

From cradle to adolescence: the development of Research in European Pediatric Emergency Medicine

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Pediatric emergency medicine (PEM) has been developing rapidly but heterogeneously in many European countries in recent years, and many national PEM societies have been founded to improve the quality of care of ill and injured children and adolescents. Key facets of any such improvement are the development, delivery and translation of high-quality research. Research in European Pediatric Emergency Medicine (REPEM) has developed a robust international structure involving clinicians, academics and national PEM research networks. This structure facilitates research collaboration within Europe and with PEM research networks from other continents. Multicentre research carried out in this way will bring about improvements in the quality of emergency care for children in European emergency departments, and result in a better quality of life for children and adolescents. This paper outlines the background and achievements of REPEM to date and describes the current structure

Introduction

Pediatric emergency medicine (PEM) is a relatively new and evolving discipline with the aim of providing the best emergency care for children. Such care is delivered in all European countries, with over 100 million attendances to emergency departments (EDs) by children and young people every year. However, PEM has been fully established and recognized as a specialty in only a few European or members of the European Society of Emergency Medicine (EuSEM) countries including the UK, Switzerland, Israel, Saudi Arabia, and Turkey (<http://www.pemdatabase.org/REPEM-members.html>).

Research is an integral part of any high-quality medical discipline [1–3]. Although some good research has been published relating to the emergency care of children, it has been sporadic, mostly single centre, with a scarcity of multicentre studies, and does not reflect the evolving discipline. Thus, similar to the status of PEM as a clinical specialty, PEM research is still in its infancy and far from being fully developed.

The high volume of childhood ED encounters highlights the need to develop research that has the potential to support evidence-based medical care in these situations.

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However, there are certain obstacles that impede the development of PEM research, primarily as follows:

- (1) Although large numbers of patients visit the ED, for specific diagnosis, for example, serious bacterial infections, large multicentred studies are needed [4,5].
- (2) We face methodological problems such as definition of the outcome measure. Mostly, a working diagnosis is defined at discharge and follow-up (including revisits at other settings) is missing.
- (3) The number of cases with serious illnesses is low as most patients attending pediatric emergency departments (PEDs) have mild and self-limiting illnesses.
- (4) The applicability of the results may be difficult because of the considerable variability in the different PEDs.
- (5) PEM staff (both physicians and nurses) undertake heavy clinical workloads and do not have protected time set aside for research in most countries.
- (6) The emergency nature of encounters is not always conducive to obtaining informed consent and gathering the necessary medical information from parents.
- (7) Many difficulties exist in gaining funding for PEM research studies from grant-awarding bodies.

To overcome some of the obstacles encountered and to obtain more generalized and meaningful research results, PEM research networks have been established over the last two decades. They all share certain common elements including a collaborative multicentre or a multinational approach to PEM studies, a clearly defined geographical domain, an operating infrastructure, a funding system and a website. As a result, they have delivered high-quality PEM research studies that have had significant impact on current clinical practice following effective dissemination [6,7.]

The aims of this review article are as follows:

- (1) To report on the status of the Research in European Pediatric Emergency Medicine (REPEM) research network including its goals, structure, achievements, and processes.
- (2) To outline the current infrastructure and methods of accessing REPEM to medics, academics, and international organizations (such as the WHO and the Red Cross) who share the vision of further studying and developing emergency care for children in Europe and the Middle East.
- (3) To offer the pharmaceutical, industrial, and technological industries an organized structure for the study of children visiting the ED and subjects related to PEM.

Pediatric emergency medicine organizations in Europe and the Middle East – current status (<http://www.pemdatabase.org/REPEM-members.html>)

In Europe, in recent years, PEM has been developing rapidly but heterogeneously in many countries. In the UK, it received official recognition by the Specialist Training Authority in 2003. In Italy, Spain, France, and Portugal, PEM is not yet a board-recognized specialty, and yet, it is practised by an increasing number of pediatricians in tertiary-level PEDs. In all these countries, PEM societies have been founded with the purpose of improving medical care for acutely ill and injured children (<http://www.pemdatabase.org/REPEM-members.html>). The Spanish society (SEUP), the French society (GFRUP), the Turkish society (CATYBD), the Italian society (SIMEUP), the Israeli society (PEMI) and the British association (APEM) were established in 1995, 1995, 1998, 2000, 2003, and 2004, respectively. Currently, these professional groups include 494, 300, 200, 950, 91, and 245 members, respectively. The last organization to be established, the Swiss society (PEMS), was established in 2010 and has 85 registered members. Annual PEM scientific meetings are held in each of these countries, at which an increasing enthusiasm for collaborative multicentre research throughout Europe has been evident.

With the purpose of promoting the development of PEM in Europe and the Middle East, the pediatric section of the EuSEM was created under the leadership of Professor Yehezkel Waisman in October 2006. Professor Waisman, as a pioneer, established the foundations for the development of emergency medicine in Israel. This culminated in 2000 with it being officially recognized as a subspecialty. These achievements were followed by recognition of the pediatric track within the subspecialty of emergency medicine in 2008 [8]. In the first version of the mission statement of the pediatric section of EuSEM, research already appeared as one of the keys to promote and facilitate the dissemination of knowledge and improve the quality of care in PEM in Europe.

Pediatric emergency medicine research networks

There are several advantages to performing PEM research on a multicentre or on a multinational network level including the following:

- (1) The ability to recruit large numbers of patients with relatively rare conditions within a short period of time.
- (2) Improved generalization of study results because of better representation of different subpopulations, avoiding the inherent bias of local studies.
- (3) Potential for significant impact of results on a large population.
- (4) Contribution towards the further development of PEM as a specialty that is focused on improving emergency care of children through high-quality research.

The following PEM research networks have therefore been established thus far:

- (1) Pediatric Emergency Care Applied Research Network (PECARN) (<http://www.pecarn.org/>).
- (2) Pediatric Emergency Medicine Collaborative Research Committee (PEM CRC) of the American Academy of Pediatrics (AAP) (<http://www.pemcrc.org>).
- (3) Pediatric Emergency Research Canada (PERC) (<http://perc.srv.ualberta.ca/>).
- (4) Pediatric Research in Emergency Departments International Collaborative (PREDICT) (<http://www.pems-aumz.org/PREDICT>).
- (5) And in 2006, the REPEM [9] was established for the European and Middle East regions.

These five networks came together in 2009 to create a global network, Pediatric Emergency Research Networks (PERN), whose intended scope of action is universal [3]. The first PERN project, focusing on H1N1, shows many of the strengths of multinational research outlined above.

However, multicentre or multinational research also poses specific challenges such as (i) the need to establish

mechanisms for study design and approval by a large group of researchers, (ii) differences in regulations and laws between countries and (iii) differences between researchers in customs, culture, and language.

Research in European Pediatric Emergency Medicine – REPEM

History and achievements of Research in European Pediatric Emergency Medicine to date

In line with the developments in the specialty of PEM in Europe, the REPEM network was created in the EuSEM meeting in Crete in 2006, including PEDs within the scope of EuSEM (Europe and Middle East). It initially comprised pediatric emergency physicians from Belgium, Hungary, Italy, Israel, Saudi Arabia, Spain, Turkey, and the UK.

The mission statement was to improve emergency care for children through high-quality multicentre and multinational research, and the objectives of REPEM were as follows:

- (1) To carry out high-level PEM research in Europe by combining the efforts of individual institutions.
- (2) To enhance the image of PEM as a credible academic discipline with its own research agenda.
- (3) To facilitate and promote research activities among participating institutions and develop cohesiveness between centres practising PEM.
- (4) To create a research infrastructure for PEM on an international level in the participating countries.

As only a small number of European countries and individuals were represented in the first iteration of REPEM, the initial governance documents of the network provided a basic structure that was in keeping with international recommendations for the performance of research. This approach was adopted to allow timely commencement of international research collaboration, and it was decided that REPEM would be involved in research studies that could benefit from such collaboration. These benefits included the following:

- (1) The ability to recruit large sample sizes in a short span of time for common conditions such as pediatric respiratory disease and gastrointestinal disease.
- (2) The ability to study low-volume, high-impact issues such as significant head injuries or serious bacterial infections.
- (3) The ability to compare differences in practice, treatment and outcomes between countries and regions for a number of childhood conditions presenting to EDs as a first step towards further study into best practice.

With this structure in place, proposals for research studies were invited from members. The first REPEM study to be selected from this initial call was an assessment

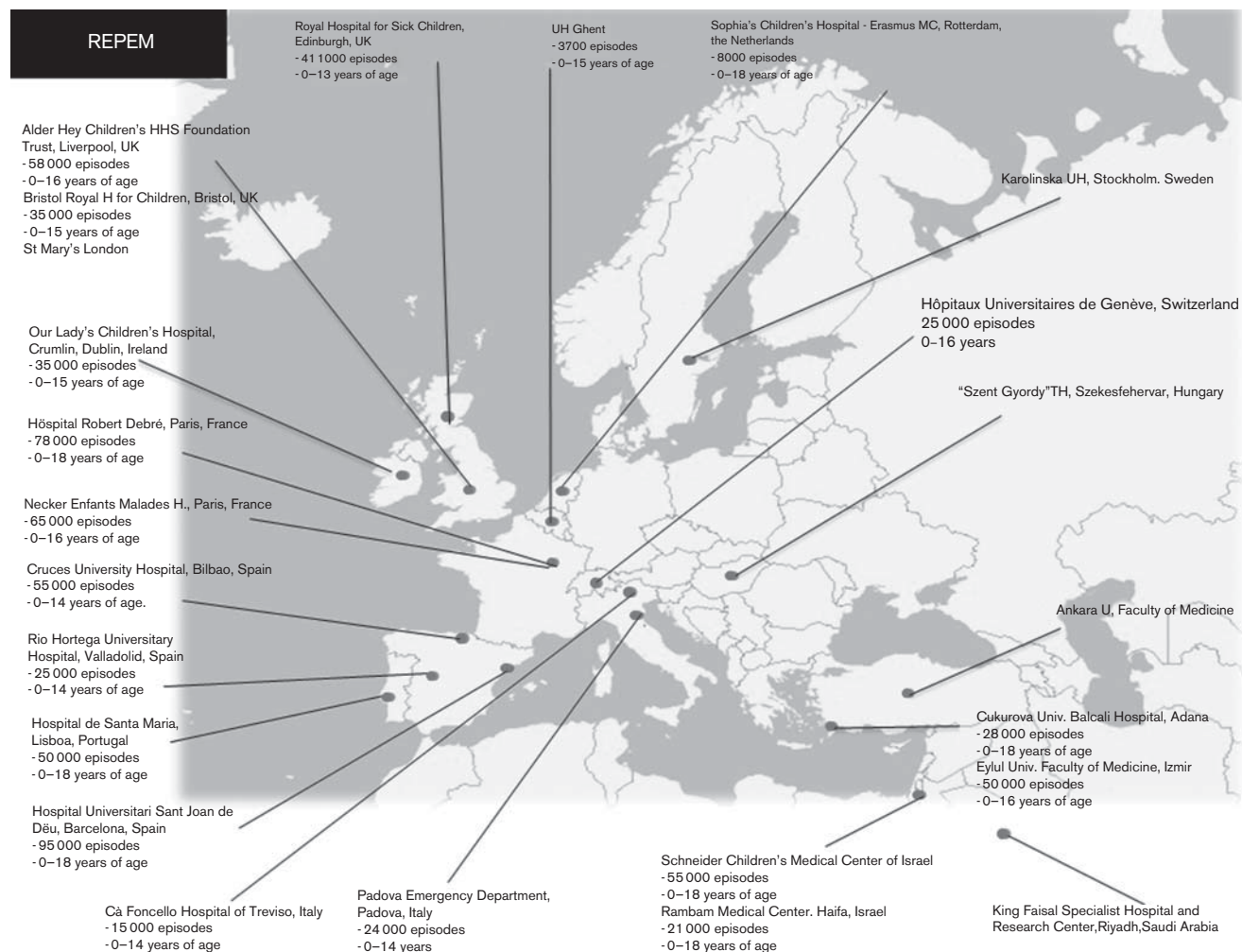
of the characteristics of PEDs throughout Europe. This study, published in 2008, collected baseline information from 53 tertiary care centres. It indicated vast differences in pediatric emergency services across the participating institutions and a training deficiency in personnel in PEM [9]. The most recent REPEM study to be completed is a retrospective observational study reviewing the epidemiology of severe pediatric ‘community-acquired’ septic shock, with assessment of the treatments initiated in EDs and outcomes [10].

Recent years have witnessed the development of several national PEM research networks in Europe, most notably in Spain and the UK and Ireland. The Research Network of the Spanish Society of Pediatric Emergencies (RISeuP-SPERG) [11] was created in April 2011 inside the Spanish Society of Pediatric Emergencies (SEUP). Currently, this network includes 43 PEDs [42 in Spain and one in the USA (Cincinnati Children’s Hospital Medical Center)], with more than 2 000 000 episodes registered yearly (<http://www.riseup.sperg.es>). Building on recent successful delivery of research in EDs, and capitalizing on developments in the national research infrastructure, Pediatric Emergency Research in the United Kingdom & Ireland (PERUKI) was formed in August 2012. This collaborative consists of 39 sites from England, Ireland, Northern Ireland, Scotland, and Wales, comprises pediatric-specific and generic EDs, and has an annual census of over 1.1 million childhood emergency care encounters. One of the objectives of both national networks is to establish relationships with other PEM research networks, including REPEM and PERN.

Next steps and the future of Research in European Pediatric Emergency Medicine

Because of the continuing growth of PEM research and of REPEM as a network, it was decided that a new structure was necessary to take into account the multinational nature of the network (Fig. 1). This structure was formulated in the REPEM meetings held in conjunction with the conferences of the European Academy of Pediatrics and EuSEM in Istanbul and Antalya on October 2012. This new structure incorporates a Steering Committee, a Scientific Committee, and an International Board, the latter being necessary because of the multinational make-up of the network and facilitating the inclusion of new PEDs. This structure also provides essential clarity in several areas including roles of young and experienced researchers, relationships with national networks, procedures regarding submission and approval of REPEM research proposals, identification of avenues for research funding and development of good communication skills and relationships with national medical societies and political authorities. This new structure will be finalized and instituted during 2013 and requires the formation of new committees and operational processes, including a revised mechanism for research proposal submission and evaluation (Fig. 2).

Fig. 1



Hospital members of Research in European Pediatric Emergency Medicine (REPEM) network.

It is also necessary to maintain a good relationship with the other national and international PEM research networks, and an important function of REPEM will be collaboration with PERN studies.

While this new structure is established, it is important to continue to complete studies already in the delivery phase and to develop new research. For this reason, the priorities for multicentre research and the research agenda for the next 5 years have been established. In principle, REPEM aims to perform three main types of research study:

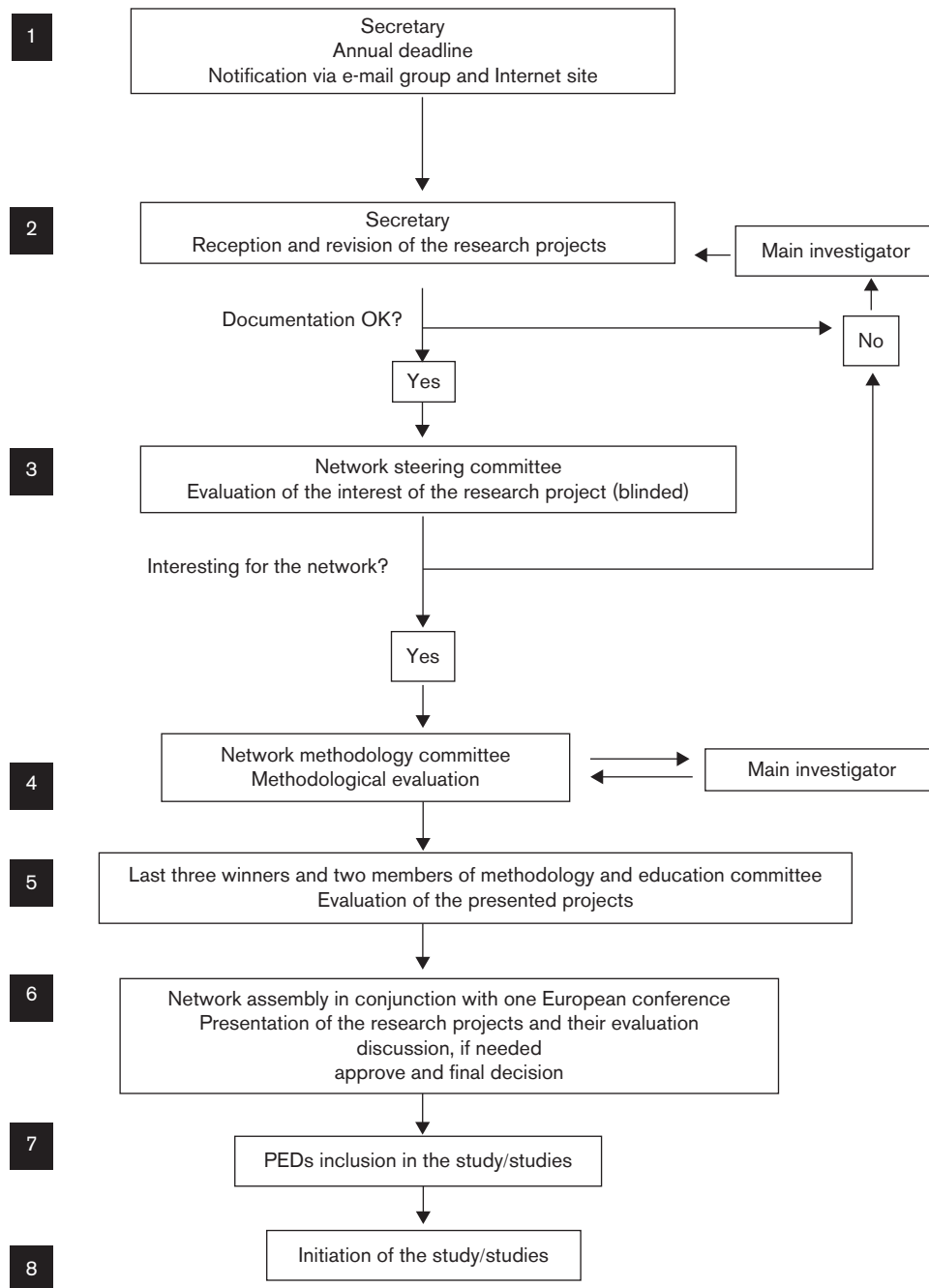
- (1) retrospective observational;
- (2) prospective observational;
- (3) prospective interventional.

As a network, REPEM has established a good track record in the first category, with the completion of the study of

severe pediatric 'community-acquired' septic shock [10]. Success in this area has facilitated progression to prospective observational studies. Performance of such studies will enable the creation of a European clinical database for specific common problems and for uncommon problems or procedures for which it is necessary to collect cases from many centres to achieve significant sample sizes. Once the new structure has been finalized and shown to be successful, there will be a logical progression to prospective interventional studies.

In keeping with this research agenda, proposals for REPEM studies were invited in 2012. From those submitted, a prospective observational study of the epidemiology of poisoning was selected and is now in the delivery phase. Data collection for 'The Global Poisoning Surveillance System' commenced in January 2013, and to date, there are more than 120 participating EDs. This study has also been supported by PERN.

Fig. 2



Mechanism for research proposal submission and evaluation.

Translation of research findings into clinical practice is key to improving pediatric emergency care in Europe. To ensure that this occurs, specific education will have to be considered and the role of young researchers may be essential in this aspect. REPEM will design a clear strategy within REPEM for dissemination of research findings and consequent translation into practice. This should also be taken into account in the design of future European PEM meetings.

Summary

PEM research throughout Europe continues to grow and develop in volume and quality. The evolution of REPEM into a robust international research network, bringing together not only researchers but also the national networks in a formal structure, will bring about significant improvements in the emergency care of sick or injured children and young people throughout Europe. The current structure of REPEM as a network provides

opportunities for collaboration between PEM researchers in Europe, offers the ability to participate in studies of global significance and creates an environment to encourage interdisciplinary working in the future.

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Conflicts of interest

There are no conflicts of interest.

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