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Handover methods between local emergency medical services and Accident and Emergency: is there a gold standard? A scoping review.

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Abstract. *Background:* Pre-hospital emergency medical systems do not appear to work totally coordinated with Accident and Emergency (A&E).Often, patient admission to A&E is marked by scarce attention to the handover between the respective healthcare professionals. This phenomenon is potentially dangerous because it exposes patients to the risk of errors in a context where the patients' critical or progressing conditions must not be worsened by avoidable errors of communication between professionals. *Objectives:* to describe the evidence concerning handover between local emergency medical services and A&E. *Eligibility criteria:* pre-hospital emergency medical and A&E professionals, setting defined as within A&E, articles on pre-hospital to A&E handover. *Sources of evidence*: PubMed and CINAHL Complete databases. Grey literature. *Charting Methods:* the results are displayed in tables according to 'Title', 'Design', 'Country', 'Population', 'Concept', 'Context' and 'Results'. *Results:* 10 studies were included. The following themes emerged: communication and interpersonal issues, secondary risks, need for staff training, the use of structured methods, information technology support. *Conclusions*: There is a gap in the literature. Issues regarding communication, differing ideas of what should be considered as priority, interpersonal relationships and trust between staff working for different services emerge. Connected with this there are structural problems such as shortage of suitable spaces and lack of staff training. The use of structured mnemonic methods, including computerized ones, seems to improve the quality of handovers, but to date it has not been possible to establish which method would be better than another. Further studies are recommended. (www.actabiomedica.it)

Key words: prehospital, handoff, handover, methods, accident, emergency

Background

In Europe and the rest of the world, local emergency medical services are organized and structured in very different ways according to the country concerned. Similarly, the different professionals making up emergency teams are very varied: nurses, doctors, paramedics and non-health staff who may also be volunteers.

In Italy, the local emergency medical service 118 (Emergenza Sanitaria Territoriale) was conceived and has evolved in very different ways from geographical

area to geographical area. The result of this process is that most medical emergency systems today are united only by the objectives that they set, but not by the ways in which they achieve these objectives, which are often vary greatly amongst themselves. The intricate network of organisational systems throughout Italy involves differences beginning with the composition of the emergency teams (1). In Accident and Emergency (A&E), on the other hand, there has been a specific person designated to take charge of patients since 1996, as set out in DPR 27/03/1992, the same decree defining 118 i.e., the triage nurse, who is 'suitably trained and works according to protocol established by the service manager' (2).

Taking a non-exhaustive view of a section of pre-hospital emergency services in Europe, we find in the Netherlands ambulances uniformly equipped with Critical Care nurses and a Driver-First Responder trained to work with the nurse (3). However, in Germany, there are two types of pre-hospital emergency medical team, the first requiring an on-board emergency doctor, with the second requiring the presence of paramedics (4). In Great Britain, the local emergency medical service is run by the National Health Service using rescue vehicles with technicians and paramedics on board (5).

Finally, in the Middle-East, systems are mixed: in particular, the emergency medical service in Iran requires the co-existence of rescue teams made up of a doctor and a nurse and others that are made up of paramedics (6).

Handover is a complex procedure that may involve a number of different figures, professionals, patients and members of the public, and a range of communication technologies and formats (7). The main objective of a clinical handover is to transfer and accept professional responsibility and responsibility for caring for the patient between healthcare professionals (8). During this process, information on the assistance, treatment, and current conditions of the patient and any recently occurring changes or predicted changes have to be clear, complete and detailed in order to minimize preventable deleterious events and guarantee safe and optimal continuity in care (7). The problems identified in handover are many and attributable to various aspects: a noisy and chaotic environment, a lack of time and resources, excessive workloads, lack of listening, frequent interruptions, lack of trust and misunderstandings between staff, lack of handover structure, lack of clarity and too much irrelevant information, lack of feedback from the receiving healthcare professionals, inconsistency between verbal handover and related documentation, missing documentation on information passed on by ambulance staff to receiving hospital staff (7). Communication errors have been identified as a serious, but preventable, cause of harm to the patient (8). These errors may even be responsible for 12% of incidents concerning safety in treating patients. For this reason, the World Health Organisation has identified improving communication during handover as a tool for increasing care safety (8).

The available literature proposes some more or less structured methods for handover between local emergency medical services and hospital.

Methods for transmitting information are made up of pre-alert by the ambulance team via radio or telephone, face-to-face verbal methods, digital or written documentation of information between ambulance and hospital staff and between the latter and bystanders (witnesses of accidents) and other professionals (General Practitioners or social workers).Wood et al. found that the standardized mnemonic method could improve continuity during handover, increase the amount of necessary information and reduce questions by A&E staff and increase points communicated during handover; however, a reduction in memorization of information by A&E staff using this method was identified (7).

On the other hand, there are authors not in favour of standardized approaches, who argue that there are no specific directives on how to structure handover. Over recent years, there have been literature reviews regarding handover between local emergency services and emergency departments (9). For example, a topical review including 22 studies concluded that the use of a structured method for transferring information between ambulance and A&E is recommended, but data are still scarce on the actual efficacy of this measure (10). Cultural problems and the lack of professional recognition also have to be addressed with educational measures to increase safety of care. Further facilitation of the process could be provided by the common tools of triage and electronic tools for handover (10).

It is therefore not clear at the current time if one handover method is preferable to another and what the best strategies to address the issues identified in handover are.

The aim of this scoping review is thus to describe the literature regarding handover between local emergency medical services and A&E in terms of method, issues and the strategies to address these issues.

Methods

Study design

A scoping review was carried out (11-13).

The scoping process was considered suitable because the investigation was of an exploratory nature to identify the evidence concerning handover modalities between local emergency medical service staff and A&E nurses. In addition, the available literature is heterogenous, therefore it was primarily necessary to understand how much the topic had been studied in order to attempt a summary of the previously emerged evidence (12).

Research strategies

The research question was: 'What is the evidence available concerning handover between local emergency medical services and A&E?'

The following sub-questions were formulated: 'Is a structured handover method preferable to a non-structured one?', 'If a structured method is preferable, which one appears to be the safest and most effective?', 'What are the issues involved in handover and the possible strategies to address them?'

The bibliographical research was carried out using the online databases Pubmed and CINAHL Complete. The 'grey' literature available was taken into consideration, searching Google Scholar and sites for the relevant scientific associations for local emergency medical services and critical care such as SIMEU (Società Italiana Medicina d'Emergenza-Urgenza), SIIET (Società Italiana Infermieri Emergenza Territoriale) e ANIARTI (Associazione Nazionale Infermieri di Area Critica).

Observing the selection criteria set, publications from the last 10 years were selected, to guarantee up-to-date evidence, in the English and Italian languages.

The research question was formulated using the elements of the acronym PCC (Population, Concept, Context) (12, 13) and is illustrated in Table 1.

The search string used in PubMed was created and assessed with the support of an archivist and is the following: (prehospital OR pre-hospital OR ambulance OR prehospital emergency OR pre-hospital emergency OR emergency setting OR emergency assessment) AND (handover OR handoff OR handoffs) AND (emergency department OR emergency room)

From this the strings utilised in CINAHL and for researching the grey literature in Google Scholar were derived. Searching the sites of scientific associations was carried out 'freely'. Searching for sources was finalized on 29/10/2021 at 10.20 a.m.

Inclusion and exclusion criteria

Inclusion criteria were: (I) population including local emergency medical service and A&E professionals, (II) setting defined within A&E, (III) concept regarding handover between pre-hospital and intra-hospital staff.

Exclusion criteria were (I) military setting (II) handover taking place between emergency departments.

Selection of studies

The records were inserted in Zotero citation software in order to simplify management of the results and eliminate duplicates.

Selection of the studies was double blind with modalities standardized for all publications emerging from the bibliographic search. Initially, the analysis

Table 1. PCC research question

P	Population	Local emergency medical service and A&E professionals
C	Concept	Handover
C	Context	Triage and A&E emergency room

took place according to title and abstract of the first 100 results, after which there was a re-assessment of the research string. The string was confirmed. Subsequently, an analysis of each study's title was carried out, and when the title seemed of relevance to the research enquiry, the abstract was read before reading the full text, if necessary, to approve of its definitive inclusion or exclusion based on the inclusion and exclusion criteria.

No discrepancies between the two groups for analysis emerged.

Data extraction

Data extraction was performed by 2 authors. The data extracted were inserted into a Microsoft Excel file according to data charting (11-13) using the following categories set during the research planning phase: name of study, design, country, population, concept, context and results.

The results were then ordered according to theme in order to draw conclusions.

Results

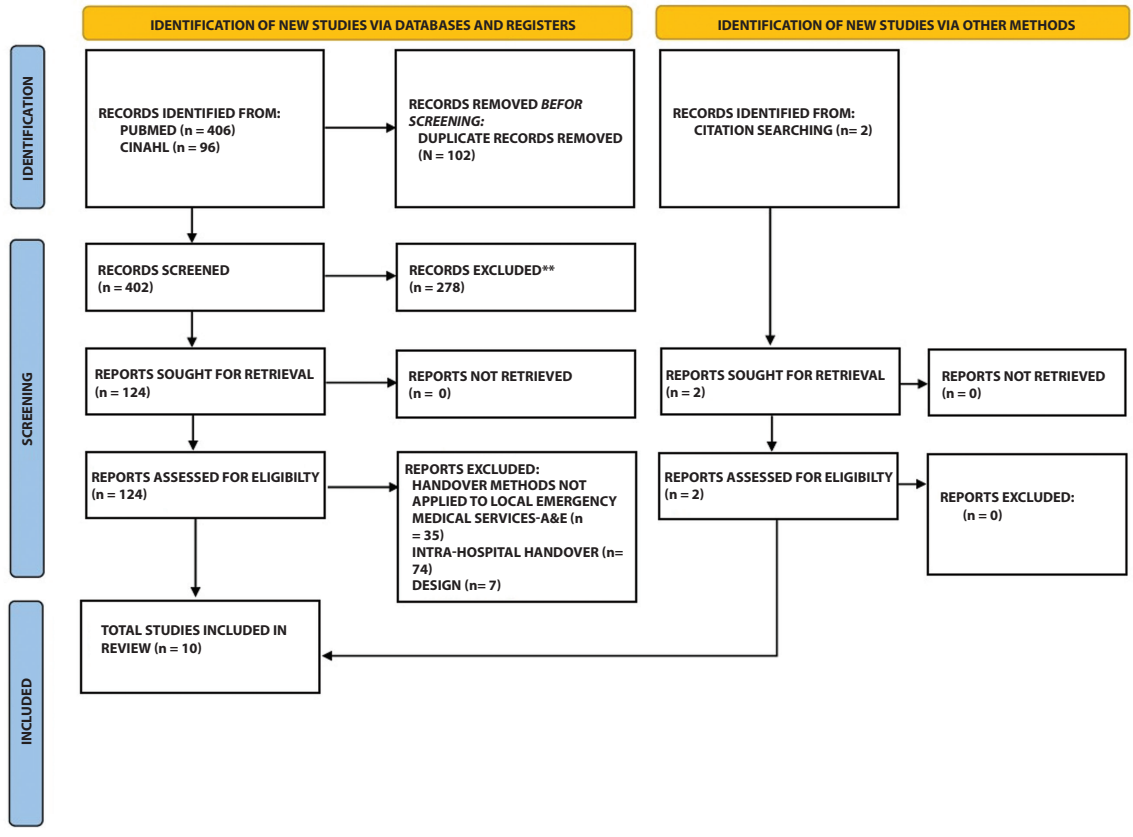
406 results were retrieved from PubMed databases and 96 from the CINAHL Complete search to form a total of 502 records. 102 duplicate records were excluded and, in the end, full text reads of 124 studies marked out for potential inclusion from a reading of the title a/o abstract took place.

Ultimately, 10 articles were included in the review, including 2 articles selected from 'related' articles in PubMed.

No studies pertinent to the search emerged from an analysis of the grey literature.

As suggested by Peters (2020) (12) the results are represented with the PRISMA diagram for scoping reviews (14) in Table 2.

Table 2. PRISMA diagram



Data Charting

Table 3. Data Charting

Study	Design	Country	Population	Concept	Context	Results
Janagama et al. (15)	Cross-sectional observational study	India	786 inter-hospital transfers of pregnant patients within the 1572 cases of handover.	Complete and effective assessment of handover according to SBAR and I-PASS methods. .	States of Assam, Gujurat, Himachal Pradesh and Karnataka	Handover was influenced by: staff overloaded with work, a chaotic environment, interruptions, passive listening and the lack of a common language between healthcare professionals. The use of a checklist (standardisation of contents), mnemonic and computerised methods improves the efficiency of handover and may improve quality.
Ehlers et al. (4)	Prospective, multi-centre observational study	Germany	721 handovers	Assessment of handover examining the content, structure and setting.	Hospitals in Bonn, Cologne, Düsseldorf.	Structured handover methods are not used in clinical practice. Therefore inconsistencies in information transmitted emerge. This may be attributable to: the healthcare professionals involved, priority of treatment and type/severity of pathology. It transpires that the more seriously ill the patient, the more difficult it is to formulate effective handover, while the less seriously ill a patient is, the greater the possibility that medical notes are not taken into consideration.
Iedema et al. (16)	Qualitative study	UK	291 paramedics	Assessment of the efficacy of IMIST-AMBO protocol before special training of staff not using structured handover methods before the study.	New South Wales Ambulance Service	With the introduction of IMIST-AMBO protocol there was an increase in communication between paramedics and emergency department staff, as well as a more orderly sequence of information, necessary information being passed on more frequently, a reduction in information getting repeated and questions asked.

Maddry et al. (17)	Observational study	USA	208 multiprofessional staff members	Determination of whether implementing the MIST tool during handover of all patients (both with medical and trauma pathology) has led to a perceived change in the transmission of relevant patient information and of the whole handover experience.	BAMC (Brooke Army Medical Center), Forth Sam, Houston.	Overall, the results of the study demonstrate that the MIST handover method resulted in an improvement in communication during handover between the local emergency medical services and A&E with the resulting increase in satisfaction of staff involved in handover.
Meisel et al. (18)	Qualitative study	USA	7 focus groups for a total of 48 participants, including doctors, nurses, paramedics and emergency medical technicians working in a pre-hospital setting.	Highlighting the range of experiences and challenges faced by paramedics during transfer of patients to A&E staff.	3 national and regional EMS conferences from January to March 2011	Paramedics stood by the patients and their widely shared goal was to provide all the information for meeting the needs of their patients. However, handovers were obstructed by some hierarchical issues. Paramedics' frustration, therefore, mostly derives from the scarce consideration for patients by hospital staff.
Hovenkamp et al. (19)	Observational study	The Netherlands	97 handovers	Evaluation of satisfaction concerning non-trauma patient handover between ambulance nurses and A&E nurses.	University of Groningen Medical Centre	In general, the level of satisfaction was very high for both groups. The dissatisfaction of the ambulance nurses mainly derives from two factors: the absence of an A&E doctor and waiting times. In the case of A&E nurses, on the other hand, dissatisfaction depends on the lack of a structured handover tool and the incomplete nature of the information or information on patients' pre-hospital condition in broad disagreement with their actual condition on arrival in A&E.

Najafi et al. (20)	Qualitative study	Iran	11 nurses and 14 paramedics	Analysis of the handover outlook for patients between paramedics and members of the A&E team.	Valiasr Hospital, Fasa, Iran	Handover of patients between paramedics and members of the A&E team presents unique challenges since they have different clinical tasks and work cultures as well as workplaces that are mostly not comparable with each other. This leads to potential errors in communication and conflicts in teamwork that could be costly, especially for the health of patients.
Waldron & Sixsmith (21)	Observational study	USA	163 handovers between paramedics and triage nurses (phase 1) 116 handovers between paramedics and a research assistant who reported to an A&E doctor (phase 2).	Assessing the awareness of the A&E doctor of pre-hospital procedures and treatments carried out.	New York Hospital Queens, Department of Emergency Medicine	The verbal report by the research assistant did not notably improve the situation. The doctors were able to respond correctly in 77% of Phase 1 cases and 83% of Phase 2 cases. The report slightly improved the doctor's awareness of the names of orally admininstered medications but not of those administered endovenously.
Di Delupis et al., 2015 (22)	Observational study	Italy	240 handovers between pre-hospital staff (non healthcare professionals, nurses and doctors) and triage nurses.	Checking the application and suitability of the ISBAR algorithm	A&E at Careggi Hospital, Florence, Italy	Only those medical technicians previously trained in handover always used ISBAR. The information most often given was the reason for the call (85%) and the information given least often was if the complete ABCDE approach for patients had been applied (1%).
Jamshidi et al. (6)	Qualitative study	Iran	15 pre-hospital and intra-hospital employees	The research objectives were adapted to the participants' responses and questions for a follow-up study were raised for the elaboration of the concept under study.	Pre-hospital and intra-hospital emergency medical centres	The themes of the data collected from the participants' responses were grouped into main and sub categories: • -insufficient infrastructure • resources; • -lack of physical working space; • -staff shortages; • -inefficient and non-scientific management; • -no common language; • -differences in understanding and empathy

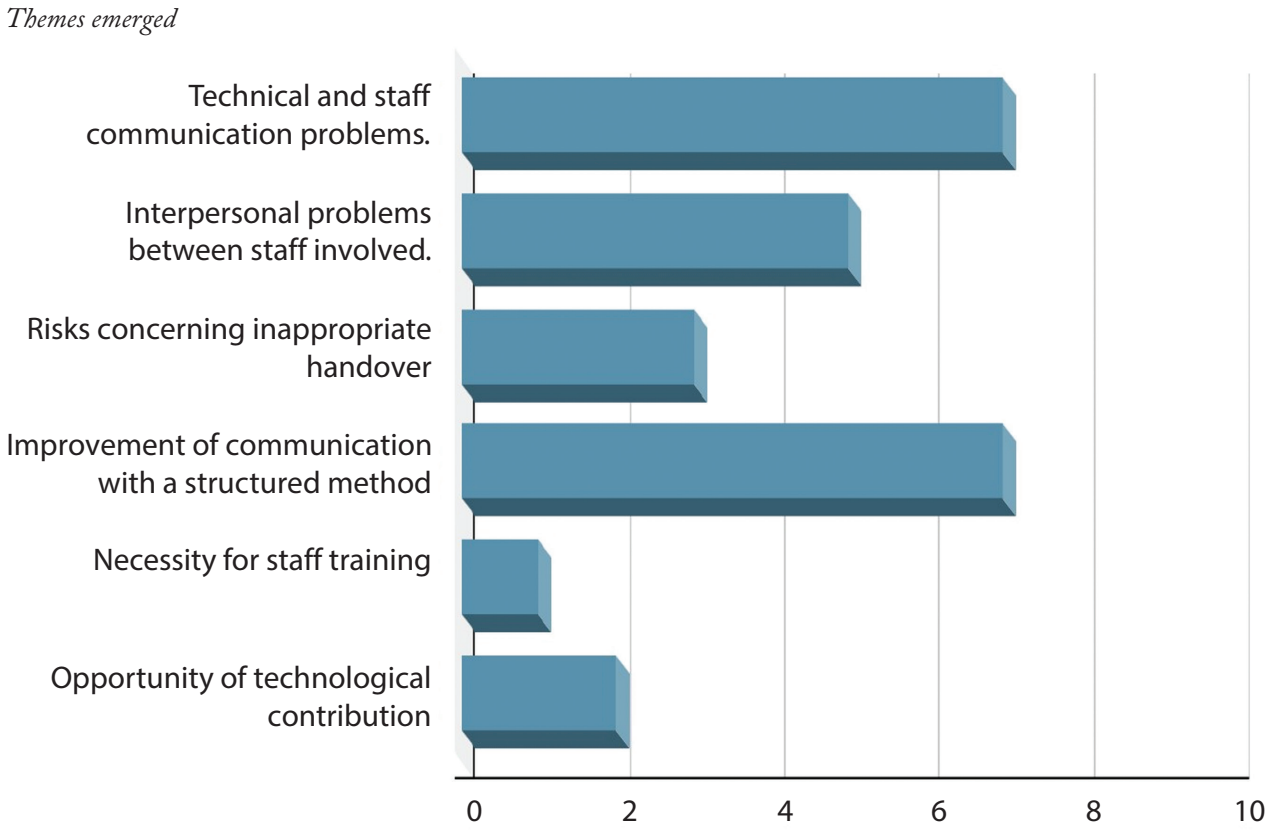


Figure 1. Themes according to number of articles in which those themes emerge.

1. Technical and communication problems during handover

Handover between local emergency medical service and A&E staff comprises various elements: the conveying of information, demographic details, the dynamics of the event, the treatment carried out and the patient's medical records (6).

Handover is often tricky because of the chaotic nature of A&E, involving the risk of a loss of essential information, and for this reason it is important for handover to happen quickly, that information is clear, efficient and as detailed as possible to avoid disinformation and errors (4, 6).

Other important issues encountered were different types of training and lack of use of a common language between pre-hospital and intra-hospital teams (6, 15).

2. Interpersonal issues between the staff involved in handover

The studies examined analysed the vision of both teams involved in handover. It emerged that A&E staff pay little attention to pre-hospital healthcare professionals, only 24.2%, but that they are satisfied with handovers received 35% of the time (21). On the other hand, pre-hospital staff feel frustrated by the scarce consideration that they are given by A&E staff for the information they provide, and for the scarce attention paid to the patient brought in, especially if they are not in a critical condition, because they are not deemed worthy of special attention and are almost an impediment to their work (18); other times they stop paying attention to handovers in order to focus their attention on the patient (22).

3. Risks concerning improper, incomplete or badly understood handover

An incomplete handover results in the loss of important information such as the identification of the healthcare professionals involved, patient records, allergies to medications, home treatments and vital signs (16).

A further issue in handover was identified in the scarce information that the A&E doctor received on pre-hospital treatments carried out on the patient, raising the risk of duplicating, overdosing or not checking the outcome or unsuccessful outcome of the treatment carried out (21). Some strategies to overcome these problems could be communicating directly with the doctor, standardizing handovers and exploiting technology to overcome communicative gaps (18).

4. Evidence concerning improvement of handover using a structured method

There appears to be little literature available regarding structured handovers.

This problem was analysed in a number of articles included that propose various methods to be utilized by the different healthcare professionals (emergency technicians, nurses, paramedics…). The main structured methods are: AMPLE (19), DeMIST (9), MIST (4, 9), SBAR (4, 15), IMIST-AMBO (16), SOAP (9), BAUM (4), ISBAR (4, 22), I-PASS (15) , SAMPLER (4, 19);

To date, the best method that may be utilized for handover has not been identified, but it is clear that using a structured method improves staff satisfaction, allows more complete transmission of information and reduces time taken up in handover (17, 19).

Furthermore, it was highlighted that using one particular structured method was not sufficient, but that total adherence to it was essential because, if this is not the case, information necessary for treating the patient risks getting lost (4).

5. Evidence concerning the need for training of staff involved in handover

The difficulty in communication between local emergency medical services staff and A&E staff is one of the main issues in handover, due to different types of training and use of a language that is not a shared one (6).

6. The opportunity of technological contribution/support

Various studies have highlighted how the loss of information gained on the scene is due to the lack of shared computerized methods; indeed, handovers are carried out prevalently using paper forms and only sometimes include verbal information with the subsequent loss of information and parameters while entering patient details into the computerized A&E program (19, 23).

Moreover, pre-hospital staff point out difficulties registering information on electronic systems because they lack the specific skills and the systems are difficult to use in the ambulance (7).

Therefore, it is suggested that using computerized systems in completing checklists, standardization of points to communicate and using mnemonic methods could improve handover (15).

Discussion

Summary of evidence

10 primary heterogenous studies have been included in the design for this review illustrating a lack of available literature concerning handover between local emergency medical services and A&E.

From the results it emerges that there are various issues involved in handover. The first problem highlighted in the literature is that of communication – indeed in most of the settings observed there appears to be a discrepancy in language and understanding between local emergency medical services staff and A&E staff.

There are associated problems involving interpersonal relationships and trust between the various service workers, sometimes linked to different ideas of priority that can nonetheless undermine an efficient handover.

However, these problems between healthcare professionals and employees are connected in many cases with structural problems concerning the place of handover represented by lack of staff and organization

and of suitable physical spaces to guarantee silence and privacy during handoff. A further organisational and health management issue that emerges from the review is the lack of training, or differences in training, in the various emergency medical service workers, who nevertheless have to guarantee absolute continuity of care in their work.

The solutions proposed in the literature tend to resolve each of the critical points highlighted, yet they require a general change in mentality and approach to the problem. Above all, A&E should be equipped with suitable spaces for handover. Secondly, local emergency medical service workers and A&E staff, despite belonging to different clinical settings, should be trained in a uniform way in order to adopt a shared vision of priority for critical patients. Linking up these points to the timely use of structured mnemonic and computerized handover methods may further reduce the information and communication gap, noticeably improving the quality of information transmitted to triage nurses by ambulance staff, also reducing handover times and increasing satisfaction of all parties.

Nonetheless, it is not possible to identify the best structured method at the current time.

Limitations

The review has been affected by the limited literature available on the topic of study.

The methodological heterogeneity of the studies included and the different outcomes taken into consideration did not allow a more in-depth comparison of the results.

Conclusions

In conclusion, the goal of describing the existing literature on handover between local emergency medical services and A&E was met and a gap in the literature was identified. It was possible to respond only to some of the research questions, indeed, issues in handover emerged and some strategies to address these were highlighted. A structured method to reduce loss of information seems advisable, but it is not possible to establish which one would be best.

Evidence points towards the need for new primary studies with homogeneous design taking into account structured methods in order to identify the best one.

Compliance with ethical standards: This article does not contain any studies with human participants or animals performed by any of the authors.

Conflict of Interest: Each author declares that he or she has no commercial associations (e.g. consultancies, stock ownership, equity interest, patent/licensing arrangement etc.) that might pose a conflict of interest in connection with the submitted article.

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