

Data source

We used electronic health records and clinical workflow tracking systems to establish timing and sequence of events from the time of arrival in the ED.

This research was officially registered as a service evaluation with the trust before data collection commenced. All data collected was anonymised and stored in a password protected Microsoft Excel spreadsheet on an [blinded for review] computer. This was a retrospective non-interventional study evaluating service provision. Therefore, no Research Ethics permission was required.

Participants

The cohort consisted of two separate sets of patients aged 80 and older attending [blinded for review] ED on Saturdays and Sundays between 0900h and 1700h in the following months:

- Randomly selected Historical controls: 1 July 2019 to 1 November 2019 seen by any ED clinician.
- OPED Intervention: 1 July 2020 to 1 November 2020 seen by OPED staff.

OPED was run weekdays only between, 2017 and 2020, but was subsequently expanded to cover weekends. This gave us the opportunity to use a 'historical control' design for the weekends in the initial time period of 2019 (prior to existence of weekend OPED service) as compared to weekends in the second time period (2020) when OPED became available. Patients were excluded from the study if they self-discharged from either department or were triaged to minors (see and treat area for minor injuries or illnesses).

Exposures and outcomes

The intervention was treatment in [blinded for review] OPED. Patients who are ≥80 years of age and who seek healthcare through the [blinded for review] emergency service are directed to OPED (a separate area from main ED) for a multi-disciplinary team assessment consisting of care of the older people specialists and the community access team.

The control group was standard care in main ED (Majors and Resus), where patients are assessed by emergency medicine clinicians, Consultants and nurses, without first-line direct access to geriatricians or completion of CGA for older frail patients.

[blinded for review] main ED consisted of three main areas at the time of study:

- Minors: 'see and treat' area for minor illnesses and injuries.
- Majors: 17-bed trolley bay.
- Resus: 4-bed room with cardiac resus bays. This area is for any patient that deteriorates in the department or has been pre-alerted by the ambulance crew.

Primary outcome

Proportion of patients admitted to hospital.

Secondary Outcomes

- Completion of the 4-hour waiting time target.
- Re-attendance to the department within 7 and 30 days of initial attendance.

- Separate admission to hospital within 7 and 30 days of initial attendance.
- All-cause mortality within 30 days of initial attendance.
- Completion of frailty screening.
- Discharge of patient to their original place of residence.
- Total time spent in the department (minutes).
- Time to initial assessment (minutes).
- Time to initial clinician (minutes).
- Time to frailty screening (minutes).
- Inpatient length of stay (days).

Covariates

We extracted information on a range of patient characteristics, including age, gender, dementia diagnosis, delirium, type of admission, admission from a care home, frailty. Covariates were measured at time of attending [blinded for review] emergency services. As this is a historical control study, there is a possibility of confounding due to changes in diseases burden during the study period July-October 2020, i.e. COVID-19 pandemic period. We extracted information on the number of daily COVID-19 admissions (7-day average rolling rate) to our hospital during the study period to determine the COVID-19-related burden (Supplemental Figure 1).

Statistical analysis

Demographic data was summarised using descriptive statistics.

For categorical outcomes, multivariable logistic regression was performed to produce adjusted odds ratios and 95% confidence intervals. A Hosmer and Lemeshow Test was performed to assess the model of fit for each regression. Adjustments were made for pre-specified variables including age, sex, type of admission, department, and indicators of

frailty (admission from care home, dementia diagnosis, delirium/acute confusion diagnosis, number of non-elective hospital admissions in previous 12 months and identified as potentially frail during clinical frailty screening).

Continuous outcomes were assessed using the Mann Whitney Test and the effect size calculated using the Eta Squared Test.

Missing data

The number and percentage of missing data for each variable is presented in Supplemental Table S1. Variables with more than 10% overall missing data were omitted from analysis and all regression models in accordance with the recommendations of Bennet (18). The exception to this rule is inpatient length of stay due to the nature of the outcome, with only those being admitted having values.

NEWS 2 scores were excluded from the adjusted analysis due to the high percentage of missing data (48.3%), especially in the main ED cohort (87.2%).

Results

For the control group, 1067 potential patients were initially identified, of which 313 minors patients were excluded, resulting in a total 754 main ED patients. In the intervention group 379 OPED patients were identified.

We used the Microsoft Excel randomiser function to randomly select eligible participants from the 754 initially identified 'historical controls' attending main ED. Main ED patients were systematically reviewed, and we excluded patients who received potentially over-lapping care involving both main ED and OPED during their hospital attendance (n=204). We eventually constructed two groups of similar sample sizes. Five OPED patients were excluded according to the exclusion criteria, resulting in 374 patients in both the

intervention and the control group, with a total of 748 patients included in the study (Figure 1). Patient demographics are presented in Table 1.

The OPED cohort were on average one year older than the main ED cohort (mean age, 87.5 years vs. 86.5 years). The OPED cohort included a larger number of patients with delirium (15.1%) and dementia (25%) compared to main ED (6.4% and 23%, respectively).

The OPED cohort included more patients identified as potentially frail using Clinical Frailty Screening (CFS) (89.8%) compared to main ED (88.0%). Overall, this is a much higher proportion than the national average of 65% in those aged 90 years and older (4). Most patients seen by both departments were majors' admissions (92.2%); however, main ED saw more patients in resus (11%) compared to OPED (4.5%).

The remaining demographic variables were equally distributed between both groups.

Supplemental Figure 1 illustrates the seven-day average COVID-19 admissions to our hospital for the relevant time period in the year 2020 (19). We extracted the seven-day-average daily COVID-19 admissions for the 17 weeks of our study, and were able to confirm that there the seven-day average showed less than one COVID-19 admission per day for 15 of the 17 weeks. Furthermore, there were eight weeks during our study period when the seven-day average for COVID-19 admissions was zero. This is corroborated by the evidence that we had no COVID-19 inpatients for a long, almost continuous stretch between 10 July and 3 Sep 2020 (other than for one day in August 2020 when one patient was hospitalised), thus confirming almost negligible COVID-19 workload during our study period (19).

The results from the adjusted analysis for the effect of OPED on outcomes are summarised in Table 2. There were proportionally fewer admissions from [blinded for review] OPED (172/373; 46.1%) as compared to main ED (187/372; 50.3%), although this difference was not statistically significant (aOR 0.84, 95% CI, 0.61-1.16).

OPED met the four-hour national target more (230/373; 61.7%) than main ED (139/374, 37.2%). This difference was statistically significant with an aOR of 3.13 (95% CI 2.29-4.29). OPED also discharged more patients to their original place of residence (323/374; 86.4%) compared to main ED (304/374; 81.3%), which was also statistically significant with an aOR 1.57(95% CI, 1.02-2.41).

OPED had a higher rate of re-attendance within seven days of initial admission (29/343; 7.8%) compared to main ED (24/372; 6.5%). This difference was not statistically significant - aOR 1.12 (95% CI, 0.63-2.01).

All-cause mortality rate at 30 days was similar for both departments, with OPED having a mortality rate of 7.2% (25/346) compared to main ED of 7.3% (24/330). This difference was not statistically significant (aOR 1.03, 95% CI, 0.54-2.00).

Continuous outcomes are summarised in Table 3. The median total time spent in the department for main ED was 297 minutes compared to 234 minutes for those admitted to OPED (just below the national four-hour target). The patients seen in [blinded for review] OPED spent significantly less time in the department than those seen in main ED ($p<0.001$). The median time to initial clinician assessment in minutes was significantly lower in the OPED cohort (72 minutes) compared to main ED (147 minutes) with an associated p-value of <0.001.

More patients were screened for frailty using the CFS in the OPED (371/373; 99.5%) compared to main ED (343/374; 91.7%) although this difference was not statistically significant (aOR 3.73, 95% CI, 0.71-19.58).

Discussion

This retrospective cohort study seeks to contribute to addressing the need for UK-based evaluative research of Older People's Emergency Departments.

[blinded for review] OPED was associated with a modest reduction in patients being admitted to hospital as compared to main ED (46.1% conversion rate compared to 50.3%). Whilst this finding is not statistically significant (aOR 0.84 (95% CI 0.61-1.16), it is still a noteworthy signal as reduction in emergency admissions has been found to be associated with increased ED efficiency and a reduction in mortality, resource use and functional decline in older patients (20) (21) (22) (23) (24) (25).

We have demonstrated that patients seen in [blinded for review] OPED, an environmentally modified area of the ED led by Consultant Geriatricians, were three times more likely to meet the four-hour national target compared to those seen in main ED. This is an important finding, as increased wait times are associated with increased inpatient length of stay, mortality, hospital admissions and functional decline in those with cognitive impairment due to a lack of optimised environment for older patients (26) (27) (28) (29). Increased completion of the four-hour target is also beneficial on a wider scale; with ED wait times often being used as a barometer for trust performance and the NHS as a whole. Reducing overcrowding is also beneficial for staff, reducing the chance of burnout which could improve the depleted staffing levels we are seeing in the field, often perpetuating the delays in treatment (30).

OPED also discharged significantly more patients to their original place of residence. In a national audit focused on older patient discharges, the need for assessment and rehabilitation of older people in their own homes was emphasised (31). Discharging more

patients back to their homes in a “discharge to assess” manner, allows for a reduction in ED crowding alongside reduced risks to the patient through unnecessary time spent in hospital. It is currently estimated that £820 million is spent on caring for older patients in hospital that could be cared for at home (31).

[blinded for review] OPED may be associated with a slight decrease in mortality rate at 30 days compared to main ED, but this was not a statistically significant finding. Although Salvi et al’s Italian OPED evaluation 15 years ago reported a statistically significant lower mortality rate in patients seen in OPED (15), we are not aware of other studies evaluating an OPED to have reported mortality as an outcome. This is primarily due to the lack of long-term follow-up and patient-centred outcomes included in the literature.

Limitations

As with all retrospective data, the quality of the results is dependent on historical hospital records. The amount of missing data is reflected by the large number of NEWS 2 scores not recorded in the main ED cohort (87.2%) and therefore, we were unable to adjust for patient severity as intended due to the large proportion of missing NEWS 2 data. We cannot ignore historical bias in unmeasured events outside of main ED and OPED the most notable of which was the COVID-19 pandemic. Although COVID-19 incidence was relatively low between July and October 2020, measures were taken to minimise this impact, with data collection taking place during a period of restriction easing and outside of a national lockdown to try and collect the most representative sample possible.

Whilst the effect of emergency admissions for COVID-19 would be a major confounder if the event rate (admissions for COVID-19) was high, this was clearly not the case during our study period as the COVID-19 workload was negligible with a rolling average rate of less than one admission per day for the vast majority of the weeks evaluated.

The lack of statistical significance in several outcomes such as proportion of admissions, readmission rates and re-attendance outcomes may be due to lack of power to assess these specific outcomes, thus causing imprecision and uncertainty regarding the true direction of effect, if any.

Unfortunately, we do not have data on whether any of the OPED patients required higher level care as part of their patient journey following admission to the hospital ward. We believe that such data would be extremely difficult to interpret because of major confounding factors such as the agreed ceiling of care during shared decision-making between the healthcare team and individual patient/ carers. This includes advanced directives (such as the Recommended Summary Plan for Emergency Care and Treatment form in England) and do-not-attempt cardiopulmonary resuscitation decisions.

At this point in time, the data is more applicable to countries that have a predominantly public funded healthcare system. We recognise the need for much more detailed research in other healthcare settings that have a different mix of patients and providers.

A larger, prospective study, allowing for inclusion of patient recorded outcome measures and long-term follow-up, will be required to further evaluate [blinded for review] OPED.

There is also an indication for qualitative evaluations to assess patient and staff views to explore the acceptability of [blinded for review] OPED, an area that is severely lacking in the current body of research. Of ultimate benefit would be a feasibility study that evaluates the practicality of implementing an OPED intervention in multiple centres alongside cost-effectiveness analysis which has been absent in studies to date. This would enable a multi-centre cluster randomised trial to be conducted, evaluating the OPED experimentally and providing definitive data on this intervention.

Conclusions and implications

[blinded for review] OPED is associated with significantly reduced department wait times, time to clinician and frailty assessment and increased discharge of patients to their original place of residence. Future work should focus on larger cohort studies allowing for inclusion of patient recorded outcome measures and long-term follow-up. Separate qualitative studies evaluations to assess patient and staff views exploring the acceptability of an OPED are also needed.

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Article Summary

1) **Why is this topic important?** The complexity of older patients along with trends in poorer outcomes in the emergency department (ED) has prompted research into how EDs can adapt to meet the needs of an ageing population. A separate Older People's Emergency Department (OPED) has been proposed to improve care at the front door.
2) **What does this study attempt to show?** Our study seeks to evaluate the first OPED in England by comparing patient flow in England's first OPED against that of the main ED prior to the initiation of the OPED service.
3) **What are the key findings?** Assessment in the Older People's Emergency Department was not associated with a significantly reduced likelihood of hospitalisation. However, patients had a shorter wait for clinical assessment with a concomitant reduction of time spent in the emergency rooms.
4) **How is patient care impacted?** A dedicated service in the Emergency Department can shorten the waiting times for clinical assessment of older people, but it is not clear that this leads to any downstream benefits in reducing likelihood of hospital admission for older patients.

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Table 1 Baseline Characteristics

	Total (n=748)	Main ED (n=374)	OPED (n=374)
Age (y), mean (SD)	87.0 (4.74)	86.5 (4.41)	87.5 (4.70)
NEWS 2 score (0-20), median (IQR)	1.0 (3)	1.0 (4)	1.0 (3)
Number of Non-Elective Hospital Admissions in Previous 12 Months, median (IQR)	0.0 (1)	0.0 (1)	0.0 (1)
Gender, n (%)			
Male	309 (41.3)	156 (41.7)	153 (40.9)
Female	439 (58.7)	218 (58.3)	221 (59.1)
Type of Admission, n (%)			
Majors	690 (92.2)	333 (89.0)	357 (95.5)
Resus	58 (7.8)	41 (11.0)	17 (4.5)
Admitted from Care Home or Acute Medical Service, n (%)			
Yes	154 (20.7)	77 (20.7)	77 (20.8)
No	589 (79.3)	295 (79.3)	294 (79.2)
Dementia Diagnosis, n (%)			
Yes	179 (24.0)	86 (23.0)	93 (25.0)
No	567 (76.0)	288 (77.0)	279 (75.0)
Acute Confusion or Delirium Diagnosis, n (%)			
Yes	80 (10.7)	24 (6.4)	56 (15.1)
No	666 (89.3)	350 (93.6)	316 (84.9)
Identified as Potentially Frail, n (%)			
Yes	644 (89.0)	309 (88.0)	335 (89.8)
No	80 (11.0)	42 (12.0)	38 (10.2)

Abbreviations: SD=Standard Deviation, IQR=Inter-Quartile Range, n(%)=number and percentage, NEWS 2=New Early Warning Score 2, OPED=Older People's Emergency Department

Table 2 effect of OPED in assessing patients 80 and older

	Number of events n (%)		aOR (95% CI)
	Main ED Patients (n=374) Referent group	OPED Patients (n=374)	
Outcomes			
Emergency Admissions	187 (50.3)	172 (46.1)	0.84 (0.61-1.16)
4-hour target completion	139 (37.2)	230 (61.7)	3.13 (2.29-4.29)
Re-attendance within 7 days	24 (6.5)	29 (7.8)	1.12 (0.63-2.01)
Re-attendance within 30 days	41 (11.0)	56 (15.0)	1.37 (0.87-2.16)
Re-admission within 7 days	9 (2.4)	19 (5.1)	2.06 (0.88-4.86)
Re-admission within 30 days	21 (5.6)	36 (9.7)	1.64 (0.90-3.00)
All-cause mortality within 30 days	24 (7.3)	25 (7.2)	1.03 (0.54-2.00)
CGA Completion	343 (91.7)	371 (99.5)	3.73 (0.71-19.58)
Discharged to original place of residence	304 (81.3)	323 (86.4)	1.57 (1.02-2.41)

The model for all outcomes was adjusted for age, sex, type of admission, department, admission from care home, dementia diagnosis, delirium/acute confusion diagnosis, no. of non-elective hospital admission in previous 12 months and identified as potentially frail via Clinical Frailty Screen assessment. 95% CI= 95% confidence interval, aOR= adjusted Odds Ratio, CGA=Comprehensive Geriatric Assessment, ED= Emergency Department, OPED=Older People's Emergency Department

Table 3 Continuous outcomes significance and effect size in relation to department

	Median (IQR)		p value	Effect size
	Main ED Patients (n=374)	OPED Patients (n=374)		
Outcomes				
Time spent in department (minutes)	297 (217,396)	234 (186,336)	<0.001	-0.194
Time to initial assessment (minutes)	13 (3,23)	14 (6,20)	0.908	-0.004
Time to initial clinician (minutes)	147 (78,209)	72 (38,126)	<0.001	-0.333
Inpatient length of stay (days)	5 (2,11)	4 (2,11)	0.140	-0.078
Time to frailty assessment (minutes)	75 (34,118)	34 (24,51)	<0.001	-0.376

Mann Whitney Test used due to test for normality not being satisfied ($p<0.001$ Shapiro Wilk test)
Eta squared Test used to determine effect size from Mann Whitney Test

ED= Emergency Department, OPED=Older People's Emergency Department, IQR=inter-quartile range

Figure 1 Study cohort