Advanced Training in Pediatric Emergency Medicine in the United States, Canada, United Kingdom, and Australia: An International Comparison and Resources Guide

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Pediatric emergency medicine is an important subspecialty of pediatrics and emergency medicine. It is a well-established subspecialty in some countries and less well developed or evolving in others. We set out to develop a resource guide and document the current status of pediatric emergency medicine training across 4 countries (United States, Canada, United Kingdom, and Australia). This article also aims to provide a starting point for pediatric or emergency physicians charged with the development of pediatric emergency medicine training programs in countries without such programs. [Ann Emerg Med. 2005;45:269-275.]

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INTRODUCTION

Pediatric emergency medicine is a relatively new and rapidly evolving subspecialty in many countries. It was first formulated and developed as a subspecialty in the United States in the 1970s. Since then, the ideas and concepts of pediatric emergency medicine have been either exported to other countries or developed de novo locally. The purpose of this comparison and resource guide for postresidency pediatric emergency medicine training is (1) to allow pediatric emergency medicine training directors to appreciate the strengths and weaknesses of their own and other systems; and (2) for countries without or with less-developed formal pediatric emergency medicine training structures to review existing models as a basis for planning purposes in the development of pediatric emergency medicine training systems.

METHODS

Advanced training structures and national guidelines for pediatric emergency medicine training were systematically reviewed and compared across 4 countries, the United States, Canada, United Kingdom, and Australia. Although the countries included are diverse, all are English speaking (English and French in the case of Canada), highly developed, and highly industrialized, with low child mortality and a high life expectancy, and have, from a global perspective, high per capita expenditures for health care.[1]

In general, the comparisons are based on publicly available documents from national bodies representing pediatrics, emergency medicine, and pediatric emergency medicine or governmental regulatory bodies' training (Table). Other data were collected through direct personal, telephone, or e-mail contact with institutions offering advanced pediatric emergency medicine training or with regulatory bodies.

RESULTS: UNITED STATES

Overview

The first pediatric emergency medicine fellowship training program began in 1981 at the Children's Hospital of Pennsylvania. As of 2003, 1,229 US physicians were board certified in pediatric emergency medicine.[2] The subspecialty is regulated jointly by the American Board of Pediatrics (ABP) and the American Board of Emergency Medicine (ABEM). Presently, there are 48 accredited pediatric emergency medicine fellowships, 41 accredited through the ABP and 7 through ABEM. Thirty-four programs are based in pediatric centers, whereas 14 are in centers treating children and adults.[3]

Pediatric Emergency Medicine Training Programs

Accreditation by the Accreditation Council for Graduate Medical Education requires that the program be affiliated with either an accredited pediatric or emergency medicine residency program. Clinical requirements are at least 12 months of clinical

pediatric emergency medicine that includes emergency care of all patients through age 21 years. In addition, trainees must receive 4 months of clinical training in the reciprocal specialty from which they entered the fellowship (Table).

In recognition of the diverse roles of pediatric emergency physicians, the requirement for "evidence of meaningful accomplishment in research" demonstrated by a first author publication was modified in 2004 to a requirement for "scholarly activity."[4] Such scholarly activity, in addition to biomedical research, may include academic endeavors related to health services, quality improvement, bioethics, education, or public policy. The activity is mentored by a thesis-like oversight committee at the training institution and must result in a written "work product" that is submitted to the ABP. ABEM does not require research or scholarly activity in pediatric emergency medicine for board eligibility. However, it is expected that fellows obtain training and gain experience in teaching and administrative aspects of pediatric emergency medicine.

Board certification by ABP or ABEM after the subspecialty certification examination is time limited. The American Academy of Pediatrics (AAP) sponsors an annual Physician Review and Enhancement Program: Emergency Medicine course that is an intensive review of pediatric emergency medicine based on the content of the ABP certification examination.

A listing of pediatric emergency medicine fellowship positions is published annually in *Pediatric Emergency Care*. There are several national pediatric emergency medicine–focused membership organizations. These organizations are independent of, but work in coordination with, the certifying boards. The AAP has a pediatric emergency medicine subsection, the Section on Emergency Medicine, that meets during the national AAP meeting in the fall and Pediatric Academic Societies meeting in the spring (available at http://www.aap.org/sections/PEM). The pediatric emergency medicine subsection has a pediatric emergency medicine list serve (Ped-em-l@listserv.brown.edu). The American College of Emergency Physicians has a pediatric emergency medicine section and the Society for Academic Emergency Medicine has a pediatric emergency medicine interest group. A meeting for pediatric emergency medicine fellows is held annually. A federally funded Pediatric Emergency Care Applied Research Network for multicenter research in pediatric emergency medicine was established in October 2001 (available at http://www.pecarn.org).

Overseas Trainees

Pediatric emergency medicine fellowship positions are open to overseas trainees who have completed either pediatric or emergency medicine training and are fully literate in English. Training requires an appropriate visa (usually an exchange visitor [J-1] visa and, less commonly, a temporary worker [H-1B] or immigrant visa or a US Immigration and Naturalization Service–issued or approved work permit is required for entry of foreign-born graduates of non-US medical schools). In addition, foreign-born international medical graduates are also required to have the Standard Certificate of the Educational Commission for Foreign Medical Graduates (ECFMG), which requires passage of a multipart medical science examination and of the ECFMG English-language test.

RESULTS: CANADA

Overview

The Royal College of Physicians and Surgeons of Canada oversees all specialty training programs within Canada. These programs must be affiliated with a university-based faculty of medicine. The Royal College has just recently recognized pediatric emergency medicine as a subspecialty, under the category of accreditation without certification.[5] Attending physician (senior staff specialist) positions in pediatric emergency medicine do not require accredited training in pediatric emergency medicine.

Advanced Training in Pediatric Emergency Medicine

Fellowship training (advanced training) in pediatric emergency medicine requires a minimum of 2 years of training, with an optional third year possible for individuals wishing to fulfill the ABP board eligibility requirement. The third fellowship year generally has a research emphasis. Residents (basic specialty trainees) may enter pediatric emergency medicine fellowship after 3 years of pediatric or 4 years of emergency medicine training (with examination eligibility during the first fellowship year) or after completion of a full pediatric (4 years) or emergency medicine residency (5 years).

A minimum of 12 months must be spent in pediatric emergency medicine training at an accredited institution. A total of 3 months of reciprocal training in adult emergency medicine, trauma, and plastic surgery/orthopedics is required for pediatric-trained fellows. Emergency medicine–trained fellows must complete 3 months in a pediatric ICU, neonatal ICU, and pediatric ambulatory care.

Fellows are evaluated by their programs according to the "Specific Standards of Accreditation for Residency Programs in Pediatric Emergency Medicine."[5] Fellowship positions are government funded and available at only 9 accredited tertiary pediatric referral centers.

Research is strongly encouraged, although no requirement for publication or completion of a research project exists. However, fellows must be significantly involved in a scholarly project related to pediatric emergency medicine. Fellows are provided with at least 2 months of dedicated time to accomplish their research and academic interests. Pediatric Emergency Research Canada was established in 1995 to provide a network for pediatric emergency medicine research. Mentorship for new investigators and fellows remains a major goal of this organization.

Overseas Trainees

Opportunity does exist for overseas trainees with pediatric and emergency medicine backgrounds. Funding through government programs is generally restricted to Canadian candidates, but alternate methods of funding are available.

Table. Comparison of advanced training in pediatric emergency medicine in the United States, Canada, United Kingdom, and Australia.

	United States	Canada	United Kingdom	Australia
National fellowship matching program	Yes (most programs participate, some programs outside the match)	No	No	No
Applications due/fellowships start	1 year before/July 1	Variable/July 1	Variable/variable	Variable/February 1 or August 1
Accept pediatric and emergency trainees	Yes (a few programs accept pediatric or emergency medicine trainees only)	Yes	Yes	Yes
Entry requirements for local trainees	Residency training in pediatrics (3 y) or in emergency medicine (3–4 y); eligibility for ABP examination (written only) or ABEM examination (written and oral)	Residency training in general pediatrics (3 y) or in emergency medicine (4 y); eligibility for RCPSC examination (written and oral) in pediatrics or emergency medicine	House officer (1 y); then by pediatric route: basic training in pediatrics (∼3 y) with Member of RCPCH examination (written and oral); or by emergency medicine route: basic broad-based training (3–4 y) with a postgraduate examination such as MRCP, MRCS (written and oral)	Internship (1 y); then by pediatric route: basic training in pediatrics (∼3 y) with FRACP examination (written and oral); or by emergency medicine route: basic training (2 y), provisional training in emergency medicine (1 y), advanced training in emergency medicine (4 y) with ACEM examination (written and oral)
Research requirements	Yes, evidence of meaningful accomplishment in research for fellows beginning before July 1, 2004; evidence of scholarly activity for fellows beginning on or after July 1, 2004 (see text)	Yes (or academic project)	No	Yes; 3 written projects, although no publication requirement (pediatric trainees)
Length of pediatric emergency medicine training (total)	3 y if pediatric trainee; 2 y if emergency medicine trainee for board eligibility; some fellowship programs require 3 y for emergency medicine trainees	2 y; 3 y if board certification in pediatric emergency medicine by ABP/ABEM	5 y either route, of which time in subspecialty training totals 21 mo if pediatric route or 12 mo if emergency medicine route	3 y
Mandatory pediatric ICU	1 mo: only for emergency medicine trainees	1 mo: only for adult emergency medicine trainee	3 mo for pediatric trainees	6 mo (3 mo can be in basic training)
Mandatory adult emergency medicine	4 mo: only for pediatric trainees; 1 mo may be EMS, adult trauma, or toxicology	1 mo adult emergency medicine, 1 mo trauma (pediatric trainees only)	None for pediatric route (5 y for emergency medicine route)	12 mo for pediatric route (2–3 y for emergency medicine route)
Mandatory additional training	For emergency medicine trainees: 3 mo general and subspecialty pediatrics, inpatient pediatrics, and neonatology. PALS/ATLS certification program dependent.	6-mo subspecialty rotations (toxicology, EMS/disaster, administration, anesthesia/pain, research). PALS/ATLS certification program dependent	APLS	APLS, EMST (ATLS)
Exit examination/certification	Yes (offered every 2 y); certification time limited: 7 y pediatrics, 10 y emergency medicine); written examination	No; trainees from RCPSC-accredited programs generally eligible for ABP exit examination	No for pediatric route; fellow of FAEM for emergency medicine route: generic examination (not pediatric related); written and oral examination	No

Table (continued).

	United States	Canada	United Kingdom	Australia
Hospitals with advanced training programs in pediatric emergency medicine	41 programs accredited through ABP; 7 programs through ABEM	9	5 for pediatric route; 5 for emergency medicine route; most training obtained ad hoc as "out of program" experience	8 fully accredited; 2 part accredited (1 y of pediatric emergency medicine training)
First year advanced training positions in pediatric emergency medicine/year	90 (range 0–5 per program/y)	15	Unknown; estimated 3 for pediatrics, 5 for emergency medicine	10
Organization overseeing pediatric emergency medicine training	ABP (for pediatric trainees) and ABEM (for emergency medicine trainees)	RCPSC	RCPCH (pediatric trainees) or FAEM (emergency medicine trainees)	Specialist Advisory Committee for pediatric emergency medicine, Royal Australasian College of Paediatrics
Minimum statutory entry requirements for licensure as pediatric emergency medicine overseas trainees	United States Medical Licensing Examination (written and oral assessment and English test)	Equivalency of training assessment by local Faculty of Medicine and Provincial College of Physicians and Surgeons	If sponsored by the FAEM, then must be on recognized training program in own country and have at least 1 year's experience; IELTS English test	None; IELTS English test to be introduced
ED visits per year (range, child only)	15,000–90,000	18,000–70,000	18,000–60,000	24,000–60,000 (fully accredited); 20,000–23,000 (part accredited)
Senior staff presence in ED mandatory 24 h/d	Yes	Yes	No	No
Combined fellowship/additional degrees	Some programs offer additional graduate degrees (masters in public health, epidemiology, etc) and combined fellowship programs (toxicology, ICU, etc)	Some programs offer masters in epidemiology and other graduate degrees and combined fellowship programs on a case-by-case basis	No	No

APLS, Advanced pediatric life support; *ATLS,* advanced trauma life support; *EMS,* emergency medical services; *EMST,* early management of severe trauma; *FAEM,* Faculty of Accident and Emergency Medicine; *FRACP,* Fellow of Royal Australian College of Physicians; *IELTS,* International English Language Testing System; *MRCP,* Member Royal College of Physicians; *MRCS,* Member Royal College of Surgeons; *PALS,* pediatric advanced life support; *RCPSC,* Royal College of Physicians and Surgeons Canada.

Prospective candidates should apply early (ideally 2 years in advance) to maximize their chances of securing funding.

Entry into fellowship is contingent on recognition of previous training by the postgraduate office of the affiliated university. If the applicant is accepted by the program and the university, a formal application is made to the provincial college to accept previous training and allow the candidate to undertake fellowship training. This process also applies to applicants with funding from their home country.

Fully qualified physicians wishing to enter the country should contact the Royal College directly to assess their qualifications.

RESULTS: UNITED KINGDOM

Overview

Pediatric emergency medicine in the United Kingdom has been developing as a subspecialty in recent years but has only in 2003 received official recognition by the Specialist Training Authority. The Specialist Training Authority is responsible for licensing all European doctors for specialist (consultant) practice, with a Certificate of Completion of Specialist Training. The Certificate of Completion of Specialist Training will be in either pediatrics or emergency medicine, but an interest in pediatric emergency medicine can now be stated for the emergency medicine specialists on the Specialist Register (the national register for physicians with specialist training). Although the first emergency medicine trainees have been accredited in 2004, the system for accreditation of pediatric trainees is likely to take until 2005 to be fully developed. At this time, employment in senior medical staff posts in pediatric emergency medicine does not mandate accredited pediatric emergency medicine training by the Specialist Training Authority.

An intercollegiate document, "A&E Services for Children," by the Royal College of Paediatrics and Child Health (RCPCH)

in 1999[6] stated that a consultant with a special interest in pediatrics should be appointed for each emergency department (ED) with 18,000 or more pediatric ED visits per year. With about 50 EDs of this size nationally, this objective is far from being achieved. Training opportunities are limited because few EDs or ED consultants (senior staff specialists) are able to train specialist registrars (advanced specialty trainees or fellows) in this way, and restrictions have been placed on the number of specialist registrars nationally.

Advanced Training in Pediatric Emergency Medicine

Each specialist registrar must have a National Training Number in either pediatrics or emergency medicine. To obtain a National Training Number, a trainee must have a postgraduate qualification (eg, member of RCPCH, Member Royal College of Surgeons, Member Royal College of Physicians) and 3 to 5 years of postgraduate training. Appointment to a National Training Number is made regionally and is highly competitive. Advanced pediatric life support/pediatric advanced life support/advanced trauma life support certification is usually expected.

There is no central register of training programs, but there were about 10 first-year pediatric emergency medicine training positions in 2003. Training posts are generally advertised in the careers supplement to the *British Medical Journal*.

The core curriculum for training has been written jointly by the RCPCH and the Faculty of Accident and Emergency Medicine.[7] Assessment of specialist registrars is performed annually by the record of in-training assessment process and, more frequently, by the designated trainer for each section of training. The logbook, or portfolio, is becoming increasingly competency based. However, the training regulations are still based on time periods.

After standard pediatric core training, pediatric specialist registrars in an area with an established training program may compete for pediatric emergency medicine training. Those in other areas may apply to hospitals that can offer ad hoc training. Pediatric emergency medicine training must include 12 months in an accredited pediatric ED, plus 3 months in pediatric surgery, 3 months in pediatric orthopedics, and 3 months in anesthesia with pediatric ICU experience.

Training for emergency medicine specialist registrars is more widely available. In some regions, positions are competed for at entry interview for specialist registrar training and in other regions, after a period of core emergency medicine training. Six months of training must be in an accredited pediatric ED. The remaining 6 months is split between at least 3 months of acute, general pediatrics or an appropriate specialty such as pediatric ICU.

Research is encouraged but not compulsory during specialist registrar training. However, several audit projects are usually undertaken. Up to 12 months of full-time research will be accredited toward specialist registrar training.

At this time, the only generic conference forum for pediatric emergency medicine specialist registrars is the semiannual Association of Paediatric Emergency Medicine meeting, for specialist registrars and consultants.

Overseas Trainees

Pediatric emergency medicine training positions in the United Kingdom have not, to date, been widely available. The overseas trainee interested in such a post would have to liaise directly with a pediatric ED. An overseas candidate interested in working in the United Kingdom would first have to pass the International English Language Testing System English test and, if sponsored by RCPCH or the Faculty of Accident and Emergency Medicine, may then not have to take the Professional and Linguistics Assessment Board test, which assesses medical and clinical knowledge. Once a candidate has successfully completed these examinations, he or she is eligible for registration with the General Medical Council.

Positions are funded by the individual EDs, and the candidate must get prospective recognition for the position from his or her respective training bodies or college.

Once the candidate had been appointed, the hospital would apply for a visa. The trainee would also be required to complete police checks and an occupational health assessment.

Emergency physicians wishing to enter the United Kingdom after having completed advanced training in another country can have their training assessed by the relevant college (RCPCH or Faculty of Accident and Emergency Medicine).

RESULTS: AUSTRALIA

Overview

Pediatric emergency medicine training is regulated by the Specialist Advisory Committee of the Royal Australasian College of Pediatrics (RACP). Eligibility for pediatric emergency medicine training requires completion of basic training and professional examinations in pediatrics. Pediatric emergency medicine training through the Australasian College for Emergency Medicine (ACEM) is not established but is to be implemented. At this time, employment in senior medical staff posts in pediatric emergency medicine does not mandate accredited pediatric emergency medicine training by the RACP.

Advanced Training in Pediatric Emergency Medicine

Advanced training in pediatric emergency medicine lasts at least 3 years, of which at least 18 months must be spent in the ED of a tertiary pediatric referral hospital.[8] A period of training can be undertaken at a major overseas center with prospective approval.

As part of advanced pediatric emergency medicine training, up to 6 months can be spent in child protection or toxicology and up to 3 months in anesthetics.

Training posts have to be at 1 of 8 pediatric emergency medicine centers (tertiary pediatric referral centers, one of which is located in New Zealand). There are 2 additional centers accredited for 1 year of pediatric emergency medicine training. Although age cutoffs vary, teenagers older than 16 years are directed toward or self-select adult or general EDs. There are 10 accredited first-year pediatric emergency medicine positions in Australia and New Zealand, although there are a number of

additional posts filled by emergency medicine and overseas trainees. The posts are all at public hospitals and government funded.

Three written college "projects," focused on pediatric emergency medicine, have to be completed by the end of the advanced training period in pediatric emergency medicine. College projects encompass a broad range of activities, including audits, case series, ethics applications, and hypothesis-driven research. Up to 6 months of full-time research will be accredited toward the required 3 years of pediatric emergency medicine training.

There is no national educational meeting specifically for pediatric emergency medicine trainees. There are special interest groups in pediatric emergency medicine within RACP and ACEM, and there is a Web-based special interest group mailing list in Australasia (available at http://health.groups.yahoo.com/group/pemsig).

Overseas Trainees

In general, pediatric emergency medicine training positions are open to overseas trainees with pediatric or emergency medicine backgrounds. Applications are made directly to pediatric EDs. There are no national medical screening examinations for overseas trainees. There is no mandatory national English test, although individual hospitals can mandate such examinations (eg, the International English Language Testing System).

If an appointment to a training post is made, the hospital then applies for a medical practitioner's visa. Overseas pediatric emergency medicine trainees funded by their home countries (honorary positions) can obtain an occupational trainee visa after approval by the relevant college.

Physicians entering Australia after having completed advanced training in another country can have their training assessed for equivalency through a process involving the relevant college (RACP or ACEM).

DISCUSSION

There are a total of 48 US, 9 Canadian, 8 UK, and 8 Australian programs for advanced pediatric emergency medicine training recognized by national bodies. Access to officially recognized pediatric emergency medicine training in the United States and Canada is after completion of general pediatric or emergency medicine training, in the United Kingdom after basic pediatric or emergency medicine training, and in Australia only after basic pediatric training (although emergency medicine trainees are accepted into positions).

In the United States, where pediatric emergency medicine has been established longest, and similarly in Canada, elements of advanced training programs include defined entry criteria after pediatric or emergency medicine residency: a defined, detailed curriculum of training that includes mentored education in clinical, research, teaching, and administrative aspects of pediatric emergency medicine; assessment by a fellowship director, as well as other attending physicians, and formal certification assessments; and a national forum for trainees and for pediatric emergency physicians. In the United Kingdom, where regulatory bodies have recognized the need for more pediatric emergency physicians, many of these elements have only recently been put in place, although access to pediatric emergency medicine training for pediatric trainees is only foreseen in the future. In contrast, in Australia, access to recognized pediatric emergency medicine training is only through the pediatric training route, although access from the emergency medicine route is planned.

Many elements of pediatric emergency medicine training are similar across all countries, including a duration of pediatric emergency medicine training of 2 to 3 years, the acceptance of pediatric and emergency medicine trainees for training posts (although recognition of pediatric emergency medicine status is limited in some to one or the other specialty), and in general the acceptance of overseas trainees.

When pediatric emergency medicine curricula are compared, one of the most notable differences between countries is the high number of rotations outside the ED in US and Canadian pediatric emergency medicine training programs compared with British and Australian programs. The requirement for minimum adult ED training during pediatric emergency medicine is also highly variable (zero to 12 months).

Board certification examinations in pediatric emergency medicine are routine in the United States and optional in Canada, depend on pathway in the United Kingdom, and do not exist in Australia.

For overseas trainees returning to their home countries, exit examinations are optional in most cases. Access to dual-fellowship training in related specialties such as toxicology and additional graduate degrees such as a masters of public health during pediatric emergency medicine training are also variable.

Research is encouraged in all countries. The recent change in the United States toward "evidence of scholarly activity"[4] recognizes that pediatric emergency medicine physicians contribute to the advancement of the subspecialty not only through research in the strict academic sense but also through more broadly based academic work in areas of health services, quality improvements, ethics, education, and public policy.

Pediatric emergency medicine training opportunities and entry criteria for overseas trainees are highly variable. Whereas Australia and, in general, Canada do not require formal medical skills testing of overseas trainees, the United States and United Kingdom require standardized medical skills testing. In the United States, this includes written and oral clinical skills testing plus an English test. In the United States, fellowship positions require a commitment of 2 to 3 years of training for local and overseas trainees, whereas in Canada and in Australia, the length of training for overseas trainees can be tailored to the needs of the trainee. In the United Kingdom, because of the shortage of advanced training positions in pediatric emergency medicine, as well as senior staff specialists in pediatric emergency medicine, it is unlikely for an overseas trainee to be accepted for a pediatric emergency medicine trainee position.

This review of pediatric emergency medicine training systems has limitations. The comparison includes only English-speaking countries. Another limitation is the focus of the comparison on the structure of the training programs rather than content. Skills taught and needed in a particular setting may vary because of different ED age cutoffs (eg, 16 years in the United Kingdom, 21 years in the United States) or availability and involvement of subspecialty services in the ED. Finally, this information is accurate as of 2004, but pediatric emergency medicine is a rapidly evolving specialty.

The different approaches to advanced training in pediatric emergency medicine also represent opportunities for pediatric emergency medicine trainees to spend time overseas and experience differences in structure and content. Many of these experiences do not require the completion of a whole pediatric emergency medicine training program but shorter elective periods.

The pediatric emergency medicine training structures outlined may be of use to ED directors or educators outside the countries reviewed who are considering the establishment of pediatric emergency medicine training structures and guidelines on a local or national level.

In summary, the general organization and training structures for advanced training in pediatric emergency medicine in the United States, Canada, United Kingdom, and Australia are presented and compared. This review and resource guide can be helpful for prospective pediatric emergency medicine trainees and senior staff charged with the development of institution specific or national training structures in pediatric emergency medicine.

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