

REVIEW

Implementation of health care quality indicators for out-of-hospital emergencies: a systematic review

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Although many health care quality indicators have been defined for establishing a common, homogeneous, and reliable system for assessing emergency department care, less information is available on the use of indicators of quality in attending emergencies outside the hospital. We aimed to identify and analyze quality indicators that have appeared in the literature on out-of-hospital emergencies. This systematic review of the literature followed the actions of the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA). We developed protocols for searching 5 databases to locate studies using quality indicators to evaluate care in out-of-hospital emergencies. Studies were published between July 2017 and July 2018 in either English or Spanish. We identified 22 studies naming 333 quality indicators in out-of-hospital emergencies. The indicators were classified as clinical or nonclinical; within each of these 2 sets, we also identified domains, or subcategories. As nonclinical quality identifiers were more numerous in the literature, it seems that they are the ones most often used to assess out-of-hospital emergency care at this time. This finding leaves the door open to designing and implementing new indicators able to measure quality of care in this clinical setting.

Keywords: Emergency medical services. Health care quality indicators. Total quality management. Health care quality assessment. Patient safety. Ambulance.

Utilización e implementación de indicadores de calidad para evaluar la atención en las emergencias extrahospitalarias: revisión sistemática

Aunque son muchos los indicadores de calidad (IC) definidos para establecer un sistema común, homogéneo y fiable de evaluación sobre la actividad en los servicios de urgencias, es escasa la información acerca de los IC relacionados con las emergencias atendidas en el ámbito extrahospitalario. El objetivo de este trabajo es identificar y analizar, a través de la literatura científica publicada, los IC específicos de dicha atención ante emergencias fuera del contexto hospitalario. Se realizó una revisión sistemática de la literatura según las recomendaciones PRISMA. Se exploraron 5 bases de datos y se elaboraron protocolos de búsqueda para localizar estudios que aportasen información sobre IC para evaluar la atención en emergencias extrahospitalarias, entre noviembre de 2017 y julio de 2018, tanto en inglés como en español. Se analizaron un total de 22 estudios y se identificaron un total de 333 IC en emergencias extrahospitalarias que fueron clasificados en clínicos y no clínicos, con sus subdominios correspondientes para cada grupo. El número de IC no clínicos identificados en la búsqueda fue superior, pudiendo concluir que son los más utilizados para evaluar la atención en las emergencias extrahospitalarias en la actualidad y dejando la puerta abierta para el diseño e implementación de nuevos IC capaces de evaluar la actividad fuera del contexto hospitalario.

Palabras clave: Servicios médicos de emergencia. Indicadores de calidad, cuidados de salud. Gestión de calidad total. Aseguramiento de la calidad, cuidado de la salud. Seguridad del paciente. Ambulancias.

Introduction

The concept of quality has long been associated with health services and is one of the strategic elements on which the transformation and improvement of modern health systems is based¹. In Spain, in the out-of-hospital setting, the concept of quality and its assessment by means of indicators does not seem to be the same as in hospital settings, probably due to its relative recent appearance and to the fact that emergency and out-of-hospital medical emergency services (MES) have been developed fundamentally since the 1980s and 1990s on the framework of the National Health System and, in continuity, of very diverse emer-

gency services. Among them were those provided by the Red Cross, those provided by the Social Security health care units and some other volunteer-based services².

There is no doubt that quality must be measured using valid and reliable tools. One way to do this would be through the implementation of quality indicators (QI), which are used to determine outcomes of care and enable comparative assessment. QIs are defined as a "measurement tool used as a guide to monitor, evaluate and improve the quality of important aspects of care practice"³. These have the advantage of measuring specific aspects of care⁴. A QI has to have three main characteristics: validity (ability to identify situations in which the quality of care can be improved), sensitivity

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(ability to detect all cases in which a real quality situation or problem occurs) and specificity (ability to detect those cases in which quality problems exist)⁵.

The primary purpose of MESs is the timely and safe delivery of patients to a definitive hospital care, with prior action in a non-health context. Historically, the measurement of the quality of care in these services has been carried out largely on the basis of criteria such as unit activation time intervals, response time or other care measures such as patient satisfaction with the care received^{6,7} or the survival rate of out-of-hospital cardiac arrest⁸. However, there is an abundance of literature suggesting that adherence to such measures has limited benefits, as they can only be applied to selected patients and are insufficient in themselves to assess the quality of out-of-hospital emergency care provided by MES⁹⁻¹³.

The development and implementation of QIs in MESs is still complicated, since in addition to the variability of the emergency, there is also the geographical distribution, the difficulty of direct quality control of assistance and the fact that the assistance process ends up in different organizations¹⁴. Speed, severity, the pressure of the environment and the possible consequences for the health and life of patients put professionals and professionals at risk. Evaluating the quality of care in out-of-hospital emergencies is of fundamental importance, given that the results of inappropriate actions or failure to comply with quality standards can be harmful for the patient and even for the responders¹⁵. However, until recently there were no indicators specifically referring to the out-of-hospital setting and their development has been different in different parts of the world. It has been necessary to raise awareness of the role acquired within the health sector in order to begin to apply improvement tools that had previously only been used in the hospital setting^{16,17}.

In the last two decades, the scientific literature has focused on developing QIs to assess out-of-hospital emergency care, making significant advances¹⁸⁻²². QIs have the advantage not only of documenting the quality of care, but also of helping to benchmark and guide prioritization of improvement initiatives that support accountability and transparency of overall health care. Little is known about the existence and development of specific QIs for the out-of-hospital setting, therefore, it is necessary to have studies that identify them and then drive the development of more evidence-based QIs that are less simplistic and, at the same time, reflect the quality of care in out-of-hospital emergencies, especially in terms of results^{14,23,24}. Therefore, the objective of this systematic review is to identify and analyze published QIs based on scientific data that specifically evaluate out-of-hospital emergency care.

Method

A systematic review of the scientific literature according to the PRISMA guidelines was carried out in order

to identify the studies related to the topic. Five electronic databases (PubMed, Scopus, CINAHL, Cochrane Library Plus and Web Of Science Core Collection) were searched between November 2017 and July 2018. The search strategy included a combination of the following terms: "quality indicators", "prehospital emergency care", "total quality management", "Emergency Medical Services", "healthcare quality", "healthcare quality assessment" and "ambulance service". Details of the search strategy are shown in Table 1. Full text published studies were selected with the following inclusion criteria: a) scientific literature published between 2003 and 2018, thus ensuring the inclusion of the most recent research of the last 15 years, written in Spanish or English; b) research designs corresponding to clinical trials, other systematic reviews, observational studies and qualitative designs; c) studies proposing at least one QI evaluating out-of-hospital emergency care, excluding studies containing QIs used by other emergency organisations, such as fire and rescue services or hospital emergency services.

Studies were evaluated according to their title and abstract. Full text versions of potentially relevant articles

Table 1. Search strategy

Scopus:

(TITLE-ABS-KEY ("quality indicator") OR TITLE-ABS-KEY ("healthcare quality assessment") AND TITLE-ABS-KEY (emergency AND medical AND services) OR TITLE-ABS-KEY (prehospital AND emergency)) AND (LIMIT-TO(PUBYEAR, 2018) OR (LIMIT-TO(PUBYEAR, 2017) OR (LIMIT-TO(PUBYEAR, 2016) OR (LIMIT-TO(PUBYEAR, 2015) OR (LIMIT-TO(PUBYEAR, 2014) OR (LIMIT-TO(PUBYEAR, 2013) OR (LIMIT-TO(PUBYEAR, 2012) OR (LIMIT-TO(PUBYEAR, 2011) OR (LIMIT-TO(PUBYEAR, 2010) OR (LIMIT-TO(PUBYEAR, 2009) OR (LIMIT-TO(PUBYEAR, 2008) OR (LIMIT-TO(PUBYEAR, 2007) OR (LIMIT-TO(PUBYEAR, 2006) OR (LIMIT-TO(PUBYEAR, 2005) OR (LIMIT-TO(PUBYEAR, 2004) OR (LIMIT-TO(PUBYEAR, 2003)

PubMed:

("Quality Indicators, Health Care"[Mesh] AND "Emergency Medical Services"[Mesh]) OR (quality[All Fields] AND ("indicators and reagents"[Pharmacological Action] OR "indicators and reagents"[MeSH Terms] OR ("indicators"[All Fields] AND "reagents"[All Fields]) OR "indicators and reagents"[All Fields] OR "indicator"[All Fields])) AND ("emergency medical services"[MeSH Terms] OR ("emergency"[All Fields] AND "medical"[All Fields] AND "services"[All Fields]) OR "emergency medical services"[All Fields]) AND ("2003/01/01"[PDAT] : "2018/04/01"[PDAT])

CINAHL:

quality indicators AND emergency medical services OR healthcare quality AND prehospital emergency care AND ambulance service - Published Date: 20030101-2018123- Interface - EBSCOhost Research Databases Search screen - Advanced Search Database - CINAHL with Full Text.

Web Of Science Core Collection:

TOPIC: (quality indicator) AND TOPIC: (emergency medical services) OR TOPIC: (quality healthcare) AND TOPIC: (prehospital emergency care) AND TOPIC: (ambulance service) Refined by: PUBLICATION YEARS: (2018 OR 2011 OR 2005 OR 2017 OR 2010 OR 2004 OR 2016 OR 2009 OR 2003 OR 2015 OR 2008 OR 2014 OR 2007 OR 2013 OR 2006 OR 2012)

Cochrane Library Plus:

"quality indicator":ti,ab,kw or "quality assessment":ti,ab,kw and "Emergency Medical Services":ti,ab,kw or "prehospital":ti,ab,kw or "ambulance":ti,ab,kw Publication Year from 2003 to 2018 (Word variations have been searched)

were obtained for later review. Clinical cases, articles in non-peer-reviewed journals, meeting abstracts, posters and editorials were excluded. Two authors independently selected the studies (JAZS and VMI). Disagreements were resolved by consensus, with the rest of the investigators (NGA, MECE and MLC) intervening in the disagreements. As a secondary strategy, new articles were manually searched from the bibliographic references cited in the selected studies (inverse search). Finally, extrahospital QIs were manually searched on websites such as those of the Spanish Society of Emergency Medicine (SEMES), the National Quality Forum (NQF), the American Society for Quality (ASQC) and the Institute for Healthcare Improvement (IHI).

After the selection of the studies, an extraction template was used, previously designed to obtain the following data: author, year of publication, country of origin of the study, design, objective(s) and population. The QI was defined as any measure comparing actual attention to ideal criteria, or a tool used to help assess quality.

The selection of variables, methodological quality and assessment of risk of bias were carried out by two reviewers, with the rest of the investigators intervening in the disagreements.

In order to evaluate the methodological quality of the articles, the latest version of the Critical Reading Cards (FLC 3.0), developed by Osteba, Health Technology Assessment Service²⁵, was used. These files are validated by the 8 agencies of the Spanish Network of Health Technology Assessment Agencies. The FLC 3.0 contemplates the evaluation criteria according to the research design that evaluates each card and, in addition, facilitates homogeneity in the evaluation among the reviewers.

Results

A total of 1,732 articles were included. Once duplicates were eliminated (254 in total), the search was expanded using literature reviews and 10 new records were located that met the inclusion criteria. Of the total number of records selected, 1,419 were excluded after reading the title and abstract. Finally, 69 full-text articles were analyzed, of which 47 were excluded and 22 included (Figure 1). Table 2 summarizes the main characteristics of the 22 studies analyzed^{22,26-46}. Most of them came from the United States (8), the rest from Canada (3), Australia (2), the United Kingdom (2), Norway (2), Spain (1), the Netherlands (1), Israel (1), Malaysia (1) and Denmark (1). With regard to the type of design, publications were found with observational design (9), followed by Delphi/RAND/Consensus/Nominal Group designs (8), systematic reviews (4) and bibliographic reviews (1).

Quality indicators in out-of-hospital emergencies

A total of 333 QIs were identified from all the re-

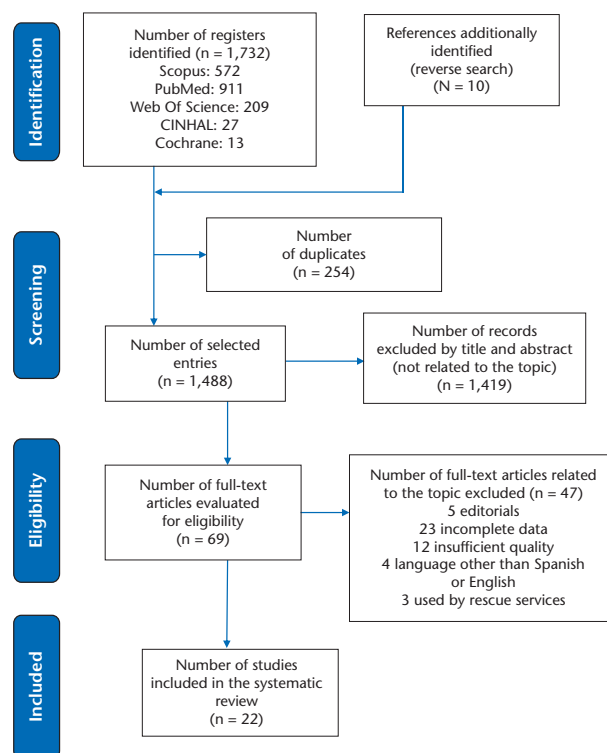


Figure 1. Flowchart showing the PRISMA selection process.

viewed studies. No QIs were identified on the websites consulted: SEMES, NQF, ASQC and IHI. After consensus of all investigators, and although there are different classifications in the literature (process, result, activity, etc.), the identified QIs were classified in two basic groups: clinical, 141 (42.34%), and non-clinical, 192 (57.65%), and both in turn were categorized in several subdomains. Clinical QIs were defined as those referring to a specific intervention or related to a specific clinical picture, and the clinical actions derived from it. On the other hand, non-clinical QIs were those that were mainly based on an aspect of service provision not referring to a specific clinical picture, such as available resources, documentation or treatment times.

Additional categorization by clinical QI group subdomains identified were: cardiorespiratory arrest (CRA), general/technical interventions, non-traumatic chest pain/acute coronary syndrome (ACS), airway management, polytrauma, stroke, epileptic seizures, respiratory problems and hypoglycaemia. CRA provided the highest number of QIs, with 37 (26%), followed by general/technical interventions, with 35 (23.9%), and non-traumatic chest pain/ACS, with 22 (15.7%). The subdomain with the lowest number of QIs in this group was epileptic seizures, with 2 (1.3%), followed by hypoglycaemia, with 3 (2%).

Additional categorization by non-clinical QI group subdomains were: documentation, interval/response times, financing/resources, patient reception, adverse effects, research, patient satisfaction, triage. Time inter-

Table 2. Studies included in the systematic review

Author	Year of publication	Country of origin	Design	Objectives	Population
O'Meara ²⁶	2005	Australia	Bibliographic review	Explore existing and potential performance frameworks for ambulance services in Australia	Not reported
Patterson <i>et al.</i> ²⁷	2006	USA	Retrospective	Present an easy to calculate indicator for the availability of the MES resources	Adult
Willis <i>et al.</i> ²⁸	2007	Australia	Sistematic review and meta-analysis	Analyze the use of QIs in traumatic patient's care	Mix
Rosengart <i>et al.</i> ²⁹	2007	USA	Delphi Method	Identifies the most important pre-hospital trauma care	Not reported
Grudzen <i>et al.</i> ³⁰	2007	USA	RAND/UCLA Method	To develop simple QIs for the adequacy of CPR in prehospital traumatic cardiac arrest.	Adult
Myers <i>et al.</i> ³¹	2008	USA	Quantitative descriptive	Develop QIs as a model to follow in AMI, EAP, bronchospasm, epileptic status and trauma.	Not reported
Colwell <i>et al.</i> ³²	2009	USA	Retrospective Cohort	To determine the quality of pre-hospital care in patients with non-traumatic ACS.	Adults (20-39 years-old) (40-50 years-old) and (> 50 years-old)
Bevan <i>et al.</i> ³³	2009	UK	Quantitative descriptive	Examine adverse events in the UK for Emergency calls	Not reported
Stelfox <i>et al.</i> ³⁴	2010	Canada	Sistematic review	Review QI literature to assess pediatric trauma care	18 years-old
Siriwardena <i>et al.</i> ²²	2010	England	Quantitative descriptive	Develop QIs in: AMI, CRA, stroke, asthma and hypoglycaemia	Not reported
Stelfox <i>et al.</i> ³⁵	2011	Canada	Sistematic review	Systematically review evidence on the reliability, validity and implementation of QIs to assess trauma care.	Adults 18 años
De la Fuente <i>et al.</i> ³⁶	2013	Spain	Delphi method	Develop QIs to assess the quality of the patient safety in MESS	Not reported
Daudelin <i>et al.</i> ³⁷	2013	USA	Focal group	Develop QIs to assess pre-hospital CVA care	Adults
Hoogervorst <i>et al.</i> ³⁸	2013	Netherlands	Delphi method	To draw up process guidelines with an expected positive relationship with survival or functional outcome in trauma care.	Not reported
Gitelman <i>et al.</i> ³⁹	2013	Israel	Sistematic review	Develop road safety QIs in TM systems in European countries that allow comparisons	Not reported
Santana <i>et al.</i> ⁴⁰	2014	Canada	RAND/UCLA method	To develop and evaluate QIs in adult lesion management.	Adults
Oostema <i>et al.</i> ⁴¹	2014	USA	Prospective cohort	To examine QI compliance among patients with CVA transported by MES and the relationship between compliance and response to CVA in the hospital.	Adults
Patterson <i>et al.</i> ⁴²	2014	USA	Modified Delphi	Detection of adverse events in HEMS	Adults
Rahman <i>et al.</i> ⁴³	2015	Malasya	Descriptive quantitative	Apply knowledge, data and experience to assess and improve MES	Not reported
Christensen <i>et al.</i> ⁴⁴	2016	Denmark	Descriptive quantitative	Describe the design and implementation of QEMS, a new Danish clinical quality database	Adults and pediatrics
Haugland <i>et al.</i> ⁴⁵	2017	Norway	Modified nominal group	Develop a set of QIs for P-EMS	Not reported
Kjøllestadal <i>et al.</i> ⁴⁶	2017	Norway	Descriptive quantitative	Develop new QIs and introduce them into a new national working group register	Not reported

CVA: cerebrovascular accident; EMS: medical emergency service; HEMS: helicopter emergency medical service; AMI: acute myocardial infarction; QI: quality indicator; P-EMS: physician emergency medical service; QEMS: quality database for emergency medical services; CPR: cardiopulmonary resuscitation; ACS: acute coronary syndrome; MES: out-of-hospital emergency medical service; TM: trauma management.

vals, with 53 (28.1%) cases, provided the greatest number of QIs, followed by documentation, with 43 (21.6%), and resources, with 40 (20.1%). The subdomain with the lowest number of QIs in this group was research, with 11 (5.5%) and patient satisfaction and triage, with 12 (6%).

Table 3 and Table 4 show the number of QIs belonging to each subdomain, for both clinical and non-clinical QIs, provided by each specific study.

Regarding the analysis of the methodological quality

of the studies included, two publications with a low level of evidence were identified, so the information provided on the development of QI was not considered relevant in comparison with studies that obtained medium evidence (7 studies) and high evidence (5 studies). For the rest of the articles, given the use of methodologies such as Delphi/RAND/Consensus/Nominal Group (8 studies) with little or no discussion of the evidence base underlying each of the articles, the evaluation was abandoned for these types of methodology.

Table 3. Number of clinical quality indicators by subdomain

Author	Year	QI number	CRA	Technical/ general interventions	Non. traumatic/ ACS chest pain	Airway manage- ment	Politrau- matism	CVA	Epileptic seizures	Respiratory problems	Hypo- glycemia
O'Meara ²	2005	3	1	2							
Rosengart <i>et al.</i> ²⁹	2007	15		11		4					
Grudzen <i>et al.</i> ³⁰	2007	28	28								
Myers <i>et al.</i> ³¹	2008	11	1		3		2		2	3	
Colwell <i>et al.</i> ³²	2009	8			8						
Stelfox <i>et al.</i> ³⁴	2010	11		5		2	4				
Siriwardena <i>et al.</i> ²²	2010	22			11			3		5	3
Stelfox <i>et al.</i> ³⁵	2011	9	1	3		2	3				
Daudelin <i>et al.</i> ³⁷	2013	5						5			
Hoogervorst <i>et al.</i> ³⁸	2013	8		4			4				
Santana <i>et al.</i> ⁴⁰	2014	5		3		1	1				
Oostema <i>et al.</i> ⁴¹	2014	2						2			
Patterson <i>et al.</i> ⁴²	2014	6	1	5							
Rahman <i>et al.</i> ⁴³	2015	3	1	2							
Christensen <i>et al.</i> ⁴⁴	2016	3	2					1			
Kjøllesdal <i>et al.</i> ⁴⁶	2017	2	2								
Total [n (%)]		141 (100)	37 (26.2)	35 (24.8)	22 (15.6)	9 (6.4)	14 (9.9)	11 (7.8)	2 (1.4)	8 (5.7)	3 (2.1)

CVA: cerebrovascular accident; QI: quality indicator; CRA: cardiorespiratory arrest; ACS: acute coronary syndrome.

On the other hand, the assessment of the risk of bias was not performed since no study included in the review was of an experimental design.

Discussion

The results of this review show a considerable amount of QI evaluating care in out-of-hospital emergencies. No specific previously published review has been identified. It is evident that there is a growing interest in measuring and evaluating quality in the out-of-hospital setting largely due to the number of publications produced in recent years, which may be linked to the creation of a greater number of out-of-hospital care units in different parts of the world

and the importance that these units are being given in turn in first world countries.

Most of the published research identified by this review was in English and originated mainly in the United States, followed by Canada and Australia. As far as Europe itself, Norway, the United Kingdom and Denmark provided evidence, while in the rest of Europe there is little published research on the subject. However, even though it is not an objective of this study, it is interesting to note that the MES models used in these countries vary significantly. The US approach uses emergency technicians as frontline personnel and relies heavily on the supervision of the coordinating physician for its management^{26,29-32,34,35,37,40-42}. This is somewhat similar to the British and Australian approaches, where non-medical professionals, called

Table 4. Number of non-clinical quality indicators by subdomain

Author	Year	QI number	Documen- tation	Interval Time/ response	Financing/ resources	Admission of patient	Adverse effects	Research	Patient's satisfaction	Triage
O'Meara ²⁶	2005	15	2	4	3	3			3	
Patterson <i>et al.</i> ²⁷	2006	1			1					
Willis <i>et al.</i> ²⁸	2007	2	1	1						
Rosengart <i>et al.</i> ²⁹	2007	13		2		3				8
Myers <i>et al.</i> ³¹	2008	1		1						
Bevan <i>et al.</i> ³³	2009	4		4						
Stelfox <i>et al.</i> ³⁴	2010	18	10	3		2	2			1
Stelfox <i>et al.</i> ³⁵	2011	12	3	3		3				3
De la Fuente <i>et al.</i> ³⁶	2013	41	10	10	7			10	4	
Hoogervorst <i>et al.</i> ³⁸	2013	13	3	8		2				
Gitelman <i>et al.</i> ³⁹	2013	12		3	9					
Santana <i>et al.</i> ⁴⁰	2014	3	1	1	1					
Oostema <i>et al.</i> ⁴¹	2014	6	2	2			2			
Patterson <i>et al.</i> ⁴²	2014	7	1	1	3		2			
Rahman <i>et al.</i> ⁴³	2015	10	2	1	4	1		1	1	
Christensen <i>et al.</i> ⁴⁴	2016	6	1	3	2					
Haugland <i>et al.</i> ⁴⁵	2017	26	7	4	10		3		2	
Kjøllesdal <i>et al.</i> ⁴⁶	2017	2		2						
Total [n (%)]		192 (100)	43 (22.4)	53 (27.6)	40 (20.8)	14 (7.3)	9 (4.7)	11 (5.7)	10 (5.2)	12 (6.2)

QI: quality indicator.

paramedics, are in charge of carrying out the first care^{22,26,28,33}. However, all of them start from the common premise of health systems with a high orientation towards the efficiency of services and with quality evaluation systems that have been in place for many years. On the contrary, the Franco-German model, used in parts of Europe and in Spain today, uses doctors, nurses and technicians in health emergencies as frontline personnel³⁶, while in northern Europe, nursing professionals specialised in the out-of-hospital setting are responsible for the timely care and delivery of the patient⁴⁴⁻⁴⁶. The latter approach also coexists with the Franco-German model in some Spanish autonomous communities. However, evaluating out-of-hospital emergency care using QI should be applied in the same way, regardless of the approach used in each country. That said, the fact that there are more publications on the subject in these countries seems to be more related to the fact that it is Anglo-Saxon cultures that, in general terms, publish more at a scientific level in health areas and not to the fact that they follow a specific type of out-of-hospital care model.

Based on the results, we found a higher number of QIs in the non-clinical field. According to De la Fuente et al.³⁶, QIs related to time intervals continue to influence the measurement of quality within the out-of-hospital setting, as they constitute the largest subdomain among the non-clinical indicators in this review, followed by the documentation subdomain, since, according to Stelfox et al.³⁴, both the implementation and reporting of QIs for later comparison over time is of vital importance. Within the group of clinical indicators, out-of-hospital cardiac arrest and general/technical interventions provided the largest number of QIs within this category. In the study conducted by Grudzen et al.³⁰, 28 QIs related to out-of-hospital traumatic cardiac arrest were developed, due to the large known impact these have on outcomes for patients in the prehospital setting. On the one hand, there are several studies^{28,29,34,35,38,39} in which QIs are developed in a common pathology such as trauma care, while in other studies^{22,31,32,37,41} they refer to other no less important out-of-hospital pathologies, such as ACS, bronchospasm, epileptic status, stroke and hypoglycaemia. As for the population under study, the QIs were developed mainly in adult population^{27,30,32,35,37,40-42}, but also focused on paediatric³⁴ and mixed population (adults and paediatrics)^{27,44}, while other works^{22,26,29,31,33,36,38,39,43,45,46} do not identify the population under study.

In a similar way, it appears from this review that there is no consensus on QIs in the pre-hospital setting within organisational quality frameworks. The success of measuring and evaluating quality, whether by implementing QIs or by any type of methodology, such as direct observation, activation tools or mortality reviews, is limited by the methodological rigour of the system that operates them and by its capacity to guarantee the completion of the evaluation within a quality improvement process. For this reason, it is vital to consider a quality framework that includes the implementation of

QIs combined with other quality measurement strategies, since this not only guarantees their proper use, but also strengthens their relationship with the final experience and outcome of patient care.

The most representative limitations of this study are those derived from the methodology of systematic reviews (possibility of selection and publication bias), although the risk of bias was not evaluated given that no study was experimental. Another limitation is the exclusion of publications in languages other than those selected. Finally, no meta-analysis could be carried out given the heterogeneity, quality of the methodologies used and the scarcity of publications in this regard.

Despite the existing limitations, we can conclude that in this study a greater number of non-clinical QIs are identified and, therefore, this field and its corresponding subdomains are the most used to evaluate care in out-of-hospital emergencies. This review provides a basis for developing research on a relatively unexplored topic. Although there is considerable interest in promoting quality measurement in the out-of-hospital setting, current publications are restricted to isolated areas and cannot be generalized. This paper aims to give a current view of the use of QIs worldwide in the out-of-hospital setting, given that QIs can be very valuable in measuring and improving service quality because of their direct importance to the patient. For future research, it would be interesting to identify, develop and analyze the possibility of having a greater number of clinical QIs, as it may be useful to make comparisons between both and at the same time it will be easier to extrapolate and generalize the results.

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