



## Brief Communication

## Where are they now? An analysis of integrated cardiothoracic surgery residency applicants

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## ABSTRACT

Changes in cardiothoracic surgery (CTS) workforce trends have affected training paradigms to include the establishment of integrated six-year CTS residency (I6) programs. This study aimed to determine commitment of selected I6 program applicants to the specialty.

Internal archives at a single institution were accessed to identify applicants interviewed for an I6 position from 2014 to 2016. A systematic internet search of publicly available information was performed to identify the trainee's current specialty. Descriptive analysis was performed.

Forty-seven applicants were identified. Successful search results were achieved for 97.9 % of the applicants. One applicant was excluded, resulting in a cohort of 45. 48.9 % of the applicants successfully matched into I6 programs. Of the 23 who did not match into an I6 program, 91.3 % began a General Surgery (GS) residency. When looking solely at the GS trainees, 71.4 % sought and matched into a traditional or 4/3 CTS residency. In total, 77.8 % of the cohort are currently pursuing careers in cardiothoracic surgery.

The study identified a strong continued interest in the field of CT Surgery among those interviewed for integrated residency. The methodology used in this study provided an effective way to follow career choice of applicants interviewed and could be applied by additional programs to further elucidate career choice and levels of commitment.

## Introduction

The field of cardiothoracic surgery (CTS) faces projected workforce shortages [1,2]. Contributing factors include, but are not limited to, an accelerating number of retirees [3], a growing population over 65 [1,2,4] and a decline in CTS trainees [5]. To attenuate these shortages, a new training paradigm was established. The integrated six-year CTS (I6) program sought to attract applicants directly out of medical school or soon thereafter. Since inception, demand for I6 positions has consistently and increasingly outpaced the number of positions offered each year [6–8]. However, the level of commitment to the field of cardiothoracic surgery among a relatively inexperienced group is unknown. A prior study concluded that only 14 % of those who previously applied to I6 programs continued into CTS [9].

In this study, a simple approach was taken to gather information about I6 program applicants. The purpose was to determine I6 program match rates, career paths taken by those who do not match, and I6

program attrition rates.

## Methods and materials

An internal archive was accessed to collect information about former applicants interviewed for the I6 program at the department of CTS at UT Health San Antonio from 2014 to 2016. Limiting the study to this timeframe ensured for a certain level of maturity in the I6 programs nationwide while allowing enough time to provide insight into the trainees' eventual career interests. The identifying information on the applicants was then used in an internet search to gather additional information to determine current career placement. The search was conducted using only publicly available information with the source logged as one of 4 categories: CTSNet, social media (LinkedIn, Facebook, Twitter, Instagram), medical institution websites and "other". No contact with members of the cohort was made. The results of the search placed the applicants into the following categories:

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The “I6 Residency” category included those applicants who matched into an I6 residency. The “General Surgery Residency - CTS Track” category contained applicants who completed a traditional or fast-track (4 + 3) residency pathway. The “General Surgery Residency - No CTS Track” category included the applicants who completed a general surgery residency who did not pursue cardiothoracic surgery training. The “Other” category included applicants who completed other surgical residencies and applicants who pursued residency training other than surgery altogether. Any applicant that did not have sufficient information online during the search was removed from the study.

All data was collected, stored, and analyzed qualitatively on Micro-soft Excel. The protocol was vetted by the Institutional Review Board and determined to not require oversight or approval.

Results

The applicant career track search produced sufficient information for 46/47 (98 %) of the applicants reviewed. One resident had not completed enough of their graduate training and was removed from the study. This resulted in a final cohort of 45. Relevant information was found across a variety of sources and most applicants (36, 80 %) had published information on multiple sites. The number of sources verifying our finding ranged between 1 (9, 20 %) and 4 (2, 4.4 %) sources per applicant, with a mean of 2.2 sources.

Initial residency matriculation distribution

Twenty-two of 45 applicants (49 %) matched into an I6 program (Fig. 1). The majority of those who did not match into an I6 program, 21/23 (91 %), matched into a GS residency. Of the two remaining applicants, one matched into a different integrated surgical program and the other into a non-surgical residency.

Current applicant career distribution

Of the 22 applicants who started an I6 residency, 20 (91 %) are finishing or have completed their resident training. 2 (9.1 %) I6 residents were found to have switched to alternate, non-surgical careers. Twenty-one applicants completed a general surgery residency. A majority (15/21, 71 %) went on to cardiothoracic residency training (Fig. 2). The remaining 6 (29 %) general surgery residents sought a

variety of subspecialty fellowships. In total, 35/45 (78 %) of the cohort are currently pursuing careers in CTS (Fig. 3). 7/45 (16 %) are pursuing surgical careers outside of CTS, and 3 (6.7 %) of the cohort are in non-surgical specialties.

Comment

The traditional training paradigm for CTS delayed the need to make such a career choice while accumulating years of clinical exposure and experience. In partial response to progressive decrease in numbers of applicants to such programs, the I6 training programs were introduced in 2008. This accelerated the need to make such a career choice as the programs were aimed primarily at graduating medical students. These programs have grown in both number and popularity [6–8]. Two questions arise from this new paradigm. Are such individuals informed and committed to the specialty at this early stage? Does this level of commitment persist if they don't matriculate into the integrated pathway?

In this study, a very select group of applicants to an I6 program were identified. After review of board scores, curriculum vitae, letters of recommendation and personal statements, interviews were offered to those who demonstrated a high level of achievement and commitment to the field of CTS. All were either in medical school or within 1–2 years of graduation at the time of the interview. This select group was chosen in order to determine whether those with this level of commitment continued to pursue the specialty. Records related to all applicants were not available.

The results showed that approximately half of interviewees matched into an I6 training program. Furthermore, of those who did not match into the integrated paradigm, a large percentage continued on to complete an alternate pathway to the specialty. The final result was that nearly 80 % of the selected group was pursuing a career in CTS. Results of this study contrast with that in previous work which concluded that only 14 % of former I6 applicants continued into CTS [9]. This is due in large part to major differences in methodology to include the groups studied and the use of a survey as opposed to the observational nature of this study. The attrition rate among those who matched into an I6 program was higher than reported previously [10], in large part due to the relatively small numbers. It is also interesting to note that some eventually chose fields quite unrelated to the field of CTS.

The major limitation of the study was the small sample size. This was

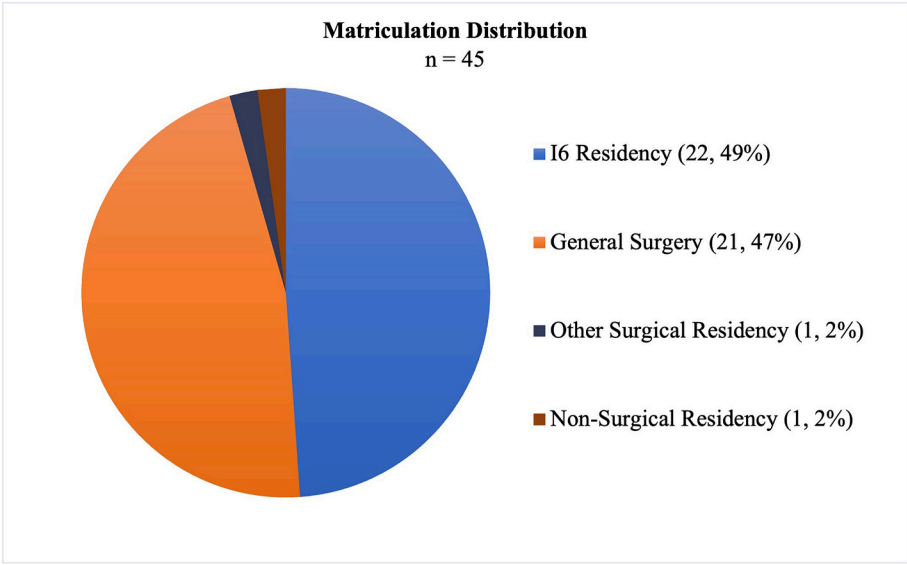


Fig. 1. Distribution of initial residency training matriculation of cohort. The bulk of I6 program applicants either matched into an I6 program or a GS residency. n = 45.

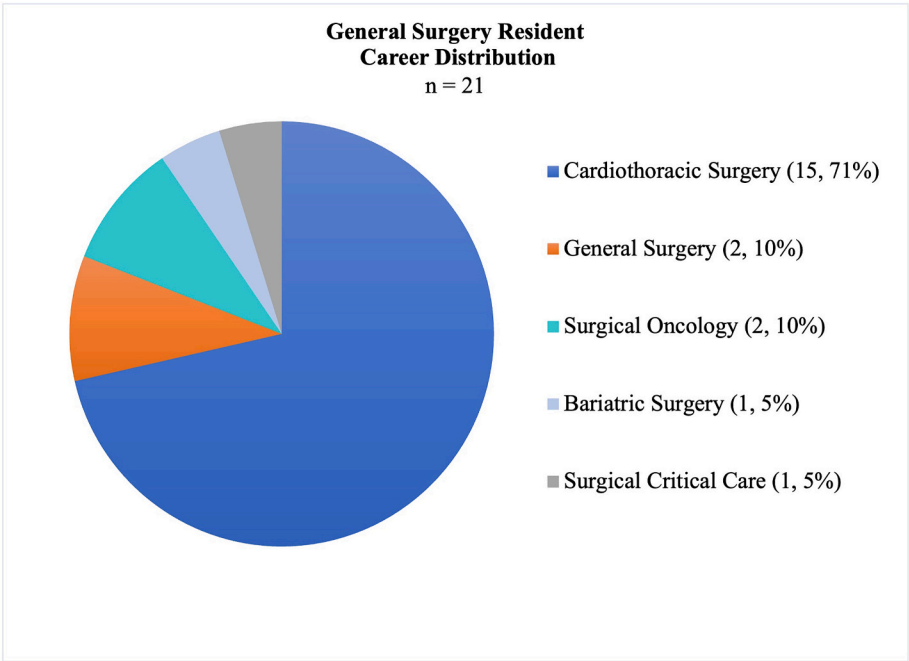


Fig. 2. Distribution of career path taken by former I6 candidates following GS residency. Nearly ¾ of the GS residents went on to pursue CTS careers. n = 23.

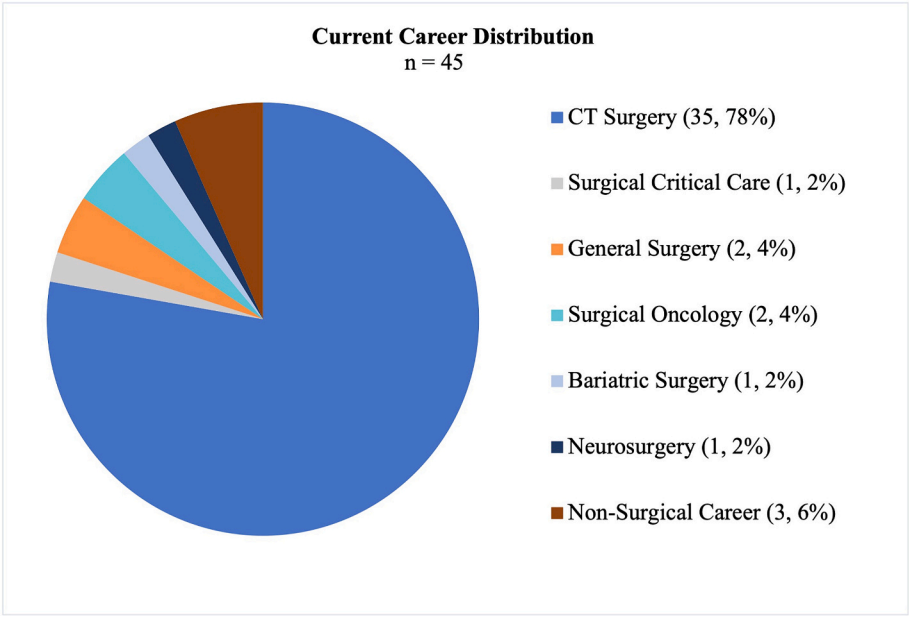


Fig. 3. Distribution of career choices made by the entire cohort. There is a strong career interest in CTS among former I6 program applicants. n = 45.

a function of restriction to a single institution and the nature of the applicant selection process. Due to the small sample size, the impact of gender could not be determined. There was also a self-imposed limit to the number of years sampled. This was chosen to look at a period of increased maturity of the integrated paradigm with enough lag time to assess outcomes. Another limitation is the reliability of data found on-line. Inferences were made to determine if the individual found online was the person previously interviewed. However, it was clear for almost all in our cohort given that information was found on multiple sites. Further detail, specifically regarding a specific track, cardiac vs thoracic surgery specialization, was not possible with this methodology.

This serves as a pilot study as the methodology proved to be effective in tracking the applicants. The information used was publicly available

and the methodology was not different from a clinical retrospective study in which patient data is used without their specific consent. Applying this to larger numbers across multiple programs (with adjustments made for duplication in information) could be done. In an environment in which multiple training paradigms exist, such information can be used to adjust relative training pathways to ensure a stable and effective workforce.

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## Ethics approval

Institutional IRB reviewed and exempted.

## CRediT authorship contribution statement

**Christopher M. Worrell:** Writing – original draft, Validation, Formal analysis, Data curation, Conceptualization. **Nitin A. Das:** Writing – review & editing, Supervision, Conceptualization. **Edward Y. Sako:** Writing – review & editing, Supervision, Methodology, Conceptualization.

## Declaration of competing interest

No authors report a conflict of interest relevant to this study.

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