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# Evaluation of a training program for emergency medical service physician dispatchers to reduce emergency departments visits

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## Abstract

**Background:** Emergency Departments (ED) have seen an increasing number of older patients who are mostly referred following a call to the Emergency Medical Services (EMS). Long waiting times in settings, which are not designed to meet older patients' needs, may increase the risk of hospital-acquired complications. Unnecessary visits should therefore be avoided as much as possible. The objective of the study was to evaluate whether a program to provide geriatric knowledge and tools to the dispatching physicians of the EMS could decrease ED referrals of older patients.

## Methods

**Design:** Before-and-after study with two 6-month periods before and after intervention.

**Participants:** All calls received by a dispatching physician of the Rhône EMS from 8 am to 6 pm concerning patients aged 75 years or above during the study period.

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**Intervention:** A program consisting of training dispatching physicians in the specific care of older patients and the developing, with a multidisciplinary team, of specific tools for dispatching physicians.

**Outcome:** Proportion of ED referrals of patients aged 75 years or above after a call to the EMS.

**Results:** A total of 2671 calls to the Rhône EMS were included corresponding to 1307 and 1364 patients in the pre-and post-intervention phases, respectively. There was no significant difference in the proportion of referrals to the ED between the pre-intervention (61.7%) and the post-intervention (62.8%) phases ( $p = 0.57$ ). Contact of the patients with their General Practitioner (GP) in the month preceding the call was associated with a 22% reduced probability of being referred to an ED.

**Conclusions:** No beneficial effect of the intervention was demonstrated. This strategy of intervention is probably not effective enough in such time-constraint environment. Other strategies with a specific parallel dispatching of geriatric calls by geriatricians should be tested to avoid these unnecessary ED referrals.

Trial registration: ClinicalTrials NCT02712450.

#### KEYWORDS

dispatching physicians, emergency department, older, telephone triage

## INTRODUCTION

Older patients are disproportionately represented among those attending emergency departments (ED) in most developed countries, which are faced with major challenges in order to adapt their health systems.<sup>1-3</sup> Patients aged 75 years and above are the age group with the second highest rate of emergency department visits,<sup>3</sup> and it has also been shown that the ED resource use intensity increases with age.<sup>4</sup> The adverse consequences related to overcrowding in the ED include long waiting times, patient dissatisfaction, stressful work environment, as well as effectiveness and safety problems.<sup>5-7</sup> In addition, EDs are not always well adapted to the needs of older patients, which are particularly prone to harmful events related to the long waiting times but also the conditions of the hospitalization that may result from attending the ED.<sup>8,9</sup>

According to the studies and the definition used, visits made by the general population to the ED may be considered as inappropriate in 20%–40% of cases.<sup>1,10</sup> This may include social issues related to difficult home care of patients with loss of functional independence, and ambulatory care sensitive conditions, which are frequent among the older population.<sup>11-13</sup> Difficulties in accessing primary care increase the risk of inappropriate visits.<sup>14</sup> In 2014, a French government report noted a

### Key points

- Emergency department visits have deleterious consequences for older patients; it is therefore important to look for ways to avoid unnecessary visits.
- Providing specific training and tools to assist emergency medical services dispatching physicians with the triage of older patients did not reduce emergency department visits of these patients.
- The very limited call management time is probably a barrier to the efficiency of this type of intervention to optimize geriatric assessment and referral of older patients

### Why does this paper matter?

Improving pre-hospital assessment of older adults is recognized as a research priority by most geriatric societies. These negative results suggest that providing dispatching physicians with appropriate training and tools might not be an effective strategy.

continuous increase in the use of hospital emergency services and, at the same time, no increase in the proportion of visits that were followed by a hospitalization.<sup>15</sup> This report highlighted their role in the management of unscheduled care, notably due to the lack of general practitioners (GP) in ambulatory care. By way of consequence, EDs are increasingly diverted from their initial mission, and are often considered as a facilitated entry point into the health care system.<sup>14,16</sup> Emergency and dispatching physicians, therefore, find themselves at the front line, and have a role to play in improving referrals for older patients and reducing avoidable hospitalizations. This requires them to develop their skills with regard to the specificities of the older population.<sup>17</sup>

Interventions to avoid ED visits and provide alternatives for managing patients at home are among the priority research topics identified by international geriatric societies.<sup>18–20</sup> In this respect, prehospital assessment and transportation protocols are key to ensure that patients get access to the best care at the most appropriate point, and that vital information (such as home environment) is handed over correctly and reliably.<sup>21,22</sup>

Emergency Medical Services (EMS), which can easily get overwhelmed, have to respect time constraints in managing situations, which sometimes makes sending patients to the ED appear to be a solution of ease and safety. This may particularly be the case for older patients who have more often multiple comorbidities and loss of autonomy. Older patients are very frequent users of EMS,<sup>23,24</sup> which may be due to difficulties in accessing outpatient and geriatric care pathways, or to a lack of knowledge of possible alternatives to referral to the ED.<sup>4,6</sup>

Telephone triage may alleviate pressure on the ED by redirecting patients with less urgent needs to other, more appropriate care pathways.<sup>5,25,26</sup> However, studies regarding older patients are lacking.<sup>27,28</sup> In a previous observational study, we found that more than half of the calls to the Rhône EMS concerning patients over 75 years of age resulted in a referral to the ED, while among these patients, half (thus a quarter of the total) had a medical reason for the presentation that would have allowed them to be treated as outpatients.<sup>23</sup> Furthermore, we observed that the dispatchers failed to ask some crucial questions to help guide the orientation of older patients' emergency pathway. This included, for example, asking if the patient was autonomous or dependent, if he/she lived alone or with a caregiver, or if he/she had been recently hospitalized. We also observed that dispatching physicians did not use the medical information system to gather information on previous hospital stays, nor did they use alternatives to sending patients to the ED such as calling the patient's GP, the geriatric hotline or the mobile geriatric team.

Based on these findings we set up a working group of geriatricians and dispatching physicians to test a new organization. We hypothesized that an intervention aiming at adapting the process of triage of situations involving older patients at the level of the EMSs (by training dispatching physicians and incorporating specific questions related to geriatric assessment and knowledge of the patient's medical and social context), could improve patient referral and reduce inappropriate ED visits.

The objective of the REGESA study was to evaluate the impact of a training program aimed at EMS dispatching physicians, on the reduction of ED referrals of patients aged 75 years or above.

## METHODS

### Design and population

The present study is a before-and-after study with two 6-month periods: 1 before intervention (January–June 2016) and 1 after intervention (January–June 2017). In France, the EMS receives all emergency calls for health reasons from professionals or patients. The initial call is conducted by a trained dispatcher assistant. He/she then directs the calls considered as extremely urgent and/or vital to an emergency physician and the calls deemed less urgent to a trained dispatching physician who is in general a trained GP. The latter was specifically targeted by the study intervention presented hereafter. Our study focused on the second type of triage, with non-vital and less urgent emergencies (Figure S1). All calls received by a dispatching physician of the Rhône EMS were included if they concerned patients aged 75 or above, and were made by the patient him/herself, his/her family, a health professional (GP, nurse, first aid, home care professional), or following the activation of a medical alarm system for older persons; between 8 am and 6 pm on weekdays (Monday to Friday), in order to correspond to open hours when GP and geriatric services are available.

### Intervention

The description of the planned intervention is guided by the template for intervention description and replication (TIDieR) checklist (Table S2).<sup>29</sup> The REGESA intervention consisted in providing specific training and tools to dispatching physicians to improve their knowledge of the specific aspects of emergency care in older patients and to help them better manage older patients dispatching, notably by gathering specific key information and by using

other pathways than the ED when possible. A multidisciplinary working group was set up, comprising four dispatching GPs, three geriatricians (working in the hospital and participating in the geriatric hotline), an emergency physician, and the study coordination team. This working group met six times between June and October 2016 to co-construct the content of the intervention and its implementation. During this development phase, geriatricians attended call dispatching in pairs with the dispatching GPs to better understand the problems of telephone triage. After the co-construction of the intervention was completed, a first training session was held with all dispatching physicians. This session was divided into two parts: the first part was a training aimed at improving their knowledge of the gerontological network via hotlines and presenting them with a simple guide developed to help them collect specific information when triaging older patients (Figure 1). The second part was organized in the form of role-playing based on concrete cases to teach them how to use the medical information system.

Following this training session, the multidisciplinary working group met with every dispatching physician individually during his/her shift at the Rhône EMS to help them to use the tool developed (Figure 1) and to answer their questions on the use of the medical information system. The number and frequency of contacts with the multidisciplinary working group were defined according to the dispatching GP's needs. The intervention was not modified during the course of the study. A qualitative study in which EMS dispatching GPs were interviewed in

a semi-directive individual interview was carried out after the implementation of the intervention. The purpose of this study was to explore the feelings of dispatching physicians regarding this project and to determine the obstacles to the use of these new tools.<sup>30</sup>

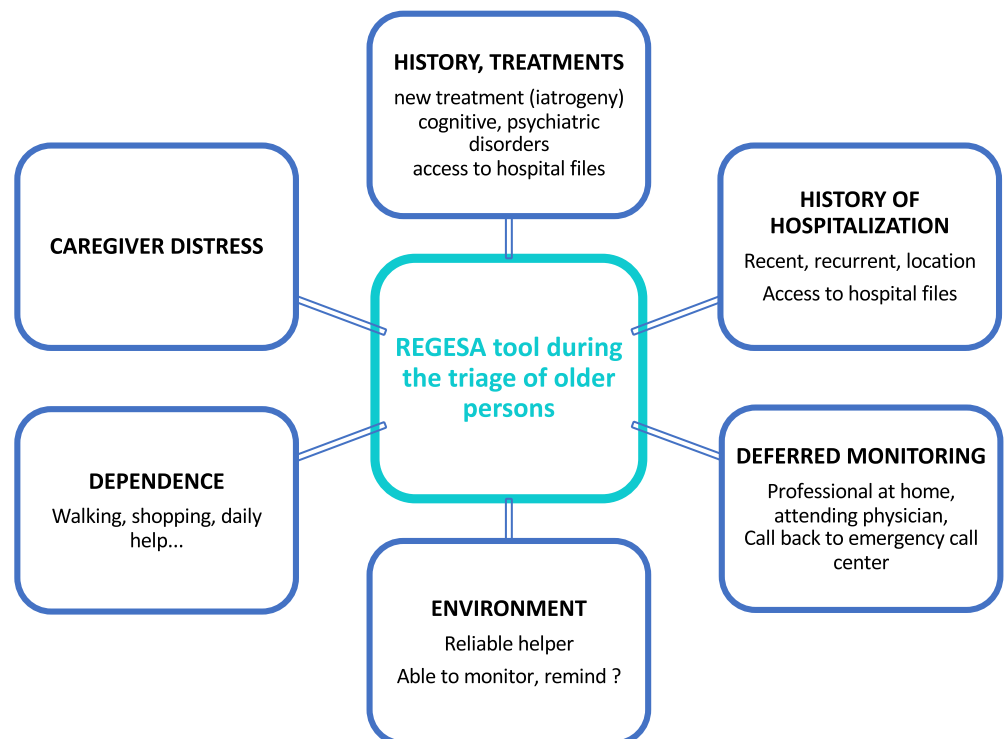
During the “pre-intervention” period, EMS managed calls according to the usual practice. Between the “pre-intervention” and the “post-intervention” period, dispatching physicians of the EMS were trained and had access to the tool developed by the multidisciplinary working group to help them in geriatric dispatching.

## Primary and secondary outcomes

The main outcome of the study was referral of the patient to the ED by the dispatching physician. The appropriateness of ED referral was not assessed. Secondary outcomes included the following: contacts made by the EMS physician to the GP, the geriatric hotline or other professionals; contact of a patient's relative; means of transportation (personal means or private ambulance); hospitalization rate; and GP visit within 7 days of the initial contact with the EMS.

## Data collection

During the pre-intervention and the post-intervention periods, data were collected.



**FIGURE 1** Functional diagram of the emergency medical service.

EMS calls (AppliSAMU software and call listening) by the trained dispatching physician using the REGESA data collection form. Further data were retrieved from the medical records of the institution to which patients were admitted (if applicable), and by a systematic telephone call to the patients or their relatives 7 days after their call to the EMS, in order to obtain information on their consultations and hospitalizations that possibly occurred meanwhile. The following data were collected: Patient characteristics (age, sex, place of living [home, nursing home...], comorbidities, ability to walk independently, number of medications, ED visit or contact with their GP in the previous 3 months); characteristics of the call to the EMS (characteristic of the caller, reason for the call, contacts of the dispatching physician with a relative or healthcare professional during the call [and if applicable which professional], and decided orientation); severity of the clinical situation assessed by means of transportation, and the French national clinical classification of patients in the ED (*Classification Clinique des Malades des Urgences*, CCMU).<sup>31</sup>

## Diversity, equity, and inclusion

In accordance with the current French legislation, no racial or ethnic data was collected. The EMS is the centralized point of call collection, which is free of charge for any citizen. Inclusions reflect the population diversity of the EMS coverage area. All callers (either patients or caregivers) were French-speaking.

## Statistical analyses

The sample size was determined taking into account the structure in clusters of the data with 16 dispatching physicians involved. Based on the results of a previous study carried out in 2012 in the Rhône EMS, the expected proportion of patients 75 years and older referred to the ED during the pre-intervention period was 55%. For an intra-cluster correlation coefficient of 0.15, a bilateral alpha risk of 5%, the inclusion of 60 patients per practitioner in each period would allow to conclude to a statistically significant difference between the two periods with a power of 80%, for an absolute difference of 12%. This corresponds to a total number of patients of 1920 over the two periods. The sample size determination was based on the method of Diggle et al. and implemented using the SAS software, version 9.3.<sup>32</sup>

The characteristics of the patients and of call management and the outcome criteria were described in each period, using the median and the minimum and

maximum values or the mean and standard deviation for quantitative variables, the absolute and relative frequency in each category for qualitative variables. The comparisons between the two periods were carried out using the Student *t* test or Wilcoxon test for quantitative variables and using the chi-square test or Fisher exact test for qualitative variables.

The analysis of the primary outcome, that is, referral to the ED by the dispatching physician was carried out using a mixed logistic regression with a random intercept allowing to take into account the intra-cluster correlation of the outcome. The period was introduced in the model as a fixed effect and the effect of the post-intervention period versus the pre-intervention period was quantified by an odds ratio with its 95% confidence interval (CI). In secondary analyses, adjustments on the characteristics known to be associated with ED referral and significantly associated with ED referral in univariate analyses were carried out. All the analyses were made using the SAS software, version 9.3. The GLIMMIX procedure was used for the mixed logistic models.<sup>33</sup>

## RESULTS

A total of 2671 older patients for whom there was a call to the EMS were included, 1307 in the pre-intervention phase and 1364 patients in the post-intervention phase. The mean age of the patients was 85.4 years and 66.4% were women. The reason for calls was usually of mild to moderate severity according to the CCMU triage category. There was no significant difference in the patient's characteristics between the two periods except that those included in the second period significantly more frequently lived in a nursing home (10.1% vs. 7.5%,  $p = 0.038$ ), and less frequently had cardio-vascular comorbidities (70.5% vs. 75.7%,  $p = 0.011$ ) and had less frequently seen a GP in the previous 3 months (33.4% vs. 39.9%,  $p = 0.004$ ) than those included in the first period. In addition, those included in the second period were more frequently the caller (Table 1).

## Patient orientation

With regards to the main outcome, we found no significant difference in the rate proportion of referral to the ED between the pre-intervention and post-intervention period (crude OR post-intervention period vs. pre-intervention period: 1.07 [95% CI: 0.91–1.26;  $p = 0.43$ ]). There was a difference between the two periods across the different categories of orientation ( $p = 0.02$ ). In particular, more patients were advised to contact their GP during the second period. Concerning means of

TABLE 1 Patient and ECC call characteristics (N = 2671)

		Pre-intervention (N = 1307)	Post-intervention (N = 1364)	p-value
Age	Median age, years (range)	85 (81.0–89.7)	85.5 (80.7–90.0)	
	Mean age, years (SD)	85.3 (5.9)	85.4 (6)	0.692
Sex	Women, n (%)	864 (66.1)	910 (66.7)	0.743
Place of living	Home, n (%)	971 (92.5)	941 (89.9)	0.038
	Nursing home, n (%)	79 (7.5)	106 (10.1)	
	Missing data, n	257	317	
Ability to walk independently (%)		937 (91.1)	934 (91.7)	0.638
Comorbidities	Cognitive impairment, n (%)	413 (41.1)	384 (38.5)	0.254
	Cardio-vascular, n (%)	747 (75.7)	691 (70.5)	0.011
	Respiratory, n (%)	239 (24.4)	200 (20.8)	0.065
	Renal failure, n (%)	167 (17.2)	139 (14.5)	0.119
	Diabetes, n (%)	210 (21.3)	180 (18.7)	0.157
	Cancer, n (%)	191 (19.6)	184 (19.2)	0.863
	Other, n (%)	543 (56.7)	549 (58.0)	0.610
Number of treatments	<3, n (%)	210 (21.4)	233 (24.7)	0.197
	3 or 4, n (%)	214 (21.8)	187 (19.8)	
	≥5, n (%)	556 (56.7)	525 (55.6)	
	Missing data, n	327	419	
ED visit in previous 3 months, n (%)		284 (30.9)	272 (31.2)	0.919
Missing data, n		388	491	
Contact with a GP in previous 3 months, n (%)		380 (39.9)	308 (33.4)	0.004
Missing data, n		355	443	
Caller	Patient, n (%)	201 (15.4)	269 (19.9)	0.0089
	Relative, friend, or other, n (%)	759 (58.1)	741 (54.9)	
	Healthcare professional, n (%)	346 (26.5)	339 (25.1)	
	Missing data, n	1	15	
Reason for the call	“Generally unwell,” n (%)	262 (20.1)	277 (20.4)	0.3782
	Cardio-vascular or respiratory, n (%)	102 (7.8)	114 (8.4)	
	Fall, n (%)	365 (28.0)	373 (27.4)	
	Behavior disorder, n (%)	68 (5.2)	75 (5.5)	
	Urological or digestive, n (%)	195 (14.9)	235 (17.3)	
	Other medical cause, n (%)	313 (24.0)	286 (21.0)	
	Missing data, n	2	4	
CCMU triage category	CCMU P, n (%)	1 (0.2)	1 (0.2)	0.6871
	CCMU 1, n (%)	26 (5.5)	15 (3.3)	
	CCMU 2, n (%)	153 (32.5)	154 (33.8)	
	CCMU 3, n (%)	249 (52.9)	249 (54.6)	
	CCMU 4, n (%)	40 (8.5)	36 (7.9)	
	CCMU 5, n (%)	1 (0.2)	1 (0.2)	
	CCMU D, n (%)	1 (0.2)	0 (0.0)	
	Missing data, n	90	113	

Abbreviations: CCMU, Classification Clinique des Malades des Urgences; ED, emergency departments; GP, general practitioner.

transportation, the proportion of patients referred to the hospital using their personal means was greater in the pre-intervention phase, while private ambulance services were more frequently used in post-intervention (trend  $p$ -value  $<0.0001$ , Table 2).

## Handling of calls to the EMS

The patients' relatives were significantly more frequently involved by the dispatching physician during the call in the pre-intervention period (51.5%) than in the post-intervention period (44.2%,  $p = 0.0007$ ). The dispatching physicians made secondary contact with another health-care professional during the call in one in four cases in either period. These contacts were essentially directed towards city nurses, nursing home staff or GPs.

Conversely, calls to the geriatric teams were very rare in either period, despite the availability of geriatric hotlines in particular (Table 2).

## Determinants of referral to the ED

In the multivariable regression model with the decision of EMS physicians as the outcome binary variable (patient-oriented to the ED Yes/No), there was no significant influence of the study period on the decision to refer patients to the ED. Patient sex, caller profile and reason for the call were associated with the probability of being referred to the ED: men were approximately 30% more likely than women to be referred to the ED, and patients calling themselves had an odds of being sent to the ED reduced by 60% compared to those for whom the call was

TABLE 2 Call management and patient orientation

	Pre-intervention (N = 1307)	Post-intervention (N = 1364)	<i>p</i> -value
Contact with a relative, <i>n</i> (%)	566 (51.5)	479 (44.2)	0.0007
Missing data, <i>n</i>	207	280	
Contact with another professional, <i>n</i> (%)	280 (25.0)	280 (26.1)	0.5901
Missing data, <i>n</i>	188	291	
Which professional?			0.1201
GP, <i>n</i> (%)	34 (12.9)	30 (11.1)	
Nursing home staff, <i>n</i> (%)	20 (7.6)	29 (10.7)	
Geriatric hotline, <i>n</i> (%)	1 (0.4)	2 (0.7)	
Geriatric unit, <i>n</i> (%)	0 (0.0)	1 (0.4)	
Nurse, <i>n</i> (%)	143 (54.4)	165 (60.9)	
Other, <i>n</i> (%)	65 (24.7)	44 (16.2)	
Missing data, <i>n</i>	17	9	
Final decision			0.0209
Referral to ED, <i>n</i> (%)	778 (61.7)	823 (62.8)	
Direct hospitalization to ward, <i>n</i> (%)	5 (0.4)	3 (0.2)	
Direct admission to ICU, <i>n</i> (%)	5 (0.4)	8 (0.6)	
Home support, <i>n</i> (%)	124 (9.8)	98 (7.5)	
Medical home visit service, <i>n</i> (%)	234 (18.6)	221 (16.9)	
Advised to contact their GP, <i>n</i> (%)	97 (7.7)	144 (11.0)	
Other advice (%)	18 (1.4)	13 (1.0)	
Missing data, <i>n</i>	46	54	
Means of transportation			$<0.0001$
Medicalized ambulance, <i>n</i> (%)	3 (0.2)	8 (0.6)	
Private ambulance, <i>n</i> (%)	691 (52.9)	744 (54.5)	
Fire service ambulance, <i>n</i> (%)	83 (6.4)	78 (5.7)	
Personal means, <i>n</i> (%)	236 (18.1)	79 (5.8)	
None, <i>n</i> (%)	294 (22.5)	455 (33.4)	

Abbreviation: ED: Emergency Departments; GP: General practitioner; ICU: Intensive Care Unit.



made on their behalf. Of note, there was also a non-significant trend towards an increased probability of ED referral in nursing home patients. Patients with falls had three-fold higher odds of being referred to the ED compared to any other reason (Table 3). In a second multivariable model, contact of the patients with a GP in the month preceding the call was associated with 22%-reduced odds of being referred to the ED (OR = 0.78, 95%CI [0.61; 0.99],  $p = 0.038$ ) and a number of treatments of five and above also increased this probability (Table S3).

## Patient outcomes

Around 37% of patients had been seen by a GP within 7 days after the call to the ECC, and there was no significant difference between the two periods. Almost 70% of patients had visited the ED within 7 days from the call, against less than 65% in the pre-intervention group

( $p = 0.0129$ ). There was no significant difference in the hospitalization rate (Table 4).

For the patients who visited the ED, there was a trend towards a shorter mean time spent in the ED in the post-intervention period compared to pre-intervention ( $p = 0.07$ ); for those who were hospitalized there was no significant difference in the mean length of stay (Table 4).

## DISCUSSION

With regard to the main outcome, we found no difference in the rate of referral to the ED between the pre-intervention and post-intervention phases. We were therefore unable to demonstrate any beneficial effect of our intervention. Furthermore, we could not demonstrate any change in practice, for instance, the use of geriatric hotlines was not increased in the second period. Referrals to the ED that could have been avoided mainly

**TABLE 3** Factors associated with the probability of being referred to ED. Result of the regression model with decision of the GP as the outcome variable.

Effect N = 2512	Value	Ref	Odds ratio	Lower confidence Limit for odds ratio	Upper confidence Limit for odds ratio	PR >  T
Period	Post-intervention	Pre-intervention	1.151	0.932	1.421	0.18
Sex	Male	Female	1.276	1.021	1.594	0.03
Age	For each addition year		0.995	0.978	1.012	0.56
Caller	Patient him/herself	Relative	0.322	0.246	0.422	<0.0001
	Healthcare professional		1.161	0.888	1.517	<0.002
Fall	Yes	No	3.106	2.367	4.075	<0.0001
Place of living	Nursing home	Home	1.489	0.946	2.343	0.08

Note: This hierarchical model successively included period, sex, caller, falls, place of living.  
Abbreviation: ED, emergency departments; GP, general practitioner.

**TABLE 4** Patient outcomes within 7 days after the call to EMS

	N =	Pre-intervention	Post-intervention	p-value
Consultation with their GP, n (%)	1866	341 (36.6)	354 (37.9)	0.5658
Contact with a geriatrician, n (%)	1607	137 (16.1)	142 (18.7)	0.1870
ED visit, n (%)	2053	662 (64.3)	712 (69.5)	0.0129
Hospitalization, n (%)	2029	478 (46.7)	465 (46.3)	0.8588
Mean length of stay in ED, hours (SD)	1130	8.67 (8.03)	7.69 (7.13)	0.0733
For hospitalized patients				
Mean hospitalization length of stay, days (SD)	941	8.05 (9.55)	7.60 (8.18)	0.7053
Contact with geriatric team during hospitalization, n (%)	1019	147 (33.3)	124 (27.6)	0.0687

Abbreviation: ECC, emergency call center; ED, emergency departments; GP, general practitioner.

concerned non-serious pathologies which could have been managed on an outpatient basis.

Another key finding is that previous contact with the GP in the month preceding the call was found to be associated with a 22% reduced probability of being referred to the ED. Recent studies have shown that comprehensive geriatric assessment (CGA) on an outpatient basis or at home may work as an alternative to hospitalization for certain older people.<sup>34,35</sup> It is undeniable that reinforcing primary care is essential to avoiding unnecessary referrals to the ED.<sup>6,12,36</sup> Consequently, the approach used in this study remains strongly dependent on access to community care and GP follow-up.

In our study, the use of hotlines remained marginal. This can be explained by time constraints, but also technical difficulties in managing a second simultaneous call. Indeed, the dispatching physicians are under great pressure due to the distress calls they receive and the large flow of calls, which requires them to be as quick as possible in their referrals.<sup>22–24</sup> Transferring older patients to appropriate health centers or outpatient and geriatric care pathways requires that these facilities are available, but medical attention from geriatricians is often delayed.<sup>5</sup> Referral to the ED remains the main recourse for dispatching physicians wishing to hospitalize their patients or to secure care in France.

In a parallel qualitative study, the EMS physicians stressed the importance of their medical-legal responsibility in referring patients.<sup>30</sup> The dispatching physicians interviewed described the geriatric assessment requested as time-consuming, with the need for rapid decision-making, a mismatch between the request and the geriatrician's response (deferred care, therefore a non-immediate response to the request) and their apprehension of seeing their already heavy workload increase. Finally, some resistance to change in established procedures could be observed.<sup>30</sup>

When patients called on their own, they were less often referred to the ED than when health professionals called. Patients able to call on their own are likely to be in a less severe clinical condition. On the other hand, professionals who call for patients have probably sought other alternatives before contacting the EMS.<sup>37</sup> The trend towards increased odds of ED referral in nursing home patients may be explained by a lack of access to specialists' medical advice.<sup>38</sup>

There equally exists risks of over-triage due to medical-legal liability and the need to close calls quickly.<sup>5,39</sup> For certain reasons for calls, such as falls or severe acute pathologies, referral to the ED remains appropriate most of the time.<sup>40,41</sup>

Alternatives could be considered by using secondary triage by community nurses or trained paramedics to

perform a clinical assessment before transfer to the ED.<sup>42</sup> Indeed, in our study, more than half of the patients were transported by private ambulance, and it has been shown that training of paramedics and secondary triage after assessment could limit referrals to the ED.<sup>43,44</sup> Our study emphasized the importance of reinforcing primary care, particularly for older patients with numerous comorbidities (polymedication, cardiovascular comorbidity, fall-related injury) for whom the risk of hospital-acquired complications is highest and may be exacerbated in the busy context of the EDs.<sup>45</sup>

To our knowledge, no previous study to date has investigated the training of medical dispatchers in conjunction with geriatricians to improve the dispatch procedure of older patients. The study has several limitations. Firstly, it was monocentric, considering that it was conducted in only one EMS in France. Nonetheless, this is a regional EMS, which serves a large territory, with patient diversity and heterogeneous access to outpatient care facilities for patients. The periods studied were comparable in terms of the season and weekday working hours, but the “before/after” study design is prone to confounding bias. A cluster randomization trial had been planned initially, each dispatching practitioner being a cluster. However, just before the start of the study the organization was changed from one dispatching GP to two dispatching GPs working together. This change made the planned design impossible because of an unavoidable contamination bias and we had to switch to a before and after study. Nevertheless, we tried to adjust for several potential confounding to avoid bias as much as possible.

Another limitation of our study is that we did not use a risk stratification tool to assess hospitalization risk, nor a formal assessment of frailty. Our study highlights the variety of criteria influencing the choice to refer patients to the emergency department, which depend not only on the clinical situation but also on the environment, the local context, the time of the call, and possibly on the level of knowledge of the dispatchers about geriatric networks.<sup>46</sup> This may explain why these scores are often insufficiently accurate to identify the patients most at risk in the ED.<sup>47</sup> Although tools such as the clinical frailty scale (CFS)<sup>48</sup> are fairly easy to use and valid in the ED setting,<sup>49</sup> we thought that it would be difficult to apply a systematic frailty assessment tool in the context of EMS dispatching calls, and that the reliability of a remote assessment of the CFS might be questionable. Rather than predicting risks such as mortality or hospital admissions, these assessment tools may have helped to identify patients' who might benefit from CGA and should be directed to specific pathways of care.<sup>49,50</sup> This model is well applied in other countries such as the UK, where automated methods for frailty identification are of widespread use.<sup>51</sup>

Our study suggests that it may be difficult to improve the triage of older patients by training EMS dispatchers. This is probably related to the very limited time they have for call management, with the need to respond quickly to calls on hold (call management time of about 4 min). This tension might prevent them from taking time to use the tools and knowledge acquired during the training. In addition, geriatricians responding to the hotline are also busy in their departments and cannot always respond in a timely manner. Therefore, this option is probably not the most effective. It can be assumed that a tool permitting the call to be transferred quickly to offload the responsibility to a geriatric dispatcher would seem more appropriate, provided that the latter can be structured to ensure this telephone permanence. For example, it has been shown that call regulation by a nurse trained in pediatrics allows for faster call handling and resolution of non-urgent calls without referral to a physician.<sup>52</sup> The development of primary care with the GP and geriatric assessments in the outpatient setting would make it possible to limit ED visits for this population. A complementary option for patients referred to the ED could be to adapt the ED setting and organization in order to better assess older patients at their point of entry, so as to identify the patients most likely to benefit from CGA and hospital-at-home approaches.<sup>53</sup>

### AUTHOR CONTRIBUTIONS

The authors Adélaïde Vincent, Nathalie Jomard, Brigitte Comte, Sylvie Porthault, Gaële Comte, Odile Theurey, Pierre-Yves Gueugniaud, Laura Bourelly, Muriel Rabilloud, Florent Boutitie, Ouazna Tassa, Julie Haesebaert, Anne Termoz and Anne-Marie Schott participated in the design, planning and development of the study. The authors Amandine Foucaud, Thomas Gilbert, Muriel Rabilloud, Florent Boutitie, Marion Douplat, Julie Haesebaert, Anne Termoz and Anne-Marie participated in analysis, interpretation of the results, critical review and writing of the manuscript. All authors read and approved the final manuscript.

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### CONFLICT OF INTEREST

The authors declare no conflicts of interest.

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A multidisciplinary external expert group reviewed this project before granting this funding. They had no involvement in the design of the study and in writing the manuscript, and will play no role in the collection, analysis and interpretation of data to be derived from the study.

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## SUPPORTING INFORMATION

Additional supporting information can be found online in the Supporting Information section at the end of this article.

**Figure S1.** Functional diagram of the emergency medical service.

**Table S2.** Tidier checklist.

**Table S3.** Factors associated with the probability of being referred to an ED regression model with decision of the EMS physician as the outcome variable hierarchical model with ECC physician as first level, including period, sex, link with caller, falls, place of living, number of treatments, history of cardiovascular disease, and contact with GP in the previous 3 months.

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