## **BRIEF REPORT**

# Implementation of autonomous decision protocols for emergency medical dispatchers: caller satisfaction survey and evolution of practices

Clarence Fischer<sup>1</sup>, Gaëlle le Bail<sup>1</sup>, Anna Ozguler<sup>1,2\*</sup>, Jérémie Boutet<sup>1</sup>, Charles Groizard<sup>1</sup>, Michel Baer<sup>1,2</sup> and Thomas Loeb<sup>1</sup>

## Abstract

Background Access to emergency care is becoming increasingly challenging due to rising demand and limited resources, such as shortage of general practitioners (GP). In France, emergency medical services (EMS) have experienced a 23% increase in call volume over the past decade. To address this, French dispatch systems are evolving, with Emergency Medical Dispatchers (EMDs) empowered to make certain medical decisions through Autonomous Decision Protocols (ADP). These ADP were designed for most frequent and simple emergency situations such as low back pain, epistaxis, head and limb injury, anxiety, and allowed EMDs to recommend medical advice, send an ambulance or refer the caller to a dispatching doctor.

**Aim** This study aimed to assess callers' satisfaction with decisions made by EMDs using ADPs compared to decisions made by medical doctors with similar chief complaint.

Material & method The study was prospective, involving all ADP calls from September to October 2023. All calls concerning ADPs and dispatched by EMDs were included. Callers were called back within a few days of the call in order to obtain their experience using a questionnaire. Retrospective patient files concerning similar chief complaints handled in the traditional way, over the same period in the previous year, were used for comparison.

Results A total of 358 calls were analyzed, with 217 (61%) callers completing a satisfaction survey. The results showed high satisfaction, with an average score of 8.6/10. The most common chief complaints were head and limb injuries, and the vast majority (90%) of callers felt their expectations were met. Only a small percentage (4%) required a second opinion or follow up due to worsening symptoms.

**Conclusion** The findings suggest that ADPs improved efficiency by providing standardized medical advice, reducing unnecessary ambulance dispatches, and saving medical resources. Callers who benefited from ADPs were generally satisfied with the service, with satisfaction rates comparable to those found in international studies. Expanding ADPs

\*Correspondence: Anna Ozguler anna.ozguler@aphp.fr; anna.ozguler@inserm.fr

Full list of author information is available at the end of the article

© The Author(s) 2025. Open Access This article is licensed under a Creative Commons Attribution-NonCommercial-NoDerivatives 4.0 International License, which permits any non-commercial use, sharing, distribution and reproduction in any medium or format, as long as you give appropriate credit to the original author(s) and the source, provide a link to the Creative Commons licence, and indicate if you modified the licensed material. You do not have permission under this licence to share adapted material derived from this article or parts of it. The images or other third party material in this article are included in the article's Creative Commons licence, unless indicated otherwise in a credit line to the material. If material is not included in the article's Creative Commons licence and your intended use is not permitted by statutory regulation or exceeds the permitted use, you will need to obtain permission directly from the copyright holder. To view a copy of this licence, visit http://creati vecommons.org/licenses/by-nc-nd/4.0/.





International Journal of





to cover additional medical conditions could further enhance emergency dispatch systems, especially in light of increasing demand and reduced medical resources.

Keywords Emergency medical service, Dispatch protocols, Emergency medical dispatchers, Satisfaction

## Introduction

Access to unscheduled care is increasingly problematic [1]. The use of emergency care systems has increased for many years despite a shortage of doctors. The results of a recent emergency survey showed a 13% increase in the number of emergency room visits in 10 years [2].

Dispatch centers have also seen their activity increase. In a French Emergency Medical Service (EMS), the number of calls has increased over 23% in the last ten years with 556,836 calls in 2022 [3].

French dispatch centers are multi-tiered systems, where all calls are handled by emergency medical dispatchers (EMDs) and according to French law [4, 5], must be transferred to doctors who provide advice and make decisions to dispatch rescue resources if necessary.

The current challenge of dispatch centers is to respond to the growing number of calls. To achieve this, the trend is to implement structural changes and to empower EMDs.

Decision-making algorithms and corresponding standardized SMS advice have been developed by doctors, enabling EMDs to make decisions for certain calls, while retaining medical supervision if necessary. When ADPs were set up, specific training for EMDs, supervised by doctors, was introduced. These decisions are governed by autonomous decisions protocols (ADPs). These algorithms aimed to offer advice to people whose main reason for calling was a "non-serious" medical reason, thus freeing up more medical time and enabling EMDs to play a more important role.

The ADPs covered six common call chief complaints: low back pain in adults - Epistaxis - Acute diarrhea in adults or children over 2 years of age - Head injury - limb injury– anxiety (see in Supplementary files: Limb & Head injury ADP).

The EMDs who answer the call identify the reason for call as being included in the ADPs and run the corresponding algorithm. All answers are binary in "yes" or "no".

Depending on the answers, EMDs have a range of options: transfer the call to a doctor, send an ambulance, refer to a general practitioner, give verbal or SMS advice (see in Supplementary files: Limb & Head injury SMS).

If there is any doubt about the applicability of the protocols, or if the caller does not understand, the EMDs transfer the call to a doctor.

The aim of this study was to evaluate the satisfaction of callers dispatched with the ADPs without transferring the call to a doctor. Secondly, ADPs and doctors' decisions for similar chief complaint calls were compared.

## **Material and method**

## Population

This study consists of two parts. In the prospective study, the population was any caller for whom an ADP had been initiated from September 1st to October 31st, 2023. The inclusion criteria were any call resulting in an ADP, where the decision was made by an EMD.

Exclusion criteria were refusal to participate or language barriers.

For the retrospective comparison, patients' profile and outcome were compared to a similar population one year before (from September 1st to October 31st 2022), when ADP did not exist and dispatch conditions were comparable considering staff number and allocated resources.

## Method

Population was included from the dispatch center software and survey was completed by interviews of the caller collected by two emergency physicians from a French EMS by phone [6, 7]. Questionnaire completion was standardized.

Collected data were patients' age and gender, the caller profile, ADP category, whether advice was given by phone, SMS or not during the call, if the caller needed to call back for the same complaint, for worsening symptoms; whether the response corresponded to their request, needed a second opinion and satisfaction rated on a scale from 1 (not satisfied) to 10 (very satisfied).

These data were collected prospectively and recorded in a secured database. Data were anonymized in accordance with French law. All patients were informed of their inclusion in the survey and received both verbal and written information.

To compare, similar calls handled by doctors regarding the most frequent common chief complaints (head and limb injury), patients' profile (age, gender, location) and outcome (ambulance dispatched yes/no) were extracted from the dispatch center software. This extraction was made anonymously. There was a change in software coding between 2023 and 2022: 'head injury' and 'limb injury' coding in 2023 replaced 'minor injury' coding in 2022.

All data collected were described univariately in terms of means (and standard deviation) and percentages, comparisons were performed using Chi-square et ANOVA tests (SAS software version 9.4).

#### Page 3 of 5

## Results

From September 1st to October 31st, 2023, 358 calls were dispatched by an EMD. Among them, 217 (61%) of the callers answered the survey. As seen in Table 1, head (19%) and limb injuries (73%) were the most frequent chief complaints. The caller was most often a relative (36%) or the patient themself (33%). Respondents considered having received advice either by telephone or SMS, or both (61%). Nine callers (4.2%) requested a second medical opinion. Eleven callers (5.2%) called back the EMS, three of them because of worsening symptoms. EMS met their expectations in 90% of cases. The average satisfaction score was 8.6/10 (standard deviation: 1.9) (Table 1).

When comparing head and limb injury handled by EMDs to "minor trauma" handled by doctors, in a similar period without ADP, there was no gender or age difference. In fact, more ambulances were dispatched when ADP were not used (Table 2).

## Discussion

This study showed that callers who had their calls dispatched by EMDs with ADP procedures were very satisfied with the way the call was handled and ADP saved resources and medical care time. Almost all the ADPs carried out were 'limb injury' and 'head injury' (91.5%). The introduction of ADPs has resulted in a low call back rate. There were more 'medical advice' decisions and fewer 'ambulance' decisions, when comparing decisions

Table 1 Comparisons of patients' profile, chief complaint, allocated resources and satisfaction among callers handled by autonomous decision protocol (ADP) (N = 358)

	Responders (n = 217)	Non respdonder ( <i>n</i> = 141)	р
Data routinely collected on dispatch software			
Patient's gendern(%)			
- Women	110 (50.7%)	67 (47.5%)	0.83
- Men	102 (47.0%)	71 (50.4%)	
- Not collected	5 (2.3%)	3 (2.1%)	
Age mean (Standard Deviation)	34.7 (25.2)	36.3 (30.1)	0.59
Location n (%)			
- Home	124 (57.4%)	78 (55.3%)	0.74
- Other	93 (42.9%)	63 (44.7%)	
Chief complaint n (%)-			
- limb injury	160 (73.7%)	96 (68.1%)	0.65
- Head injury	39 (18.0%)	33 (23.4%)	
- Epistaxis	11 (5.1%)	6 (4.3%)	
- Anxiety	4 (1.8%)	3 (2.13%)	
- Acute diarrhea	1 (0.5%)	0 (0.00%)	
- Low back pain	2 (0.9%)	3 (2.1%)	
Ambulance sent (yes) n (%)	63 (29.0%)	41 (29.1%)	0.99
Responses to telephone surveys			
Caller n (%)			
- Relative	78 (35.9%)		
- Patient	72 (33.2%)		
- Bystander	62 (28.6%)		
- Health professional	5 (2.3%)		
Type of advice n (%)-			
- By phone	86 (39.8%)		
- By SMS	7 (3.2%)		
- By phone & SMS	39 (18.1%)		
- Ambulance sent	84 (38.9%)		
Need for second opinion n (%)-			
- No	205 (95.8%)		
- Yes at Emergency Department	6 (2.8%)		
- Yes visit to GP* or other	3 (1.4%)		
Call back EMS**– yes n (%)	11 (5.2%)		
Call back for worsening of symptoms– yes n (%)	3 (1.4%)		
The response provided by EMS corresponded to the need n (%)	193 (90.2%)		
Satisfaction mean (Standard Deviation)	8.7 (1.9)		
*GP: General Practitioner			

\*\*EMS: Emergency Medical Service

	ADP* handled limb and head injury 2023 (N=328)	Doctor handled Minor injury 2022 (N=854)	p
Gender n (%)			0.08
- Women	161 (49.1%)	423 (49.5%)	
- Men	159 (48.5%)	424 (49.7%)	
- Not collected	8 (2.4%)	7 (0.8%)	
Age mean (Standard Deviation)	35.2 (27.1)	36.6 (27.3)	0.43
Location n (%)			0.01
- Home	179 (54.6%)	551 (64.5%)	
- Other	149 (45.4%)	303 (35.5%)	
Ambulance sent (yes) n (%)	102 (31.1%)	338 (39.6%)	0.01

Table 2 Comparisons of ADP handled limb or head injury patients versus those with minor injury handled by Doctor (N=1182)

\*ADP: Autonomous Decision Protocol

made by EMDs on the 'limb injury' and 'head injury' ADPs in 2023 with the decisions made by the doctors in 2022 on the 'minor injury' motives. This could be explained by the implementation of standardized SMS advice messages. This ensured that the information sent to the caller was correct.

One limitation relates to the caller response rate, as 33% of callers did not respond. This might be a significant issue in interpreting the results. This may have led to a selection bias, even though there was no difference considering gender or age. The second limitation was a likely memory bias, although this was limited by a call back within 48 h of the call.

There have been few international recent studies evaluating EMDs dispatch protocols. The training and tasks of EMDs are different, but it is possible to compare these results with other international studies. Satisfaction rate (79%) was in line with other studies particularly those by Zinger et al. in 2019 [8] and Neumayr et al. in 2016 [9], which found similar satisfaction rates. However, patients might be reluctant to criticize the healthcare system, as shown by the study by Hall et al. [10].

The aim of ADPs is to identify frequent situations and to develop corresponding algorithms that could be easily applied. This work suggested that regular assessment of the ADPs could lead to an evolution of the patterns of these protocols.

After analyzing different dispatch models, all of them evolve quickly according to the needs to adapt to the growing number of calls. Bearing in mind the challenge of a reduction in medical resources, one possible development would be to add staff with intermediate qualifications such as nurses within the call center, as it is already done in some countries [11, 12].

## Conclusion

The aim of ADPs was to optimize medical time by strengthening the role of EMDs.

The study revealed a high level of satisfaction among callers who had benefited from these protocols. In

comparison with a period where ADPs were not available, the results showed an increased proportion of medical advice with ADPs application.

As part of a process of change in medical dispatch systems in France, new ADPs (such as "lifting person at home" or "recurrent renal colic") could be set up to cover other chief complaints and be implemented in other medical dispatch services.

#### Abbreviations

ADP Autonomous Decision Protocols

- EMD Emergency medical dispatcher
- EMS Emergency medical service
- GP General practitioner
- SMS Short message service

## **Supplementary Information**

The online version contains supplementary material available at https://doi.or g/10.1186/s12245-025-00880-w.

Supplementary Material 1 Supplementary Material 2 Supplementary Material 3

#### Acknowledgements

None.

#### Author contributions

Substantial contributions to the conception and design of the work: CF, GLB, AO, JB, CG. Data analysis for the work: CF, GLB, AO, JB. Drafting the work: CF, GLB, AO, TL. Revising it critically for important intellectual content: CG, MB, TL. Final approval of the version to be published: all authors.

Funding

#### No funding.

#### Data availability

No datasets were generated or analysed during the current study.

#### Declarations

#### Ethics approval and consent to participate

Data and analyses were done anonymously. According to French legislation, this research was declared to the National Council for Statistical Information (CNIL), and our treatment is in accordance with MR-004 number 2230078 v 0. Consent was obtained indirectly: patients were informed that they

were included in the study and could ask to withdraw from the study, have access to the data, or request that their data be modified - as specified in the law (information sent to patients is in related files). This was performed in accordance with ADELF; ADEREST; AEEMA; EPITER. Recommendations for professional standards and good epidemiological practices (version France 2007). Rev Epidemiol Sante Publique. 2008 Jul;56 Spec No 1:S121-75. English, French. PMID: 18841590.

#### **Consent for publication**

Not applicable.

#### **Competing interests**

The authors declare no competing interests.

#### Author details

<sup>1</sup>SAMU des Hauts-de-Seine - Assistance Publique– Hôpitaux de Paris, University of Paris- Saclay, Raymond Poincaré Hospital, Garches 92380, France

<sup>2</sup>Institut de Recherche et d'Enseignement des Soins d'Urgence, Raymond Poincaré Hospital, Garches 92380, France

## Received: 1 February 2025 / Accepted: 23 March 2025 Published online: 17 April 2025

#### References

- Braun F, Berthier F, Boudénia K, Carli P. Organisation de la médecine d'urgence en France: un défi pour l'avenir. Samu-urgences de France Livre Blanc; 2015.
- Lenglart F. July. Urgences hospitalières en 2023: quelles organisations pour la prise en charge des patients? DREES • Études et Résultats [Internet]. 2024; Paris (FR) Available from: https://drees.solidarites-sante.gouv.fr/sites/default/fi les/2024-07/ER1305\_0.pdf

- Boutet J. Bilan d'activité 2023 SAMU 92 SMUR de Garches. Garches (FR). 2023.
- Décret 87-1005 du 16 décembre 1987 relatif aux missions et à l'organisation des unités participant au service d'aide médicale urgente appelées SAMU. JO du 17 décembre 1987.
- Loi. n°86–11 du 6 Janvier 1986 Relative a L'aide medicale urgente et aux transports sanitaires.
- Burroughs TE, Waterman BM, Cira JC, Desikan R, Claiborne Dunagan W. Patient satisfaction measurement strategies: a comparison of phone and mail methods. Jt Comm J Qual Improv Juill. 2001;27(7):349–61.
- Harewood GC, Yacavone RF, Locke GR, Wiersema MJ. Prospective comparison of endoscopy patient satisfaction surveys: e-mail versus standard mail versus telephone. Am J Gastroenterol Déc. 2001;96(12):3312–7.
- Zinger ND, Blomberg SN, Lippert F, Collatz Christensen H. Satisfaction of 30 402 callers to a medical helpline of the emergency medical services Copenhagen: a retrospective cohort study. BMJ Open 8 Oct. 2019;9(10):e029801.
- Neumayr A, Gnirke A, Schaeuble JĆ, Ganter MT, Sparr H, Zoll A, et al. Patient satisfaction in out-of-hospital emergency care: a multicentre survey. Eur J Emerg Med Off J Eur Soc Emerg Med Oct. 2016;23(5):370–4.
- Hall JA, Dornan MC. What patients like about their medical care and how often they are asked: a meta-analysis of the satisfaction literature. Soc Sci Med 1982. 1988;27(9):935–9.
- Infinger A, Studnek JR, Hawkins E, Bagwell B, Swanson D. Implementation of prehospital dispatch protocols that triage low-acuity patients to advice-line nurses. Prehosp Emerg Care. 2013;17(4):481–5.
- Pope C, Turnbull J, Jones J, Prichard J, Rowsell A, Halford S. Has the NHS 111 urgent care telephone service been a success? Case study and secondary data analysis in England. BMJ Open 2 Juin. 2017;7(5):e014815.

#### Publisher's note

Springer Nature remains neutral with regard to jurisdictional claims in published maps and institutional affiliations.