



Setting priorities for an agenda within the Spanish pediatric emergency medicine research network

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Abstract

The research network of the Spanish Pediatric Emergency Society (RISeuP-SPERG Network) needs to establish its research agenda relevant to pediatric emergency medicine (PEM) to guide the development of future projects, as other networks have done before. The aim of our study was to identify priority areas in PEM for a collaborative network of pediatric emergency research in Spain. A multicenter study was developed including pediatric emergency physicians from 54 Spanish emergency departments, endorsed by the RISEuP-SPERG Network. Initially, a group of seven PEM experts was selected among the members of the RISEuP-SPERG. In the first phase, these experts elaborated a list of research topics. Then, using a Delphi method, we sent a questionnaire with that list to all RISEuP-SPERG members, to rank each item using a 7-point Likert scale. Finally, the seven PEM experts, using a modified Hanlon Process of Prioritization, weighted prevalence (A), seriousness of the condition (B), and feasibility of conducting research projects (C) on that condition to prioritize the selected items. Once the list of topics was chosen, the seven experts selected a list of research questions for each of the selected items. The Delphi questionnaire was answered by 74/122 (60.7%) members of RISEuP-SPERG. We established a list of 38 research priorities related to quality improvement (11), infectious diseases (8), psychiatric/social emergencies (5), sedoanalgesia (3), critical care (2), respiratory emergencies (2), trauma (2), neurologic emergencies (1), and miscellanea (4).

Conclusion: The RISEuP-SPERG prioritization process identified high-priority PEM topics specific to multicenter research that may help guide further collaborative research efforts within the RISEuP-SPERG network to improve PEM care in Spain.

What is Known:

- Some pediatric emergency medicine networks have established their priorities for research.

What is New:

- After a structured process, we have set the research agenda for pediatric emergency medicine in Spain. By identifying high-priority pediatric emergency medicine research topics specific to multicenter research, we may guide further collaborative research efforts within our network.

Keywords Network · Quality improvement · Research

Abbreviations

ED	Emergency department
HPP	Hanlon Process of Prioritization
IQR	Interquartile range

PEM	Pediatric Emergency Medicine
PECARN	Pediatric Emergency Care Applied Research Network
PERUKI	Pediatric Emergency Research in the United Kingdom and Ireland
PERC	Pediatric Emergency Research Canada
PREDICT	Pediatric Research in Emergency Departments International Collaborative Research in European Pediatric Emergency Medicine
REPEM	Research in European Pediatric Emergency Medicine
RISeuP-SPERG	Spanish Pediatric Emergency Research Network

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A complete list of study group members appears in the Acknowledgements.

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SEUP Spanish Pediatric Emergency Society
 SIG Special interest groups

Introduction

The creation of collaborative networks has given a significant boost to research in pediatric emergency medicine (PEM) [1]. The expanded access afforded by these networks enables investigators to assemble larger patient samples and study less prevalent diseases within a reasonable time frame. In addition, network-facilitated collaboration between geographically distant hospitals makes it possible to analyze variability in the management of diseases and acute injuries in children [2, 3]. Finally, these networks connect investigators from different institutions, giving clinicians from organizations with more limited research resources the opportunity to partner with colleagues from other centers with higher patient volumes.

Despite these benefits of collaboration, many networks have limited resources, and few of the research proposals drafted by members are put into practice. It is therefore necessary to establish priority lines of research so as to distribute both human and economic resources effectively. For this reason, several research networks have set formal research agendas in recent years [4–9].

The Research Network of the Spanish Pediatric Emergency Research Group (RISeuP-SPERG) was founded in 2011 under the aegis of the Steering Committee of the Spanish Pediatric Emergency Medicine Society (SEUP). In 2021, RISeuP-SPERG comprised 127 investigators from 54 emergency departments (ED). The network has an operating structure and financing system [10], and its activity is disseminated through its website (www.sperg.es), Facebook, and Twitter. The mission of RISeuP-SPERG is to facilitate high-quality multi-institutional research for the prevention and treatment of diseases and acute injuries in children and adolescents [11]. Like other networks, RISeuP-SPERG focuses its efforts on a particular geographic area. Members are encouraged to submit research proposals for evaluation, and each year winning submissions are selected. In its first 10 years of the initiative, 18 papers have been published with network support.

Objective

The aim of the study was to identify areas of priority in PEM for a collaborative network of pediatric emergency research in Spain.

Methods

We systematically followed a four-phase process (Fig. 1) consisting of face-to-face meetings and a modified Delphi process consisting of two web-based surveys and one

face-to-face meeting [12]. The modified Delphi method has been previously used in other research priority setting initiatives in PEM [5, 6, 9].

Initial phase

A seven-member expert panel was formed at the beginning of the study, made up of the four members of the network with the highest impact factor over the previous 5 years, the principal investigators of the two most recent studies supported by the network, and the Scientific Chairman of the SEUP Steering Committee.

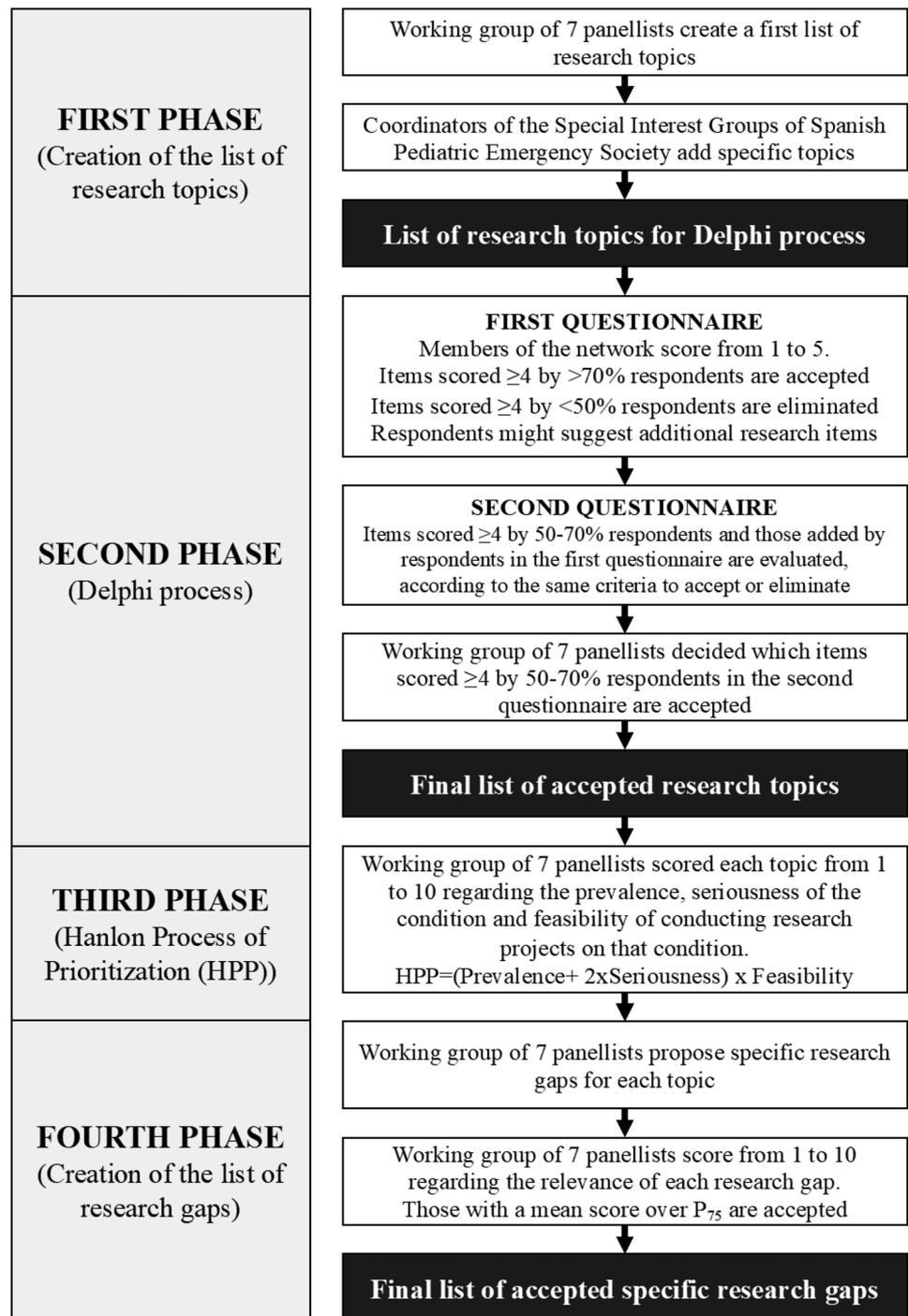
The panelists held two meetings by videoconference. In the first meeting, the members drafted a list of potential research topics, grouped by medical condition. The list was created using a brainstorming method and based on similar lists published by other networks [5–9]. After the first meeting, the list was sent to the coordinators of the 14 special interest groups (SIG) of SEUP to add more topics.

Second phase

In the second phase, using the Delphi method, a questionnaire with the list from the first phase was forwarded to all the 127 members of RISeuP-SPERG by email. Participants were asked to evaluate the clinical relevance of each item on the list using a 5-point Likert scale, 1 indicating the lowest level of importance and 5 the highest. For those topics given a score of 1 or 5, respondents were asked to provide a brief explanation of the reasons for such a rating. Non-respondents were sent email reminders 2, 4, and 8 weeks after the initial email. Those items given a score ≥ 4 by at least 70% of the site investigators were included in the final list (see below), and those that obtained less than 50% were dropped. A second questionnaire was sent to participants who answered the first one containing those items given a score of ≥ 4 by 50% to 70% of respondents, as well as the feedback from respondents who gave priority scores of 1 or 5 points for these topics. The topics of the second list were included or eliminated in accordance with the same criteria as the first questionnaire, and those items scoring ≥ 4 by 50% to 70% of respondents in the second questionnaire were discussed by the working group and included in the final list if at least four of the seven panelists considered them relevant.

We computed the median score along with the interquartile range (IQR) and the mean score along with 95% confidence intervals for the priority ratings. In Delphi studies, the IQR serves as an indicator of consensus within participants' ratings. An IQR ≤ 1 is considered "strong consensus" for items rated on a 5-point scale [13].

Fig. 1 Methodologic flow chart



Third phase

In the third phase, the panelists prioritized the topics included in the final list resulting from the Delphi process using a modified Hanlon Process of Prioritization (HPP) [14]. For each condition, panelists evaluated the prevalence (A), seriousness of the condition (B), and feasibility of conducting

research projects (C) on a scale of 1 to 10. An HPP score was calculated for each item using the mean scores given by the seven panelists for each of the three domains as follows:

$$HPP = (A + 2B) \times C$$

This process was carried out by online survey.

Fourth phase

In the fourth and final phase, the panelists were asked to propose specific research questions for each topic included in the final list. Once all panelists had sent their questions, an online survey was created, including all the questions. Panelists scored the relevance of each research question using a 10-point scale, with 1 being the lowest level of importance and 10 the highest. Those questions with a mean score of P_{75} or higher were included.

The study was endorsed by the RISeuP-SPERG network. Since the study did not involve patient participation, ethics approval was not requested.

Results

Phase 1 A list of 77 research topics was created by the main working group. The SIG coordinators included nine additional topics.

Phase 2 The first Delphi questionnaire, including 86 topics, was sent to the 127 members of RISeuP-SPERG, and 82 (64.6%; 80 pediatricians and 2 nurses) of them completed the questionnaire. Sixteen topics (18.6%) were accepted and 39 (45.3%) were dropped. A second questionnaire with the remaining 31 topics and three additional ones suggested added to the first questionnaire by the SIG coordinators was sent to the 82 respondents. We received answers from 74 participants (90.2%; 72 pediatricians and 2 nurses); 9 topics (26.5%) were accepted and 5 (14.7%) were eliminated. The remaining 20 topics were discussed by the main working group, which decided to include 13 topics in the definitive list. The overview of the entire Delphi process is shown in Fig. 2, and the evaluation of each topic appears in Supplementary Table 1. Table 1 shows the number of topics related to each category included in the final list.

Phase 3 Table 2 shows the results of the HPP for each of the 38 topics included. Among the ten topics obtaining the highest priority, four were related to quality improvement and three concerned sedoanalgesia.

Phase 4 A list of 128 gaps in the research was proposed, and after the seven panelists evaluated their relevance, 31 were included in the list. “Febrile infant” (4), “shock” (3), and “urinary tract infection” (3) were the topics for which the highest number of research questions were gathered. Table 3 shows the complete list.

Comparison with prior research priorities

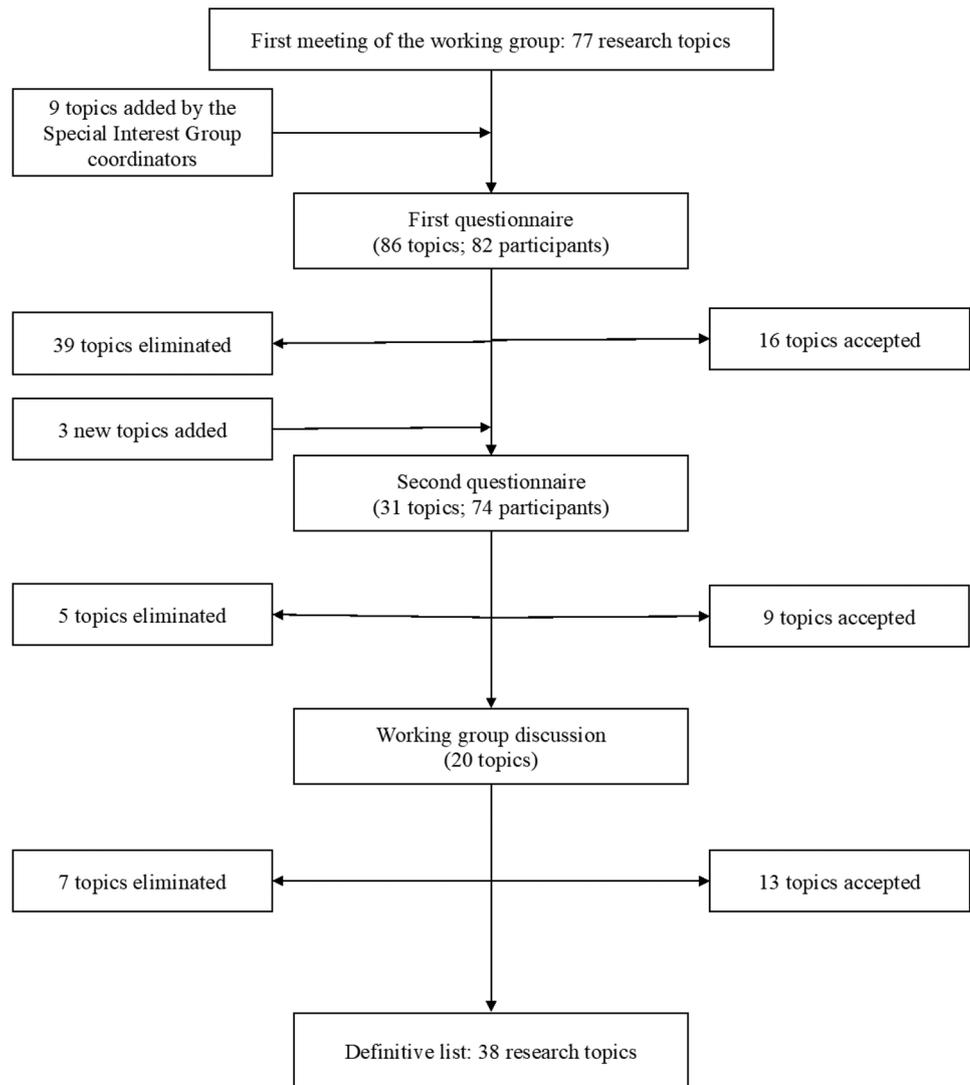
Table 4 shows the topics and rankings from this process compared to prior research priority setting initiatives in the ED setting [5–9]. Since the studies of Hartshorn et al. (Pediatric Emergency Research in the United Kingdom and Ireland (PERUKI)) and Deane et al. (Pediatric Research in Emergency Departments International Collaborative (PREDICT)) elaborated a list of research questions, we have incorporated to the table the topics which the top five questions referred to. Among the top five priorities of our network, there were three matches with Pediatric Emergency Research Canada’s (PERC) top five, one match with Pediatric Emergency Care Applied Research Network (PECARN) and PERUKI, and zero matches with Research in European Pediatric Emergency Medicine (REPEM) and PREDICT.

Discussion

This is the first study to establish the research priorities of PEM clinicians in Spain. The top research topics include questions on quality improvement, sedoanalgesia, and infectious and respiratory diseases; the main research gaps were related to infectious diseases and critical care. Research topics concerning quality improvement were deemed as priority areas by respondents, likely because they affect all patients seen in the ED. However, most RISeuP-SPERG members are clinicians, which may explain why the specific research questions addressed clinical conditions that present frequently to the ED and for which evidence is lacking. Also, it should be noted that most of the panelists have a background in research on infectious diseases, mainly in the febrile infant and urinary tract infections [15–21], which may have led the participants to formulate research questions about these issues.

The RISeuP-SPERG network was created in 2011 [10]. Since then, the number of research proposals has increased each year. Nevertheless, clinical PEM research in Spain is carried out in EDs with limited staff and resources, as most of the working hours are dedicated to clinical practice. Furthermore, funding for research is scarce. For this reason, it is necessary to establish and disseminate priority areas of research, as done by other networks [4–9].

Certain similarities can be found between our top research topics and those obtained by the PERC research network [6]. In both, quality improvement and the use of clinical decision support tools in infectious diseases were the main priorities. However, the research gaps selected in our study contrasted with other networks, such as REPEM and PREDICT [5, 8]. On the one hand, our questions were

Fig. 2 Overview of the Delphi process

more focused on infectious diseases, mainly in the selection of low-risk patients suitable for conservative management, while the priorities established by other networks, such as PERUKI, tended to address the critical patient. In addition,

Table 1 Results of the Delphi process: number of topics related to each category included in the final list

Category	Topics
Quality improvement	11
Infectious diseases	8
Social/psychiatric problems	5
Miscellanea	4
Sedoanalgesia	3
Respiratory diseases	2
Critical care	2
Trauma	2
Neurology	1

our agenda has been set a few years later than that of the other networks, and in that time, some of the research questions established by them have been the object of research by other researchers, which makes these questions less relevant to our network.

One strength of our list of topics is that they were designed by a set of panelists with expertise in research and were externally validated through a Delphi process. The Delphi method was specifically designed to build consensus on clinical best practices through iterative and controlled interaction between diverse respondents across geographic locations [22, 23]. Unlike other exploratory qualitative methods such as interviews and focus groups, respondents are blinded to the responses of the other participants, and no individual can dominate or influence group thinking. At the same time, panelists learn about group responses during the process and can reconsider their own position in subsequent phases. Thus, the Delphi process facilitates consensus

Table 2 Results of the Hanlon Prioritization Process for each research topic

Category	Research topic	P	S	F	Total
<i>Quality improvement</i>	Quality of care	10	9	8	224
<i>Quality improvement</i>	Triage	10	8	8	208
<i>Sedoanalgesia</i>	Sedoanalgesia for procedures	6	8	9	198
<i>Infectious diseases</i>	Meningitis, encephalitis	4	9	9	198
<i>Quality improvement</i>	Clinical decision support tools	8	8	8	192
<i>Infectious diseases</i>	Febrile infant	7	7	9	189
<i>Respiratory diseases</i>	Bronchiolitis	7	7	9	189
<i>Sedoanalgesia</i>	Acute pain	8	7	8	176
<i>Sedoanalgesia</i>	Sedoanalgesia	7	7	8	168
<i>Quality improvement</i>	Simulation training	8	8	7	168
<i>Quality improvement</i>	Patient safety	10	9	6	168
<i>Quality improvement</i>	Satisfaction of patient/family	10	7	7	168
<i>Respiratory diseases</i>	Respiratory failure	6	9	7	168
<i>Infectious diseases</i>	Sepsis	4	10	7	168
<i>Respiratory diseases</i>	Asthma	7	7	8	168
<i>Infectious diseases</i>	Urinary tract infection	7	5	9	153
<i>Infectious diseases</i>	Antibiotic stewardship	7	6	8	152
<i>Quality improvement</i>	Healthcare worker education	9	8	6	150
<i>Infectious diseases</i>	Fever in the immunocompromised child	3	9	7	147
<i>Quality improvement</i>	Missed opportunities for improving diagnosis	6	9	6	144
<i>Infectious diseases</i>	Wellness and safety of staff	8	8	6	144
<i>Critical care</i>	Shock	4	10	6	144
<i>Infectious diseases</i>	Pneumonia	6	6	8	144
<i>Trauma</i>	Head trauma	6	6	8	144
<i>Miscellanea</i>	Point-of-care tests	6	6	8	144
<i>Quality improvement</i>	Resource management	9	7	6	138
<i>Social/psychiatric problems</i>	Suicide	4	9	6	132
<i>Social/psychiatric problems</i>	Physical abuse	4	9	6	132
<i>Infectious diseases</i>	Bone/joint infection	4	6	8	128
<i>Miscellanea</i>	Poisoning	4	6	8	128
<i>Trauma</i>	Major trauma	3	9	6	126
<i>Miscellanea</i>	Patient with special needs	4	7	7	126
<i>Quality improvement</i>	Communication (clinician-patient, ED-other areas)	9	8	5	125
<i>Neurology</i>	Stroke	2	9	6	120
<i>Social/psychiatric problems</i>	Child abuse and new technologies	4	8	6	120
<i>Miscellanea</i>	Point-of-care ultrasound	5	6	7	119
<i>Social/psychiatric problems</i>	Risk behavior/recreational poisoning	3	7	6	102
<i>Social/psychiatric problems</i>	Psychosomatic disorder	5	5	4	60

ED emergency department, P prevalence, S seriousness, F feasibility

through anonymous communication, avoiding confrontation [22]. Also, the Hanlon Method for Prioritizing Health Problems is a well-respected technique which objectively takes into consideration explicitly defined criteria and feasibility factors [14]. The method is advantageous when the desired outcome is an objective list of health priorities based on baseline data and numerical values.

Setting the research agenda for PEM in Spain is key to optimizing the research efforts of network members and establishing a long-term strategy. Since the network was

founded, RISeuP-SPERG has aimed to focus on relevant clinical questions by avoiding wasted resources devoted to studies concerning questions that have been already answered, are being studied by other networks, or require sample sizes that are too difficult to obtain in Spain. Also, by making the agenda public, other networks can more easily decide which topics are less worthwhile, since they are currently being studied.

There were some limitations to this study. First, the survey was restricted to the members of the network, and as such

Table 3 Current RISEUP-SPERG research gaps with the highest priority scores

Research ítem	Research gap	Note
<i>Fever in the immunocompromised child</i>	<ul style="list-style-type: none"> • In immunosuppressed children with fever, are there any clinical or laboratory factors associated with a low risk of invasive bacterial infection (IBI)? 	9.09
<i>Sepsis</i>	<ul style="list-style-type: none"> • In children with fever, is any clinical decision support tool better than others to identify in the Emergency Department (ED) patients who are going to develop sepsis? • In children with sepsis, is any clinical or analytical scale superior to others to identify those patients with a worse outcome? 	8.65 7.93
<i>Bone/joint infection</i>	<ul style="list-style-type: none"> • In children with osteoarticular infections, are clinical or laboratory factors associated with a low risk of complications? 	8.51
<i>Shock</i>	<ul style="list-style-type: none"> • In children with hypovolemic shock, is volume administration with saline as effective and safe as volume administration with balanced crystalloids? • In children with shock, is the administration of fluid therapy at 10 ml/kg more effective than 20 ml/kg in reversing the shock situation? • In children with shock, is early infusion of inotropic drugs more effective than later administration in reversing the shock situation? 	8.49 8.18 7.63
<i>Urinary tract infection</i>	<ul style="list-style-type: none"> • In children > 90 days of age with urinary tract infection (UTI), are short-course (5-day) oral antibiotics as effective as 10-day therapy in preventing the risk of kidney scarring and re-infection? • In infants < 90 days of age with UTI, is oral antibiotic treatment as effective as IV in reducing the risk of kidney scarring? • In children with UTI treated with oral antibiotics, what are the predictors of persistence of fever 48 h after the initiation of therapy? 	8.20 8.13 7.74
<i>Quality of care</i>	<ul style="list-style-type: none"> • What is the degree of compliance with the SEUP quality indicators in the different EDs? • In children who seek further care within 72 h of discharge and require admission, what are the most frequent diagnoses? 	8.19 7.66
<i>Patient safety</i>	<ul style="list-style-type: none"> • What is the impact of different strategies on treatment-related safety? • Which drugs most frequently associated with dosing/administration errors in the ED? 	8.16 7.97
<i>Triage</i>	<ul style="list-style-type: none"> • What is the predictive value of vital signs in triage for different diseases? 	8.10
<i>Febrile infant</i>	<ul style="list-style-type: none"> • Does the 22–28-day-old febrile infant have a different prevalence of IBI than infants ≤ 21 days old or infants > 28 days old? • In febrile infants 3–24 months of age, what is the most appropriate temperature cut-off point above which to recommend blood tests to detect occult bacteremia? • In febrile infants 3–24 months of age, are there clinical low risk factors for IBI other than laboratory biomarkers? • In febrile infants < 90 days of age, do patients with a positive <i>Enterovirus/Parechovirus</i> polymerase chain reaction (PCR) in blood or cerebrospinal fluid have a different prevalence of IBI than infants with a negative result? 	8.03 7.79 7.72 7.59
<i>Meningitis, encephalitis</i>	<ul style="list-style-type: none"> • In children with suspected meningitis or encephalitis, does the use of PCR techniques improve management compared to classical diagnostic methods (Gram, culture)? • In children with suspected acute encephalitis, should acyclovir be administered empirically in all patients? 	7.96 7.59
<i>Head trauma</i>	<ul style="list-style-type: none"> • In infants < 90 days of age with scalp haematoma and Glasgow Coma Scale of 15, which factors are associated with a low risk of traumatic brain injury (TBI)? • In children with head trauma, are there any biomarkers of TBI? 	7.85 7.80
<i>Bronchiolitis</i>	<ul style="list-style-type: none"> • In children with bronchiolitis, are there any predictive factors for failure of high-flow oxygen therapy? 	7.78
<i>Suicide</i>	<ul style="list-style-type: none"> • What are the characteristics of children with an attempted suicide in Spanish EDs? • In children with an attempted suicide by drug ingestion, is it necessary to determine paracetamol blood levels routinely? 	7.75 7.65
<i>Simulation training</i>	<ul style="list-style-type: none"> • What is the impact of simulation training on real-world clinical practice? • What are the areas for improvement most frequently detected in critical patient care simulation training? 	7.72 7.63
<i>Missed opportunities for improving diagnosis (MOID)</i>	<ul style="list-style-type: none"> • In children < 5 years of age, what percentage of IBI cases are diagnosed during a second ED visit? • What are the most frequent MOIDs in Spanish EDs? 	7.69 7.66
<i>Stroke</i>	<ul style="list-style-type: none"> • What are the characteristics of children < 16 years of age in whom a stroke code is activated in Spanish EDs? 	7.59

Table 4 Comparison between the top five RISeuP-SPERG priorities and those published by other research networks in previous studies

	PECARN (Miller SZ, et al. <i>Acad Emerg Med</i> 2008) [7]	PERUKI (Hartshorn S, et al. <i>Emerg Med J</i> 2015) [9]	PREDICT (Deane HC, et al. <i>Emerg Med J</i> 2018) [8]	PERC (Bialy L, et al. <i>Acad Emerg Med</i> 2018) [6]	REPEM (Bressan S, et al. <i>Arch Dis Child</i> 2019) [5]	RISeuP-SPERG
1	Respiratory illnesses/asthma	Biomarkers in fever	Asthma	Mental health presentations	Biomarkers in sepsis	Quality of care
2	Prediction rules for high-stakes/low-likelihood diseases	Major trauma	Urinary tract infection	Pain and sedation	Risk stratification in sepsis	Triage
3	Medication error reduction	Sepsis	Major trauma	Practice tools	Practice variation in sepsis	Sedoanalgesia for procedures
4	Injury prevention	Asthma	Cardiopulmonary resuscitation	Quality of care delivery	Practice variation in fever	Meningitis, encephalitis
5	Urgency and acuity scaling	Clinical decision support tools	Septic arthritis/osteomyelitis	Resource utilization	Biomarkers in fever	Clinical decision support tools

PERUKI and PREDICT elaborated a list of research questions, so we have incorporated to the table the topics which the top five questions referred to

may not reflect the opinion of all Spanish PEM providers. However, most EDs with PEM staff are included in our network, so we believe it is unlikely that the list of priorities would differ substantially with a larger sample of respondents. Moreover, and this is probably the main limitation of our study, nearly all respondents were pediatricians. This limitation is due, on the one hand, to the composition of our research network, where nurses accounted for less than 8% of the network members at the time of the study. Therefore, only two of the ten member nurses answered the questionnaire. In addition, the study design did not include families in the working group. In Spain, unlike other countries, the inclusion of families in this type of work has been less frequent until very recently [4, 6]. The authors believe that, although this list of priorities is robust and valid for the present time, this limitation makes it essential to develop a new similar study in the coming years, this time including families and the rest of the participants in the process of care of pediatric patients in the ED. Finally, the first and last phases were conducted by a small group of individuals, which may have introduced bias. Furthermore, this group may have missed subtle nuances of some of the second phase questions.

Conclusion

The RISeuP-SPERG prioritization process identified high-priority PEM research topics specific to multicenter research that may help guide further collaborative research efforts within the network to therefore improve PEM care in Spain.

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Authors' contributions Dr. Velasco designed the study, analyzed the data, wrote the initial draft of the manuscript, and approved the final manuscript as submitted. Dr. Alonso-Cadenas, Dr. de la Torre, Dr. Martínez Mejias, Dr. Mintegi, and Dr. Yañez conceived and designed the study, collaborated in data collection, revised multiple manuscript drafts, and critically revised the final manuscript. Dr. Gomez conceived and designed the study, collaborated in data collection, revised multiple manuscript drafts, and critically revised the final manuscript. All

authors approved the final manuscript as submitted and agree to be accountable for all aspects of the work.

Availability of data and material All data of the study are at disposal of the editor if needed.

Declarations

Ethics approval The study was approved by the Ethics Committee of the Basque Country.

Consent to participate There was no patient involved in the study.

Consent for publication There was no patient involved in the study.

Conflict of interest The authors declare no competing interests.

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