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ORIGINAL ARTICLE

Formative research experiences in pediatric surgeons: a mixed methods study of Pediatric Trauma Society members

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Abstract

Purpose A career in pediatric surgery has historically required extensive research experience, but the optimal research training is not well defined. The purpose of this study was to explore the formative research experiences among pediatric surgeons.

Methods A 1-h focus group was held with 14 pediatric surgeons at the 2017 Pediatric Trauma Society annual meeting. A 17-item survey was also administered. Questions were intended to elicit discussion of prior research experiences. A qualitative analysis of the dialogue was performed.

Results Seventy-seven percent of respondents completed a research fellowship. Most (77%) currently conduct clinical research. Participants most frequently desired additional training in study design (50%), NIH funding (43%), and grant preparation (43%). Seven themes were identified from the focus group: (1) Early research exposure is rudimentary; (2) Resume-building was a motivation; (3) Mentorship is important; (4) Institutional resources are vital; (5) Independent learning is necessary; (6) Protected time is limited; and (7) Basic science research is not always practical.

Conclusions Many pediatric surgeons feel that their research training can be improved upon. Formal mentorship, dedicated research time, and institutional resources were perceived to be important factors. Education in research study design, grant writing, and NIH funding may be beneficial.

Level of evidence V, expert opinion.

Keywords Research experience · Pediatric surgery

Introduction

A career in pediatric surgery has historically required extensive research experience [1]. Surgical residents often take time off during residency to perform research. Successful candidates applying to fellowship positions in pediatric surgery have nearly twice as many research publications as unsuccessful applicants [1, 2]. Over two-thirds of American Pediatric Surgical Association (APSA) members report being actively involved in research [3], and pediatric surgeons have been successful in attaining National Institute of Health (NIH) funding [4]. It is well known, however, that clinical demands are high among pediatric surgeons and over half report no formal research funding [3, 5], suggesting that research experience gained during training is not always used in practice.

Program directors of pediatric surgery fellowships may not emphasize research as a mandated requirement for applicants [6], but most successful candidates still have extensive research experience [1, 2]. The ideal research training for

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an aspiring pediatric surgeon is not well defined. The purpose of this study was to understand the formative research experiences in pediatric surgeons and how these experiences shaped their practice.

Methods

Study population

This was a qualitative study of 14 pediatric surgeons. Institutional Review Board approval was obtained prior to performing the study. Voluntary recruitment occurred at the annual Pediatric Trauma Society (PTS) meeting. Recruitment information was included in the conference program and website. Lunch was served to participants during the focus group.

Survey

Participants were asked to complete an anonymous survey prior to participation in the focus group. The survey included 17 items which queried training background, research experiences in medical school and fellowship, current research, and components of research that they wished they had received training.

Focus group

A 1-h focus group was held with all study participants. A study member with a background in surgical research (specifically the use of qualitative methods) served as the focus group leader. The focus group was designed to use open-ended questioning to elicit discussion on surgeons' experiences with research, both as a trainee and as an attending, with a focus on how their perceptions have evolved over time. A focus group guide was used as a framework for the discussion (Appendix). The focus group was audio recorded with participants' permission.

Data collection and analysis

Survey data was analyzed with Qualtrics software. The audio recording was transcribed by an experienced transcriptionist. Qualitative analysis of the transcription was performed with ATLAS.ti software (v8.1.28.0; ATLAS.ti Scientific Software Development GmbH, Berlin, Germany). Two authors (CM and EB) independently reviewed the transcript to identify themes in the dialogue. Quotations were arranged into theme categories and iteratively refined.

Results

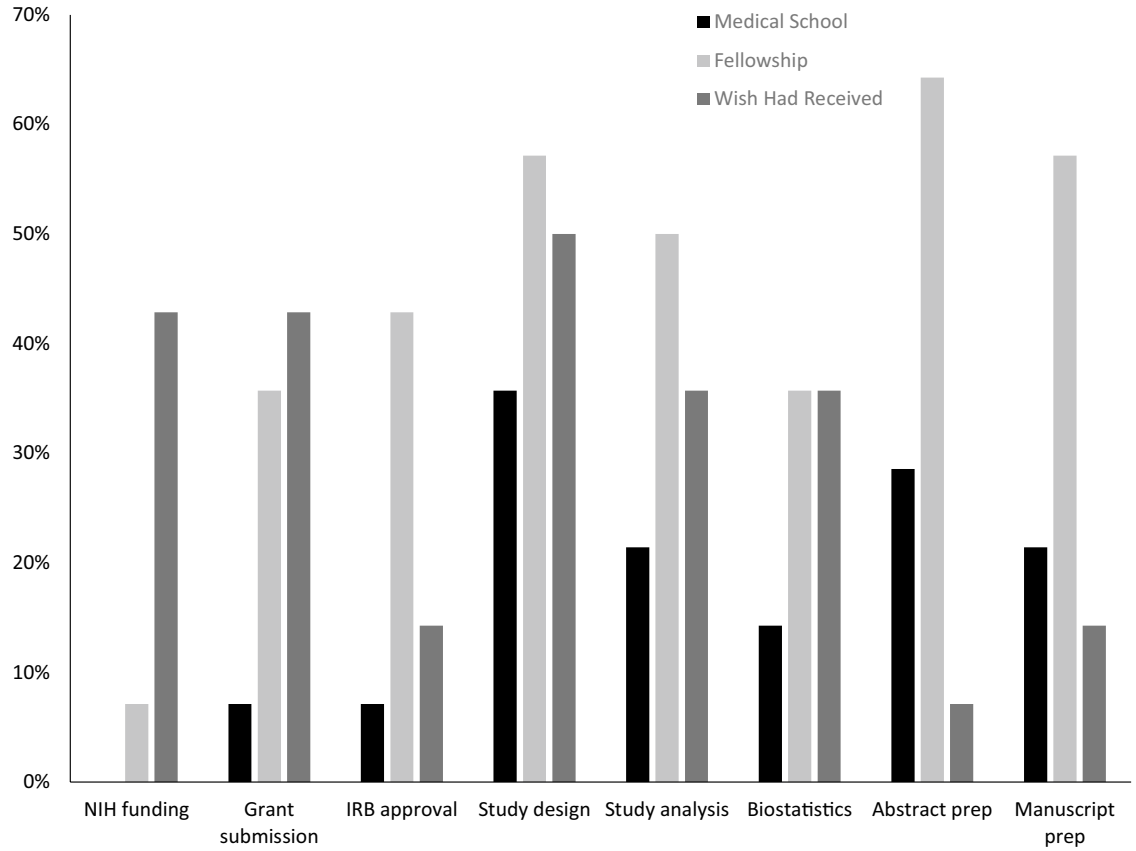
Fourteen pediatric surgeons completed the survey and participated in the focus group. Survey results indicated that a minority (29%) of pediatric surgeons received formal research training in medical school (Table 1). Most (77%) later received formal research training during a dedicated research fellowship, in which mentorship was the most frequent setting for research training (67%). Sixty-three percent of participants rated their research fellowship training as 'good' or 'great'. Most (75%) conducted clinical research during their fellowship and most (77%) perform clinical research currently.

Of the pediatric surgeons who reported receiving research training in medical school, study design (36%) and abstract preparation (29%) were the most common subjects (Fig. 1). Much more dedicated research training was reported during the surgeons' fellowship, most prominent of which were abstract preparation (64%), study design (57%), manuscript preparation (57%), and data analysis (50%). Top subjects that surgeons wished they had received more training included study design (50%), grant submission (43%), NIH funding (43%), data analysis (36%), and biostatistics (36%).

Table 1 Self-reported training and research characteristics of surveyed pediatric surgeons

Question	*N* (%)
Research training in medical school ($n=14$)	4 (29%)
Setting ($n=9$)	3 (33%)
Class	3 (33%)
Lecture	3 (33%)
Mentorship	3 (33%)
Research fellowship training ($n=13$)	10 (77%)
Clinical research ($n=12$)	9 (75%)
Setting*	
Class	4 (33%)
Lecture	6 (50%)
Mentorship	8 (67%)
Other	1 (9%)
Rank quality ($n=11$)	
Poor	1 (9%)
Okay	3 (27%)
Good	3 (27%)
Great	4 (36%)
Years as faculty ($n=13$)	4 (2–6)
Current research ($n=13$)	
Basic science	3 (23%)
Clinical	10 (77%)

*Survey responses were not mutually exclusive. $N=14$ total surgeons who completed the survey



Survey responses were not mutually exclusive. N = 14 total surgeons who completed the survey.

Fig. 1 Self-reported research training received during medical school and research fellowship, and training that pediatric surgeons wished they had received

Analysis of the focus group transcript identified seven overarching themes: (1) Early research exposure is rudimentary; (2) Resume-building was early motivation; (3) Mentorship is important; (4) Institutional resources are vital; (5) Independent learning is necessary; (6) Protected time is limited; (7) Basic science research is not always practical.

Early research exposure is rudimentary

Early exposure to research in undergraduate education was described as "like the introduction to what research is…it was not as much how to actually conduct research… the emphasis was to…recognize good or bad clinical research". This was echoed by another participant who said, "Med school and even into residency for me, it was much more about judging the research rather than conducting the research".

Resume-building was early motivation

One participant said that "my goal was not, 'I'm going to do great, basic science'. Whereas my goal was, 'I'm going to be a pediatric surgeon, and the only way to do this is to build that CV'". Another participant reported, "I actually sought out residencies where I would not have to do two years worth of research, and then I knew once I wanted to do peds [pediatric surgery] I really had to do it". Obtaining a pediatric surgery fellowship was reported as a "secondary gain" and one participant said that attending conferences was a primary motivation.

Mentorship is important

The challenge of mentorship was described as, "The two problems with mentors are getting them and getting time with them". Another participant mentioned the "lack of mentorship availability" as a problem. When speaking about

starting a research project, one participant said, "it is like I'm pulling out the machete every time to get through the weeds, versus having that little guidance to…keep focused on this, and that is how you are going to get through there".

Institutional resources are vital

Components of a good research environment were described as "a really great mentor in clinical research, a well-established clinical research lab and statistician support". Others felt that the addition of "formalized training" or degree programs in research are helpful. There was also an emphasis placed on "even knowing where to find the resources". This was echoed by another participant: "When you look at ways to get more time without having more time, it is the resources, it is the access to things…Like from a desk or protected space, to paper and pens or printer, or a computer program. It may be biostatisticians. It may be people who are also interested in your research project who are going to join and collaborate".

Independent learning is necessary

Participants reported a relative lack of guidance in research training, reporting that "we just kind of figured it out" and "I just had to do it". One participant remarked, "you have to kind of dig around until you find it…by the time you turn around the first year's gone and that is when you finally figured out where to find the software you need to apply the data that you have barely collected". Another said that "you can kind of fake it until you make it, and I don't know if that is the best way". Several participants reported supplementing their education by attending short research courses, watching online videos, or troubleshooting with other researchers.

Protected time is limited

The lack of protected time was reported as a major challenge by many participants. More than one participant cited the lack of protected time in residency as a reason for not doing research, with one person joking that "they [their boss] would allow me to have protected time as long as I carved out the protected time, between 9:00 at night and 6:00 am". When commenting on research as an attending, one participant said that "the old school model of where you could be in your lab doing science and the resident would be operating…that is not the reality anymore".

Basic science research is not always practical

Many of the participants cited an experience with basic science research. One person said, "I have done some basic novel drug discovery, organic chemistry experience in undergrad. Those were enough to convince me not to be a research scientist". Another participant remarked: "I did two years of lab…I use absolutely none of that". This sentiment was echoed by others, saying they would "never…do that again". One person felt that "I don't do the research as good as a PhD does".

Discussion

This qualitative study of research experiences among pediatric surgeons revealed numerous ways in which research training can potentially be improved. Available and able mentorship, ample dedicated research time, and institutional resources were felt to be important factors to a productive research experience. Formal training in study design, obtaining NIH funding, and grant submission may also be beneficial.

The surgeons in this focus group frequently identified pitfalls to conducting research. One of the most prominent themes included the lack of protected time. This was especially true in residency, a time in which many participants reported scarce opportunities to meet with a mentor. This lack of protected time is likely the reason that more than three-quarters of the participants completed a research fellowship. The problem of insufficient time does not seem to improve with seniority; as several surgeons cited clinical demands as a major limitation to performing research. This concept is supported by a previous survey of newly hired pediatric surgeons that found only 10% of their time was dedicated to research [5]. Stolar et al also suggested that pediatric surgeons' clinical efforts exceed that which they are compensated for [7]. While certain institutions may incentivize research efforts, the clinical activities of a pediatric surgeon usually generate the most revenue. As physician debt levels continue to rise [8], surgeon interest in research may be further marginalized.

Only 23% of respondents reported involvement with basic science research. Many felt that it was not practical for them. This may be due to lack of interest or experience. It may also reflect the lack of protected time, as basic science projects may take more time and resources to conduct. This perception of a decreased emphasis on basic science research among surgeons has also been reflected by a recent survey of the Association for Academic Surgery and Society of University Surgeons [9]. In reaction to this current phenomenon, the Society of University Surgeons recently issued guidelines for success in academic surgery, recognizing the numerous barriers that basic science researchers currently face [10]. Basic science research is also costly. Central to basic science research is experience in grant writing and obtaining NIH funding—two factors

which respondents frequently wished they had more training in. Previous data suggests less MDs and more MD-PhDs are pursuing NIH R01 grants [11], and one estimate suggests 13% of pediatric surgery fellows have PhD training [12]. Institutions that place a value on basic science research may need to recruit more PhDs.

There is little doubt that research is an important element in furthering surgical knowledge and ultimately improving patient outcomes. The challenge facing many pediatric surgeons is how to incorporate research into a busy practice. Financial concerns among young pediatric surgeons may be further allayed by increasing investment in loan forgiveness programs (such as those offered by the NIH and the U.S. Department of Education). Incentivized research scholarship and funding for advanced degrees may aid in recruiting pediatric surgeons to a research career. Important factors for research success identified in this study may not be available at all institutions (e.g., dedicated research time). A clustering of surgeon–scientists is likely already occurring at selected academic institutions that are most equipped to offer a supportive research environment. The future of academic surgery may rely upon this type of institution to serve as a haven for surgical research, which may not be viewed positively by smaller institutions but may be necessary to prevent a dwindling of active surgeon–scientists.

This study has several limitations. Due to the small sample size of surgeons and exploratory nature of this project, the themes identified may not be generalizable to all pediatric surgeons. This cohort was recruited from the annual Pediatric Trauma Society meeting, which is typically attended by pediatric surgeons who have an interest in trauma. This may have resulted in significant bias, selecting for a group of surgeons who are more clinically oriented in their research interests. Thirteen out of fourteen participants reported that they still conduct research, which again may reflect selection bias created by recruiting this cohort from an academic meeting. Limitations inherent to using a focus group include self-selection of participants and the possibility that more candid participants can dominate the discussion and prevent others from voicing their opinions [13]. The results of this study are best generalized to pediatric surgeons with an interest in research and care for trauma patients.

In conclusion, this study revealed that many pediatric surgeons perceive their early research training was not optimally designed to prepare them for practice. Factors which appeared to be most important included formal mentorship, protected time for research, and institutional support. A focus on education in research study design, grant writing, and NIH funding may be especially important for those surgeons who wish to incorporate research into their career.

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Compliance with ethical standards

Conflict of interest The authors declare that they have no conflict of interest.

Ethical approval All procedures performed in studies involving human participants were in accordance with the ethical standards of the institutional and/or national research committee and with the 1964 Helsinki declaration and its later amendments or comparable ethical standards.

Informed consent Informed consent was obtained from all individual participants included in the study.

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