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Filling the gap: Objective data to guide pediatric surgery applicants who do not match on the first attempt

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ABSTRACT

Purpose: Acquiring a pediatric surgery fellowship is an arduous process, with less than half of applicants matching each year. For those who fail to match initially but remain steadfast in their goal to become a pediatric surgeon, choosing a valuable postresidency path can be challenging. Furthermore, objective data to evaluate the utility of pediatric surgical subspecialty fellowships (PSSF) are lacking.

Methods: PSSF training programs were identified on the APSA website. Names and contact information of PSSF graduates between 2014 and 2018 were obtained from individual training programs. Each graduated fellow was then contacted to participate in a voluntary 14-question survey.

Results: Names of 47 graduated fellows were obtained from programs listed on the APSA website. Among them, 30 (64%) ultimately matriculated into a pediatric surgery fellowship, 11 (37%) of whom matched at the same institution they completed their PSSF. The type of PSSF was not predictive of matriculation into a pediatric surgical fellowship ($p = 0.43$). Thirty-two (68%) of the 47 study participants completed a satisfaction survey. While all but two graduates found their fellowships to be at least satisfactory, those who matched were more likely to recommend their PSSF compared to those who did not (100% vs 67%, respectively, $p = 0.02$). Within the cohort of fellows who did not ultimately match into pediatric surgery ($n = 17$) and completed a survey ($n = 9$), all who completed a critical care fellowship (4/4) currently use/or plan to use the skills obtained during their PSSF while only two of five (40%) completing other PSSFs use them.

Conclusion: The matriculation rate from a PSSF into a pediatric surgery fellowship was 64% with no significant difference among subspecialties. Of fellows who did not match, those completing a critical care PSSF were more likely to use their fellowship training than those completing a different PSSF.

Type of study: Clinical research paper.

Level of evidence: III

Acquiring an Accreditation Council for Graduate Medical Education (ACGME)-accredited pediatric surgery fellowship remains an arduous process. In 2017, 44 fellowship programs participated in the National Resident Matching Program (NRMP) for pediatric surgery. Ninety-four applicants applied, and of them, only 42 (45.2%) matched, making it the most competitive match process in 2017 [1]. Thus, more than half of applicants were forced to seek alternative options. For many, the disappointment is derailing. Applicants are faced with a difficult and individualized decision — continue the pursuit of a pediatric surgical fellowship, with the understanding that they may be in the same predicament in subsequent years, or change their ultimate career path.

Alternative options are prodigious and often overwhelming. Common paths include reentering the pediatric surgery match, applying to a different surgical fellowship, or proceeding into general surgery. For those considering reentering the pediatric surgery match, three critical questions must be considered by the applicant. First, what are the weaknesses in my application to improve upon? Second, what are my chances of obtaining a fellowship position the second or even third time applying? And third, what do I do after completing residency? The answer to the first question varies based on the applicant and may or may not be obvious, while the second two questions are often more individualized and challenging to answer. Numerous factors affect the likelihood of matching including research experience, test scores, number and quality of publications, letters of reference, and interview skills [2]; however, the benefit of a pediatric surgical subspecialty fellowships (PSSF) after graduation from residency is unknown.

Objective data to provide counsel for these decisions are scarce. In a 2015 study by Rothstein, he found that among ten ACGME-accredited pediatric surgical critical care fellowships, 84% of graduates successfully matched into a pediatric surgery fellowship [3]. What has not been reported is the benefit of non-ACGME-accredited PSSFs. These fellowships include bariatrics, colorectal, extracorporeal membrane oxygenation

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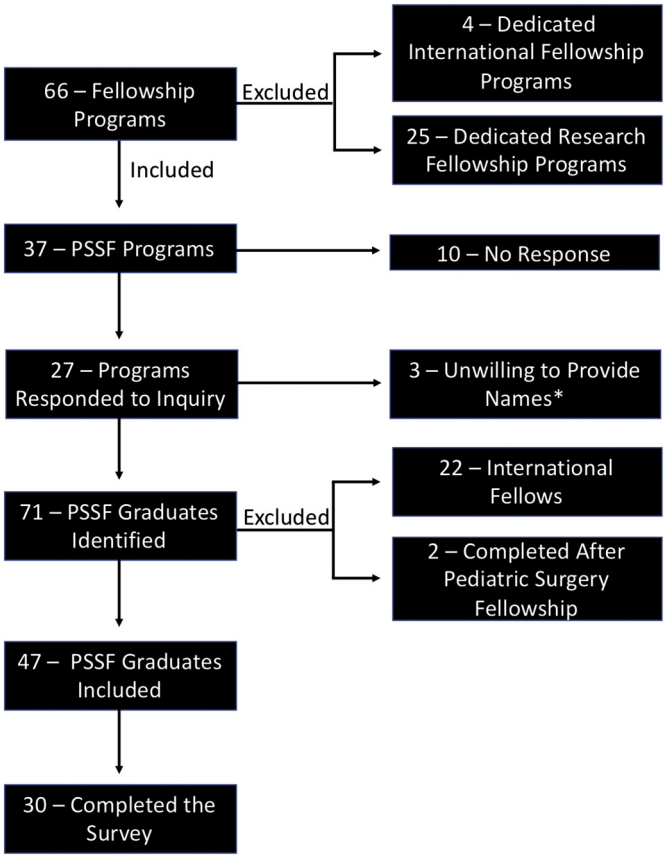

Fig. 1. Description of cohort. Flow diagram reporting graduates who were included and excluded from data analysis. *Two of the three programs unwilling to share graduates names refused to for privacy considerations while one program would not respond. PSSF, pediatric subspecialty fellowship.

(ECMO), fetal, medical innovation, minimally invasive, neonatal, surgical oncology, and trauma. The objective of this study is to assess matriculation rates from a PSSF into an ACGME-accredited pediatric surgery fellowship and describe the fellowship experience from the perspective of those completing it.

1. Methods

Programs with a PSSF were identified from the American Pediatric Surgical Association (APSA) website. Names of fellows who did not match into pediatric surgery on the first attempt but graduated from a PSSF after completing a general surgery residency between 2014 and 2018 were obtained by electronic communication with program directors and/or coordinators. Contact information for each graduated fellow was then procured either from their training program, searching the APSA and American College of Surgeons (ACS) directories, web-based searches, or social media outlets. A 14-question survey was developed using Google Forms to obtain a general description of those completing a PSSF, the matriculation rate into an ACGME-accredited pediatric surgery fellowship, the use of the PSSF skillset after training, and the overall satisfaction with the fellowship (Appendix A). A link to the survey was initially emailed to all graduated fellows. If no response was received by two weeks, a reminder email was automatically sent. This was repeated one additional time four weeks after the original survey request was sent. Matriculation was determined either by direct correspondence with the PSSF graduate, the APSA or ACS membership directory, or their practice associated website. Univariate analyses included Fisher's exact test and student t-test. A p-value of <0.05 was considered statistically significant. Statistical analyses were performed using Stata 14 (College Park, Texas).

2. Results

The APSA website advertised a total of 66 subspecialty training positions in areas of pediatric surgery at 25 institutions. A flowchart describing the acquisition of data is depicted in Fig. 1. Dedicated international and research fellowships were excluded in order to focus on our primary aim which was to describe the benefit of clinical PSSFs in acquiring an ACGME-accredited pediatric surgical fellowship. In total, we identified 47 North American graduates who met inclusion criteria. While matriculation into a pediatric surgery fellowship data were available for all 47 candidates, 32 (68%) completed a satisfaction survey.

Eleven different PSSFs exist with critical care the most common (Table). All critical care fellowships were ACGME-accredited, while all other PSSFs were not. Data pertaining to the number of fellowships completed were available for 32 graduates — twelve (38%) completed one PSSF while 20 (63%) completed two. Although not statistically significant, the average number of PSSFs completed by those who matched into pediatric surgery was 1.74, compared to 1.45 among those who did not match ($p = 0.08$).

The matriculation rate into an ACGME-accredited pediatric surgery fellowship was 64% (30 of the 47 graduates) with an average of 1.8 attempts through NRMP. Four applicants applied three times, of whom 2 (50%) matched. Seven of the 30 (23%) who matched were offered positions outside of the NRMP. The match rate was independent of the PSSF completed (Table) with no significant difference between those who completed an ACGME-accredited fellowship (i.e. critical care) and those who completed a non-ACGME-accredited PSSF (61% vs 67%, respectively, $p = 0.77$). Among applicants who did match, 11 (37%) were accepted into the program where they completed their PSSF. Career paths for those who did not match were available for 13 of 17 (76%) applicants. Among those who did not ultimately match into

Table
Description of pediatric surgery subspecialty fellowship graduates.

Pediatric Surgical Subspecialty Fellowship	Available Positions in 2018, n (%)	Graduates During the Study Period (2014–2018)	
		Total, n (% of 47 total PSSF graduates)	Matched, n (% of PSSF specific graduates)
Total	37	47	30 (64%)
Bariatric Surgery	2 (5%)	-	-
Critical Care	12 (32%)	23 (49%)	14 (61%)
Colorectal Surgery	3 (8%)	7 (15%)	4 (57%)
ECMO	3 (8%)	-	-
Fetal Surgery	3 (8%)	3 (6%)	2 (67%)
Medical Innovations	1 (3%)	-	-
Minimally Invasive Surgery	3 (8%)	5 (11%)	4 (80%)
Neonatal Intensive Care	1 (3%)	1 (2%)	1 (100%)
Vascular Anomalies	2 (5%)	2 (4%)	2 (100%)
Surgical Oncology	2 (5%)	2 (4%)	1 (50%)
Trauma	5 (14%)	4 (9%)	2 (50%)

ECMO, extracorporeal membrane oxygenation.

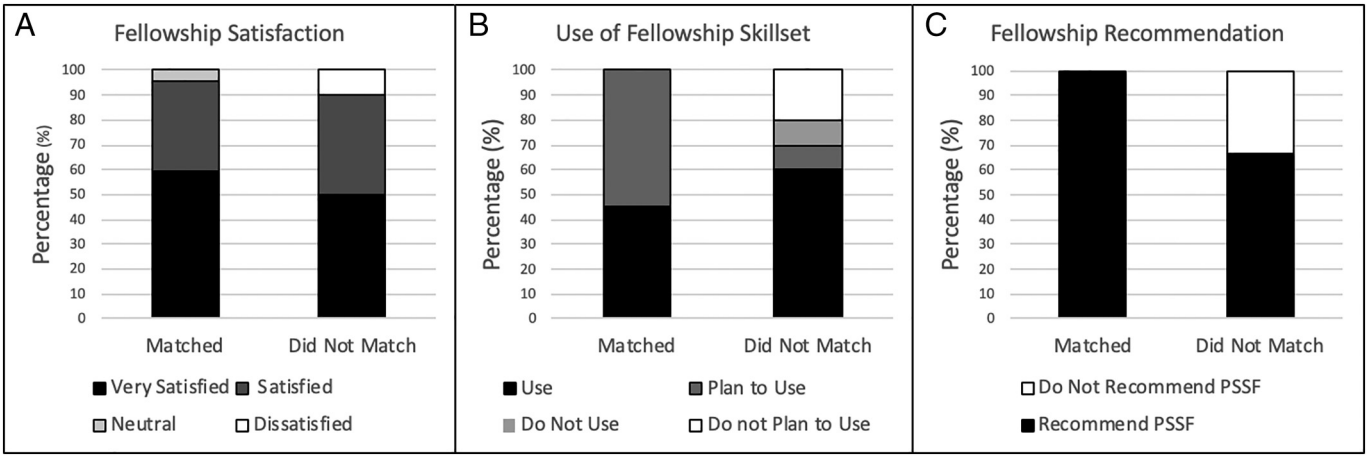

Fig. 2. Survey results comparing those who did and did not match into a pediatric surgery fellowship. PSSF, pediatric subspecialty fellowship.

pediatric surgery, seven (54%) are currently general surgeons, four (31%) are acute/critical care surgeons, one (8%) completed additional adult subspecialty training (colorectal), and one (8%) is undecided.

Thirty-two graduates completed a satisfaction survey. There was no significant difference in the matriculation rates into pediatric surgery between those who did complete the survey, 21/32 (66%), and those who did not complete the survey 8/15 (53%, $p = 0.52$). Data pertaining to fellowship satisfaction and utilization of the skillset obtained from individual PSSFs are described in Fig. 2. While all but two (94%) found their fellowships to be at least satisfactory, those who matched were more likely to recommend their PSSF than those who did not (100% vs 66%, respectively, $p = 0.02$, Fig. 2c).

3. Discussion

While the decision to pursue a PSSF is individualized, we provide objective data to help guide this difficult process. We identified 47 applicants over a five-year period who did not initially match into an ACGME-accredited pediatric surgery fellowship and went on to complete a PSSF. We found that the subsequent matriculation rate into a pediatric surgery fellowship was 64%, with a significant number finding positions outside of the NRMP or matching at the same institution they completed a PSSF. Furthermore, independent of whether a fellow matched into a pediatric surgery fellowship, 94% were at least satisfied with their PSSF, and among those who did not ultimately match, a majority use their skillset in clinical practice.

Currently, 58 ACGME-accredited pediatric surgery fellowships exist in North America. In 2017, 44 programs interviewed applicants, a reflection of several program offering biennial positions. Compared to 2010, when 34 programs offered interviews, there has been a 23% increase in fellowship positions [4]. Growing concern over job security and adequate case volume has prompted several institutions to limit the number of training positions, but this notion continues to be an ongoing discussion [5]. Paralleling the increase in fellowship positions is an increase in the number of applicants, with nearly 100 residents applying each year [1]. Thus, approximately 50 aspiring pediatric surgeons who fail to match each year are faced with challenging decisions centered around their future career. As nearly 75% of them indicate that they plan to reapply [4], the inception of PSSFs came by virtue of offering a valuable opportunity to fill a *gap year(s)* directly after residency. We found that over the past five years, fellows completing a PSSF had a 64% chance of matriculating into a pediatric surgery fellowship. Furthermore, the type of PSSF completed did not affect the match rate with the caveat that if a reapplicant failed to ultimately match into a pediatric surgery fellowship and pursued an alternative career, critical care fellows were more likely to use their PSSF skillset than those who completed other PSSFs.

Rothstein evaluated the utility of pediatric surgical critical care fellowships among fellows who graduated between 2003 and 2013 and found the matriculation rate into pediatric surgery was 84% [3]. We, on the other hand, found both the critical care and composite matriculation rate to be markedly lower (61% and 64%, respectively) between years 2014 and 2018. While the perceived benefit of additional training in pediatric surgery subspecialties may be less valuable today than it previously was thought to be, additional factors likely influence the odds of matching (e.g. if the applicant was a poor candidate during the first attempt, pursing a PSSF may not be as beneficial as it would be for a stronger candidate). Regardless of matriculation into a pediatric surgery fellowship, a majority of graduates were satisfied with their training experience and would recommend it to others in a similar situation.

We recognize that there are several limitations to this study. First, we were unable to adjust for variation in a candidate's academic strength including the quality of reference letters, test scores, number and type of publications, research experience, and Alpha Omega Alpha (AOA) status [2]. While previous reports focused on predictors of successful matriculation into pediatric surgery and other competitive fellowships such as obstetric and gynecologic fellowships [2,6], studies describing the various subspecialty opportunities and their utility are absent. Additionally, it would have been informative to compare matriculation rates into a pediatric surgery fellowship between this cohort and those who did not complete a PSSF, but rather filled their *gap year(s)* with either general surgery practice or research, but we were unable to identify that cohort. This study is also at risk for inclusion bias as it was easier to accrue contact information for those who matched into pediatric surgery either through the APSA website or fellowship programs directly. In an effort to minimize this bias, we emailed program directors and coordinators from the fellow's graduating institution, queried the APSA and ACS directories, and performed web-based and social media searches. Lastly, it is possible that the programs unwilling to provide graduate's names did so because their fellows did not ultimately match into pediatric surgery. While possible, two programs that were unwilling to share names noted privacy concerns, not reputation, which may be the case for nonresponding fellowship programs as well; nevertheless, this could reduce the matriculation rate we report.

This study is the first to evaluate the utility of PSSFs as a means to obtain an ACGME-accredited pediatric surgery fellowship. While multiple variables affect the likelihood of a candidate matching, we consider PSSFs to be a valuable adjunct and recommend that strong candidates committed to becoming a pediatric surgeon pursue one. With eleven subspecialties available, the choice should be based on clinical interest

as the probability of matching was not affected by the type. Ultimately, the next step after failing to match is an individualized decision requiring the consideration of multiple variables. We hope that by providing objective information regarding the utility of PSSFs, these data can better guide that challenging decision-making process.

Appendix A. Pediatric Surgery Subspecialty Satisfaction Survey

1. How many pediatric surgical subspecialties did you complete?
   A) 1
   B) 2
   C) 3
   D) >3
2. What type of pediatric surgical subspecialty (e.g. critical care, colorectal...) did you graduate from (please indicate if you completed more than one)?
   _____
3. What year(s) did you graduate from each pediatric surgical subspecialty?
   _____
4. How many years was each pediatric surgical subspecialty?
   _____
5. How many times did you go through the pediatric surgery match?
   A) 1
   B) 2
   C) 3
   D) 4
6. Did you match into a pediatric surgery fellowship?
   A) Yes
   B) No
7. If so, was it at the same institution you completed your subspecialty fellowship?
   A) Yes
   B) No
8. If you didn't match into pediatric surgery, what did you do the following year and what was your ultimate career path?
   _____.
9. If you did match into a pediatric surgery fellowship, was there time off between your pediatric surgery subspecialty fellowship and starting and what did you do?
   _____.
10. If you completed a critical care fellowship, are you board certified?
    A) Yes
    B) No
    C) Took, but did not pass
11. Do you use or do you plan to use your skills obtained during your fellowship?
    A) Yes, I use them
    B) Yes, I plan to use them
    C) No, I do not use them
    D) No, I do not plan to use them
12. How satisfied were you with the overall fellowship experience (i.e. are you happy you did it)?
    A) Very satisfied
    B) Satisfied
    C) Neutral
    D) Dissatisfied
    E) Very dissatisfied
13. If you were advising individuals who did not match the first time around, would you recommend your 1st fellowship?
    A) Yes
    B) No
14. If you completed more than one, would you recommend the 2nd fellowship?
    A) Yes
    B) No

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