



Published in final edited form as:

Pediatr Emerg Care. 2016 December ; 32(12): 840–845. doi:10.1097/PEC.0000000000000962.

Publishing trends in the field of Pediatric Emergency Medicine from 2004 to 2013

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Abstract

Objective—To identify publishing trends within the field of Pediatric Emergency Medicine between 2004 and 2013.

Methods—We conducted a MEDLINE search of Pediatric Emergency Medicine articles, filtered by clinical trial, published between 2004 and 2013 in ten journals from the fields of Pediatrics, Emergency Medicine, General Medicine, and Pediatric Emergency Medicine. Each article was classified by journal type, study design, results (positive or negative/equivocal), age/type of subjects, and major topic (based on the objective of the study). Articles were stratified by publication time period (2004–2008 or 2009–2013) to analyze trends.

Results—A total of 464 articles were analyzed. The majority of articles were described as randomized controlled trials (47%) with negative/equivocal findings (70%). The most common major topics were pain management, asthma, sedation, bronchiolitis, resuscitation, simulation, and ultrasound. Over time, the percentage of articles published in Pediatrics and Pediatric Emergency Medicine journals increased ($p=0.0499$) and the percentage for all study designs increased except for randomized controlled trials ($p=0.0089$). There were no differences between the two publication time periods when stratified by results, age/type of subjects, and major topic.

Conclusions—By identifying these trends, we hope to encourage researchers to perform studies in the field of Pediatric Emergency Medicine where deficiencies lie and to guide pediatric health care professionals to where published, evidence-based studies can be found in the medical literature.

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The authors have no financial relationships relevant to this article to disclose.

Keywords

publishing trends; pediatric emergency medicine; clinical trials

INTRODUCTION

Emergency medicine (EM) as a medical specialty is relatively young. Despite its growing popularity in the 1950s and 1960s, it was not until 1979 that the American Board of Medical Specialties voted to recognize EM as its own entity within medicine.¹ Similarly, the field of Pediatric emergency medicine (PEM) has only recently emerged as a board-certified subspecialty. The Section of EM was officially approved by the Executive Board of the American Academy of Pediatrics (AAP) in 1981, and has since become one of the largest specialty sections in the AAP.² Since the establishment of the first PEM fellowship at the Children's Hospital of Philadelphia over 3 decades ago, the field has expanded to include 80 accredited PEM fellowships within the United States.³

Since its inception, leaders within PEM have emphasized the importance of research. According to its original 1981 bylaws, the AAP's Section of EM aimed to "improve the care of children encountered in the emergency department by providing forum for discussion, stimulating research in and teaching of emergency care for children and disseminating knowledge of pediatric emergency care."² Today, PEM fellowship programs in the United States strongly urge their fellows to complete a research project within the 3 year training program and mandate involvement in a scholarly project related to PEM.³ In addition, the Pediatric Emergency Care Applied Research Network was developed in 2001 in an effort to expand the quality and quantity of PEM research, and is the first federally funded national network for research focused solely on pediatric emergencies.^{4, 5} Since then, academic groups, such as the Pediatric Emergency Research Network, the Pediatric Emergency Medicine Collaborative Research Committee, the Paediatric Emergency Research Canada, the Paediatric Research in Emergency Departments International Collaborative, and the Research in European Paediatric Emergency Medicine, have coordinated meetings amongst international PEM networks in order to explore the potential for collaborative research that would "promote quality of care of the acutely ill and injured child/youth globally."⁶

Although there have been many studies published in the field of PEM since its inception, there have been no studies examining publishing trends within the field of PEM. The objective of our study is to identify publishing trends within the field of PEM between 2004 and 2013. By identifying these trends, we hope to encourage researchers to perform studies in the field of PEM where deficiencies lie and to guide pediatric health care professionals to where published, evidence-based studies can be found in the medical literature.

MATERIALS AND METHODS

We conducted a MEDLINE search using the Medical Subject Headings terms "Pediatrics" and "Emergency medicine" published in ten selected journals. The authors selected these ten journals based on the highest impact factors reported in 2013 within the fields of Pediatrics [*Pediatrics* (5.30), *Journal of the American Medical Association - Pediatrics* (formally

known as *Archives of Pediatrics and Adolescent Medicine* – 4.25), *Journal of Pediatrics* (3.74)], EM [*Annals of EM* (4.33), *Academic EM* (2.20), *Journal of EM* (1.18)], General Medicine (GM) [*New England Journal of Medicine* (54.4), *Lancet* (39.2), *Journal of the American Medical Association* (30.4)], and PEM [*Pediatric Emergency Care* (0.92)]. Furthermore, the search was filtered by article type (including only clinical trials), publication dates (2004 to 2013), species (including only human), and languages (including only English). In addition, we included studies conducted in an emergency department setting, studies with an outcome applicable to the emergency care of pediatric patients, studies that included both pediatric and adult patients, and studies conducted on medical providers of pediatric patients. We excluded studies focusing only on patients over 18 years of age.

Following the MEDLINE search, each qualifying article was independently evaluated by one of the three authors (NSR, JR, JG) and classified by journal type (Pediatrics, EM, GM, or PEM), study design [randomized controlled trial, prospective non-interventional, retrospective, or study specific methods (secondary analysis of emergency department data, multicenter focus group study, 3-group randomized assignment trials, multicenter cross sectional trials)], results (positive or negative/equivocal), age/type of subjects [pediatric only, pediatrics and adults, or medical providers (physicians, fellows, residents, physicians' assistants, nurse practitioners, nurses, emergency department medical staff)], and major topic (based on the objective of the study). Articles were stratified by publication time period (2004–2008 or 2009–2013) to analyze trends.

In terms of categorizing results, *positive results* were defined as the rejection of the null hypothesis and/or a primary objective/outcome that demonstrated a statistically significant difference, while *negative/equivocal results* were defined as the affirmation of the null hypothesis and/or a primary objective/outcome that demonstrated no statistically significant difference.

All analyses were performed using SAS software version 9.4 (SAS Institute, Cary, NC). All variables were summarized with frequencies and percentages. A Chi-square test was used to make comparisons of journal type, study design, study results, age/type of subjects, and major topic between the two publication time periods (2004–2008 and 2009–2013). The study was deemed to be exempt by the Institutional Review Board at the Penn State Hershey Medical Center.

RESULTS

A MEDLINE search using the Medical Subject Headings terms “Pediatrics” and “Emergency medicine” resulted in a total of 6142 articles. After inclusion criteria were applied, a total of 464 qualifying articles were included in the analysis [175 (38%) Pediatrics, 158 (34%) EM, 106 (23%) PEM, and 25 (5%) GM]; 202 published 2004–2008 and 262 published 2009–2013. Table 1 categorizes all qualifying articles stratified by type of publishing journal, study design, results, and age/type of subjects.

Table 2 presents the total number and percentage of qualifying PEM articles published between the two publication time periods stratified by journal type. The total number of qualifying PEM articles published increased between the two time periods for all journal types with the exception of GM. In addition, the percentage of all qualifying PEM articles published increased between the two publication time periods for Pediatrics and PEM journal types, and decreased for EM and GM journal types ($p=0.0499$).

Table 3 presents the total number and percentage of qualifying PEM articles published between the two publication time periods stratified by study design. There was an increase in the total number and percentage of all study designs between the two publication time periods except for randomized controlled trial ($p = 0.0089$).

In terms of results (positive or negative/equivocal), when stratified by the two publication time periods, we demonstrated no significant difference [28% and 31% of qualifying PEM articles published positive results between 2004–2008 and 2009–2013, respectively ($p = 0.5284$)]. Furthermore, in terms of age/type of subjects, when stratified by the two publication time periods, we demonstrated no significant difference [67% and 68% of qualifying PEM articles included only pediatric patients between 2004–2008 and 2009–2013, respectively ($p = 0.8843$)].

Lastly, Table 4 describes all qualifying PEM articles by major topics, then stratified by type of publishing journal. There was no significant difference detected in the percentage of major topics published between 2004–2008 and 2009–2013 ($p = 0.06$).

DISCUSSION

The objective of our study was to identify publishing trends within the field of PEM between 2004 and 2013. Based on the clinical trials published in the ten selected journals from the fields of Pediatrics, EM, GM, and PEM, we can conclude that there have been a significant number of studies published, representing a variety of study designs, results, age/type of subjects, and major topics. Furthermore, the number of published PEM articles found in GM and EM journal types decreased during the time period. This may be secondary to the tremendous growth of published adult studies in GM and EM journal types, and subsequent difficulty to have PEM specific studies accepted to these journals. Therefore, it is imperative to educate general EM physicians and health care providers, who may not be as familiar with Pediatric and PEM journal types, to where alternative sources of evidence-based PEM studies can be found.

We determined that articles with major topics, such as pain management, asthma, sedation, bronchiolitis, and resuscitation, were published consistently during the study time period. Among the qualifying articles focusing on pain management, a few examined the use of opiates for pain control in children with chief complaints such as fracture and suspected appendicitis, while others described the role of topical anesthetic agents in decreasing pain associated with venipuncture.^{7–10} Since the American Pain Society and the AAP released a joint statement in 2001 that called for an improvement in pain management among pediatric patients,¹¹ it is reassuring to see the consistent number of published studies during our study

period highlighting the inadequacies of pain control in the emergency department and interventions to improve these deficiencies.^{12–13}

Among the qualifying articles focusing on asthma, several examined treatment options for status asthmaticus in children, such as corticosteroids,¹⁴ budesonide,¹⁵ and levalbuterol¹⁶. Furthermore, several qualifying articles published during our study period examined the use of classic agents, such as benzodiazepines and ketamine, in combination with relatively newer agents such as propofol, for procedural sedation in children.^{17–18}

Qualifying articles examining the treatment of bronchiolitis focused on various therapies such as the use of bronchodilators versus racemic epinephrine,¹⁹ Heliox,²⁰ inhaled fluticasone,²¹ nebulized hypertonic saline,²² and high flow nasal cannula therapy.²³ Lastly, a variety of qualifying articles were published focusing on pediatric resuscitation, including studies examining the threshold at which to initiate blood transfusions,²⁴ the use of continuous positive airway pressure therapy,²⁵ and the utility of the Broselow tape in pediatric resuscitation.²⁶

We determined that the number of qualifying articles published with major topics relatively new to the field of PEM, such as simulation and ultrasound, increased during the study time period, although not statistically significant. Published articles examining the use of simulation in the education of pediatric health care providers focused on a variety of topics, such as the quality of intern-learning retention,²⁷ the success rate of endotracheal tube versus laryngeal mask airway intubation among residents,²⁸ and the efficacy of a neonatal resuscitation course among residents.²⁹ As the medical community advances in both its technology and techniques, there are an increasing number of opportunities to educate trainees in challenging skills like those of pediatric resuscitation.³⁰ The use of bedside ultrasound, exclusively used by emergency medicine providers for adult patients in the past, has become an accepted part of the management of pediatric patients in the emergency department, reflected in qualifying articles focusing on the use of bedside ultrasound for conditions such as pneumonia,³¹ forearm fractures,³² and dehydration.³³

We have identified several limitations. We chose ten, English-language journals with the best assigned impact factors within the fields of Pediatrics, EM, GM and PEM in order to include studies with sound methodological design that were rigorously peer-reviewed. Furthermore, by filtering our MEDLINE search by “clinical trial” we would have excluded many articles, with impactful conclusions important to the field of PEM and overall medical knowledge, because of research designs such as observational studies and case reports. While we made the decision to include specific journals and exclude certain articles due to research design in order to limit the number of articles analyzed, we realize that this process would have excluded many clinically important PEM studies published in other journal types, both national and international, and our data would not be completely representative of all studies disseminated in the field of PEM during our study period. Another identified limitation of our study was that each of the qualifying articles was not evaluated by each of the authors, thus introducing substantial bias in the classification of each qualifying article. Each co-investigator should have independently analyzed each qualifying article in order to measure interrater reliability to strengthen our reported data.

In conclusion, based on our data, there have been many studies published in the field of PEM with the hope of improving the quality of care provided to acutely ill and injured infants and children. Future studies analyzing PEM articles published in other peer-reviewed journals, including international journals, and representative of a variety of research designs, including observational studies and case reports, may give a better representation of the research disseminated in the field of PEM, to determine trends and deficiencies in the field and promote investigative collaboration.

Acknowledgments

Conflicts of Interest and Sources of Funding:

Erik Lehman's work was funded and supported by the National Center for Advancing Translational Sciences, National Institutes of Health, through Grant UL1 TR000127. The content is solely the responsibility of the authors and does not necessarily represent the official views of the NIH.

No external funding was secured for this study.

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Table 1

Description of all qualifying PEM articles, then stratified by type of publishing journal

Study Design	All Qualifying Journal Articles (N = 464)	% of total	Pediatric Journals (N = 175)	%	EM Journals (N = 158)	%	GM Journals (N = 25)	%	PEM Journals (N = 106)	%
Randomized Controlled Trial	218	47.0	80	45.7	64	40.5	19	76.0	55	51.9
Prospective Non-Interventional	139	30.0	46	26.3	63	39.9	1	4.0	29	27.4
Retrospective	66	14.2	25	14.3	19	12.0	3	12.0	19	17.9
Study Specific Methods ¹	41	8.8	24	13.7	12	7.6	2	8.0	3	2.8
Results										
Positive	138	29.7	43	24.6	62	39.2	11	44.0	22	20.8
Negative/Equivocal	326	70.3	132	75.4	96	60.8	14	56.0	84	79.2
Age/type of subjects										
Pediatric only	313	67.5	144	82.3	75	47.5	12	48.0	82	77.4
Pediatric and Adult	117	25.2	15	8.6	77	48.7	13	52.0	12	11.3
Providers ²	34	7.3	16	9.1	6	3.8	0	0.0	12	11.3

¹ Examples of study specific methods include: “secondary analysis of ED utilization data,” “multicenter focus group study,” “3-group randomized assignment trial,” “multicenter cross-sectional trial.”

² Includes physicians, fellows, residents, physicians’ assistants, nurse practitioners, nurses, emergency department medical staff

Table 2

Total and percentages of qualifying PEM articles published 2004–2008 and 2009–2013 stratified by type of publishing journal

Journal Type	2004–2008		2009–2013	
	Total	% of all qualifying PEM articles	Total	% of all qualifying PEM articles
EM	76	37.6	82	31.3
Pediatrics	68	33.7	107	40.8
PEM	42	20.8	64	24.5
GM	16	7.9	9	3.4

Chi-square test p-value=0.0499

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Table 3

Total and percentage of qualifying PEM articles published 2004–2008 and 2009–2013 stratified by study design

Study Design	2004–2008		2009–2013	
	Total	% of all qualifying PEM articles	Total	% of all qualifying PEM articles
Randomized controlled trial	111	55.0	107	40.8
ProspectiveNon-Interventional	56	27.7	83	31.7
Retrospective	19	9.4	47	17.9
Study Specific Methods	16	7.9	25	9.5

Chi-square test p-value=0.0089

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Table 4

Description of all qualifying PEM articles by major topics, stratified by type of publishing journal

	Pediatrics (n = 175)	GM (n = 25)	EM (n = 158)	PEM (n = 106)	Total (n = 464)
Pain management	13	0	19	16	48
Asthma	16	0	10	10	36
Procedural sedation	1	0	15	7	23
Bronchiolitis	12	2	4	2	20
Resuscitation	11	4	0	3	18
Simulation	7	0	1	8	16
Ultrasound	2	0	10	4	16
Head trauma	10	1	3	1	15
Gastroenteritis	11	1	2	0	14
CT scan	2	1	8	1	12
Fractures	2	0	6	4	12
Influenza	9	0	2	1	12
Drug/Alcohol Use	3	1	5	2	11
Meningitis	5	2	3	1	11
Pneumonia	9	0	1	1	11
Seizures	4	2	1	2	9
Appendicitis	3	1	4	0	8
Skin/Soft Tissue Infections	4	0	2	2	8
Violence	2	0	4	2	8
ED Quality of Care	3	0	0	4	7
Urinary tract infections/pyelonephritis	6	0	1	0	7
Child abuse/neglect	3	0	1	2	6
Endotracheal intubation	1	0	4	1	6
Laceration repair	0	0	3	3	6
Pharyngitis	5	0	0	1	6

	Pediatrics (n = 175)	GM (n = 25)	EM (n = 158)	PEM (n = 106)	Total (n = 464)
Accidental ingestion	1	2	2	1	6
Fluid resuscitation	2	0	1	2	5
Intravenous placement	0	0	1	4	5
ED Quality improvement	3	0	1	1	5
Suicide/Mental Health	1	1	0	3	5
ED Triage	1	0	3	1	5
Upper respiratory infections	3	1	1	0	5
Animal/Insect bites	0	0	4	0	4
Bacteremia	2	1	0	1	4
Croup	0	2	0	2	4
ED Length of Stay	1	0	2	1	4
Medication use	1	0	1	2	4
Intentional overdose	0	0	4	0	4
Sickle Cell management	2	1	1	0	4
Epidemiology	0	0	2	1	3
Mortality	0	0	2	1	3
Weight estimation	0	0	2	1	3
Apparent life-threatening events	0	1	1	0	2
Burns	0	0	2	0	2
Diabetic ketoacidosis	2	0	0	0	2
ED documentation	0	0	2	0	2
Fever	2	0	0	0	2
Follow-up	2	0	0	0	2
Foreign bodies	1	0	0	1	2
Intraabdominal injury	0	0	2	0	2
Motor vehicle collisions	0	0	1	1	2
Otitis media	1	1	0	0	2
Risk assessment	0	0	2	0	2

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	Pediatrics (n = 175)	GM (n = 25)	EM (n = 158)	PEM (n = 106)	Total (n = 464)
Anaphylaxis	1	0	0	0	1
Cardiac arrest	0	0	1	0	1
Patient compliance	0	0	1	0	1
Constipation	0	0	0	1	1
Chest radiography	0	0	1	0	1
Diarrhea	0	0	0	1	1
Disaster relief	0	0	1	0	1
ED re-visits	1	0	0	0	1
Emergency contraception	0	0	1	0	1
Gastritis	0	0	1	0	1
HIV	0	0	1	0	1
Infectious arthritis	1	0	0	0	1
Intussusception	1	0	0	0	1
Lumbar puncture	0	0	0	1	1
Migraine headache	0	0	1	0	1
Nausea	1	0	0	0	1
Pneumothorax	0	0	0	1	1
Pregnancy	0	0	0	1	1
Research bias	0	0	1	0	1
Sexually transmitted infections	1	0	0	0	1
Tuberculosis	0	0	1	0	1
Tobacco use	0	0	1	0	1
Wound care	0	0	1	0	1
Ankle sprain management	0	0	1	0	1
Totals	175	25	158	106	464

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