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Perception of congenital cardiac surgery as a career choice among cardiothoracic surgery trainees in the United Kingdom

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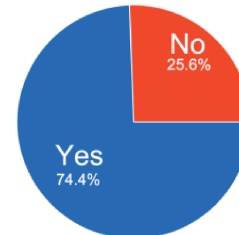
Abstract

Attitudes towards congenital cardiac surgery as a career amongst UK cardiothoracic trainees

Summary

In a survey of cardiothoracic surgical trainees, we evaluated interest in congenital cardiac surgery as a sub-specialty career. A significant proportion have considered it as a career early in their training, with interest waning in the latter years, citing negative perceptions about the sub-specialty and training.

Have you ever considered a career in congenital cardiac surgery?
43 responses



Legend: Survey demonstrating interest in congenital cardiac surgery as a sub-specialty

OBJECTIVES: Our goal was to evaluate interest among trainees in pursuing congenital cardiac surgery (CCS) as a sub-specialty career and probe for reasons in decline in interest.

METHODS: An anonymized, voluntary survey of cardiothoracic surgical trainees across the United Kingdom and Ireland was conducted from October 2020 to December 2020. The questionnaire included demographics, congenital experience and career intentions.

RESULTS: A total of 43 respondents from all training regions responded with a response rate of 36%. A total of 28% reported having no access to a congenital cardiac unit in their training region, reflecting that 4 out of the 14 regions do not have a congenital unit. Although only 18% of trainees have undertaken a placement, a large proportion (74%) have considered a career in CCS, predominantly (50%) before entering training or in the first half of the training programme (38%). Reasons for not pursuing included discouragement by

colleagues (42%) and concerns regarding the training pathway, citing, among other reasons, length of training, limited exposure to operations and uncertainty about career progression. Respondents suggested improvements to the training programme, including increasing exposure and early mentoring and steps to dispel unduly negative perceptions about the specialty.

CONCLUSIONS: A large proportion of cardiothoracic trainees have a negative perception of CCS in terms of career and training. Interest wanes substantially after entry into the United Kingdom cardiothoracic training programme for several reasons. As well as short-term measures to improve exposure to CCS and structure of training, there has to be long-term planning to improve perception about this sub-specialty at all levels.

Keywords: Congenital cardiac surgery • Training • Career • Attitudes

ABBREVIATIONS

CCS	Congenital cardiac surgery
CTS	Cardiothoracic surgery
SCTS	Society for Cardiothoracic Surgery in Great Britain and Ireland
UK	United Kingdom
UK/Ire	UK and Ireland

INTRODUCTION

Congenital cardiac surgery (CCS) is a surgical sub-specialty that delivers surgical care for patients with congenital heart defects from infancy into adulthood. It has been recognized worldwide as a sub-specialty requiring practitioners to undertake specific training. In countries such as the United States and the United Kingdom (UK), specific credentialing has been recently implemented by their respective postgraduate medical training bodies (Accreditation Council for Graduate Medical Education and the General Medical Council) [1, 2]. The usual pathway is for trainees or residents to be accepted into a programme for adult cardiac or cardiothoracic surgery (CTS) and subsequently sub-specialize in CCS.

In the UK, the number of cardiothoracic trainees entering the sub-specialty has declined, leaving congenital training posts unfilled, as evidenced by only 2 trainees having gained the sub-specialty qualification in the last 8 years according to the General Medical Council. Concerns about declines in interest and recruitment into the overall specialty have been raised by several groups. In the UK, as in many countries, interested surgeons have to first undertake CTS as a specialty before sub-specializing in CCS. The training programme and curriculum for all cardiothoracic surgeons require trainees to be knowledgeable about the fundamentals of congenital heart disease, on which they are tested in section 1 of the mandatory intercollegiate specialty examination (Fellow of the Royal College of Surgeons in the specialty of CTS) [3].

Our goal was to delve into the current state of attitudes towards CCS as a career by trainee surgeons in CTS.

MATERIALS AND METHODS

This study was undertaken in accordance with the latest version of the Declaration of Helsinki. Because anonymized survey participants were implicitly asked permission to use anonymized data derived from the responses they gave, formal consent was not obtained.

An online survey was designed by the study authors, and anonymized responses were collected using a commercially available platform (docs.google.com/forms). The survey was open to respondents who consented to be contacted through the mailing list. The link to the form was distributed nationally to junior surgeons working in CTS through the Society for Cardiothoracic Surgery in Great Britain and Ireland (SCTS) mailing list between October 2020 and December 2020. This group includes both trainees in the national training programme (specialty training, years 1-8) as well as non-trainees working in CCS (fellows and registrars).

Categorical variables are reported numerically with percentages. χ^2 tests were used to compare differences in responses or demographics, with a *P*-value of <0.05 defined as significant.

RESULTS

There were 43 responses to the survey. This number represents a response rate of 36%, as there are approximately 120 trainees in the UK and Ireland (UK/Ire). There were respondents from all 14 regions of the training programme covering UK/Ire. Of these, 70% (30) were male and 40% (18) were in the age group 31–35 years (Fig. 1).

Availability of placements

A total of 67% (27) of trainees reported they did not have any CCS placement in their training. This situation appeared to be due to 2 main factors: access to centres and whether the placement was compulsory or not (Fig. 2).

A total of 28% (12) of respondents did not have access to any congenital centres in their programme. Only 18% (8) of

What is your age group?

43 responses

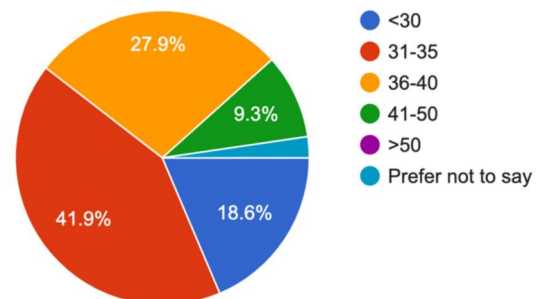


Figure 1: Age distribution of survey respondents.

Do you have a congenital cardiac surgery centre in your home deanery?

43 responses

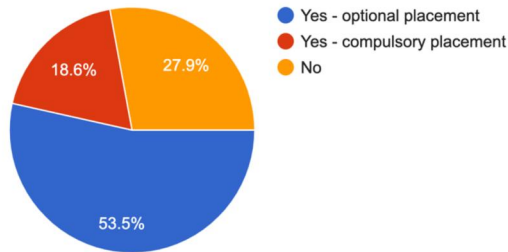


Figure 2: Accessibility to congenital unit in training programme/deanery.

respondents had a compulsory placement, though 72% had access either as optional or compulsory placements.

This situation is reflected by the geography of the 14 training programmes and the distribution of 12 congenital cardiac units (Supplemental Table 1). The 12 CCS units are located within only 10 (out of 14) training programmes. In those 10 programmes, 6 offer optional placements and 4 have compulsory rotations in CCS. There are 4 programmes that do not have any CCS units in their region. Three of these 4 programmes used to carry out CCS, but re-organization of services over the past 2 decades led to the closure of units in these regions.

Interest and exposure

Promisingly, 74% (32) had considered a career in CCS at some point, but only 14% were actively pursuing CCS as a career option. Of the 26% of respondents who had not considered it, 64% (7) had already determined their interest to be either adult cardiac or thoracic surgery. The remainder had either never had any exposure or had been put off the specialty.

Among those who did consider a career in CCS, 50% had considered it before entering training (16), 37% (12) had considered it in the first half of training (specialty training, years 1-4), and only 13% considering it in the latter half of training (specialty training, years 5-8, post-CCT) (Fig. 3). They had significantly greater congenital exposure compared to those who had not considered a career in CCS (44% vs 18%, $P < 0.0001$).

Disappointingly, 58% of all trainees reported having been discouraged by colleagues from pursuing an interest in CCS. This experience had a greater effect on those who had initially expressed an interest in CCS because a larger proportion of those who had considered it as a career, reported this (47% vs 27%, $P < 0.001$).

Obstacles to training

Confidence in training appeared to be split 3 ways among all respondents. Only 28% of trainees were confident that it is possible to train in CCS in the UK; 33% were not confident; and 39% replied 'maybe' (Fig. 4).

The main personal and systemic obstacles to training were queried as an optional open question with the option to write free text. More than 90% of respondents responded in this section with their perceptions.

At what stage of your training did you consider a career in congenital cardiac surgery?

32 responses

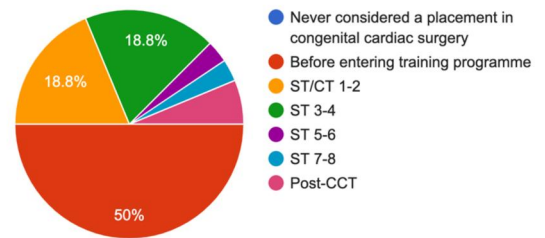


Figure 3: Stage of consideration of career in congenital cardiac surgery.

Do you think it is possible to train in congenital cardiac surgery in the UK?

43 responses

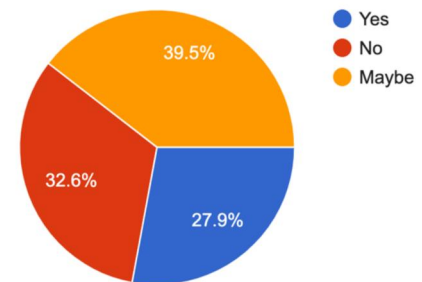


Figure 4: Perceived confidence in United Kingdom training programme.

Responses may be divided into 4 broad themes on analysis of the free text answers (shown verbatim in italics below):

i. Training-related

- *Poor training, lack of training, no hands on as trainee*
- *No clear training pathway, poorly structured programme*
- *Length of training*
- *Limited geographical centres*
- *Requirement for international fellowships*
- *Requires training as consultant that is dependent on interested consultant colleague, dedicated mentor*

ii. Exposure-related

- *Limited exposure, kept hidden as oblivious subspecialty, not well advertised or accessible to trainees*
- *Perception from other trainees*
- *Discouraged, no contact with senior surgeons, no support*

iii. Work-related

- *Difficult to cope with paediatric mortality, high stakes, very low job possibilities, "After Bristol, . . ."*
- *Lack of certainty about career prospects and progression compared to adult, a history of not employing [local trainees], few jobs available given to internationally trained doctors*

iv. Money-related

- *No extra incentives, less rewarding, poor rewards for very demanding specialty, new junior doctor contract not in line with training needs*

Proposed solutions to perceived obstacles

Respondents provided solutions to their perceived obstacles as further free-text answers. These solutions could be divided into 3 main themes (shown verbatim in italics below).

- i. Training changes
 - *Separate cardiac and thoracic, and consider congenital as part of cardiac*
 - *More exposure to congenital/compulsory 3-month attachment*
 - *More encouragement/support and mentorship*
 - *Early identification of trainees with interest. At the moment CHS training begins at the end of training. Then training begins again. This is a major barrier to people.*
 - *Institute formal international fellowships for trainees [in centres with high-volume]*
 - *More hands on*
 - *Standardized training pathway with clear milestones of successful progression in training*
- ii. Perception changes
 - *Narrative of congenital heart surgery needs to change to attract trainees. "I had a strong interest in CHD surgery since medical school, but hearing discouraging accounts from seniors takes its toll over time."*
 - *"As a trainee with an interest in CHS it is disheartening seeing the lack of colleagues who want to pursue this specialty and also the low percentage of consultants who have been trained through the UK system".*
- iii. Increased support for trainers
 - *Dedicated trainers at training centres, stimulate genuine recognition for genuine trainers.*
 - *Consultants need support from management, training for the trainers, structured curriculum, clear goals in writing.*

Proposed changes in training

Respondents were divided (47% against, 44% for) on the issue of committing to tailored CCS training in the early years of cardiothoracic training. Most agreed (93%) that one should train in adult acquired cardiac surgery and thoracic surgery before committing to CCS, with 78% suggesting either 1–2 years or 2–4 years at least. They also supported achieving minimum numbers of cases as first operator in coronary artery bypass grafting, aortic valve replacement, mitral/tricuspid and aortic surgery.

DISCUSSION

We gathered detailed motivations and rationales from the current cohort of UK/Ire cardiothoracic trainees in relation to considering CCS as a career. A similar study probing motivations among the CTS trainees in the United States has also shed light on this area: 64% of the cardiothoracic residents in the United States had considered CCS, increasing to 85% in the integrated 6-year run-through programme [4]. Echoing our survey results, those with earlier exposure (before CTS residency) were significantly more likely to be interested in CCS.

Previous surveys have shown that trainees tend to commit to CCS at an early stage of their training [5, 6], perhaps even before applying to the CTS training programme. Even recently, a study

showed 37% of aspiring applicants to CTS training programmes were interested in CCS [7].

The survey of Congenital Heart Surgeon Society and European Congenital Heart Surgeons Association members who are practising congenital heart surgeons reveals similar timing of onset of their interest in the sub-specialty. A total of 35% had considered it before surgical residency, the number increasing to 89% prior to starting cardiac surgical training, noting that cardiac surgery training took place after general surgery residency in that era [8].

These studies, in concert with our own, show that a significant proportion of trainees may have been motivated to apply to the cardiothoracic specialty in the first place specifically because of the congenital subspecialty. However, it is troubling that these juniors (82% in our study) do not experience CCS as part of their training programme in CTS.

Once they are in training, early engagement with cardiothoracic surgical trainees is crucial because many of them lose interest in pursuing CCS in the latter half of training. In a survey of congenital trainees in the United States, mentorship was flagged as the factor that most motivated them to pursue the specialty. Mentorship also correlates with exposure to CCS as a resident or medical student. The authors of this study in the United States deemed early exposure to be important to recruitment into the subspecialty [9].

Unlike the UK/Ire cohort in our study, 97% of the residents in the United States had a congenital placement either in their training programme or through an outside institution, spending an average of 3–4 months usually by year 4 of their integrated programme. Benefits of this placement included 42% of trainees undertaking cases as primary surgeons (most commonly atrial septal defect, patent ductus arteriosus ligation and pulmonary valve replacement (PVR)) and feeling more prepared for the congenital questions in the board examination. Job availability and length of training were cited as the most common reasons by those not pursuing CCS as a career.

The availability and mandating of CCS placements may be difficult to achieve in the UK programme. An important difference lies in the delivery of congenital cardiac care in the UK, where congenital units are predominantly in stand-alone paediatric hospitals institutionally and geographically separate from where adult cardiac surgery is undertaken. Of the 48 sites in the British Isles where any cardiothoracic services are delivered, only 2 provide the entire spectrum of services (paediatric, adult cardiac, thoracic, adult congenital and transplant). Only half of the CCS sites (6 out of 12) have co-located paediatric and adult cardiothoracic services (excluding transplant) (Supplemental Table 1).

There may be other factors that affect the attractiveness of opting to undertake a CCS placement. Trainees may feel they would rather improve their surgical logbook in adult cardiac or thoracic surgery in the limited time at each placement rather than leaving their learning curve and spending time as a novice in CCS. Access to operating opportunities and accruing first operator cases have been issues of consternation among trainees, particularly in the last decade. This situation has been exacerbated by the pandemic and the shortening of the UK run-through training programme to 7 years. Furthermore, trainees would have witnessed an unusually high turnover of consultant surgeons (50%) leaving UK practice in the last decade, double that of a comparable specialty such as neurosurgery [10].

Exposure to congenital heart disease also affects sister specialties such as paediatric cardiology. For example, a survey of cardiologists in training in Japan revealed that congenital heart disease was one of the least popular subspecialties, with only 0.7% considering it

[11]. Similarly low interest in the adult congenital heart disease subspecialty among UK cardiology trainees has been reported, with only 4% choosing it, citing poor exposure as a potential reason [10].

PROPOSALS

The surgical body involved in the governance of specialty training in CTS (Specialty Advisory Committee) has issued guidance to increase exposure to congenital placements. They have proposed mechanisms to facilitate 3- to 6-month placements in CCS for all trainees, including utilizing placements in adjacent training programmes. This procedure will serve to improve exposure to CCS for all trainees.

With few trainees having undertaken placements in CCS units, the key to trainee (and trainer) satisfaction will be the extra support in place within these units as they transition to receiving regular junior trainees. It will be important to assess the effect of these placements—one idea would be to compare the proportion of correct answers to congenital themed questions in the first part of the specialty examination (Fellow of the Royal College of Surgeons in the specialty of cardiothoracic surgery) before and after implementation.

Workshops and wet labs in congenital surgery would serve to engage early-year trainees. This step has been undertaken recently with the SCTS organizing a fully-funded national wet lab in congenital surgical skills [12]. It is already known that highly interactive workshops are highly influential in affecting career choice, particularly in the early years [13].

Congenital surgeons could facilitate mentoring opportunities by tutoring in bootcamps and in courses attended by all trainees, especially in the early years [14]. This step can bridge the gap for trainees who may never have the opportunity to interact with a congenital surgeon in their institution or programme.

As our survey showed, a significant proportion of trainees were discouraged from pursuing CCS as a career. Perception may improve once exposure improves and trainees have fulfilling placements. Other measures include improving visibility and presence in cardiothoracic meetings by having congenital topics included in plenary sessions.

LIMITATIONS

The limitations of our survey include a relatively low response rate, though this result is similar to the results of other voluntary surveys among cardiothoracic residents published in the literature. We sought to improve take-up by inclusion in multiple mailing lists. There may be an element of selection bias with some trainees being strongly opinionated about CCS as a career, as evidenced by having 90% of respondents giving detailed free-text responses. It is impossible to know how representative the survey was of real perceptions of the population. However, the proportion of interest in CCS among respondents is not dissimilar to that in other surveys.

CONCLUSION

We have conducted a detailed interrogation into attitudes towards a career in CCS in the UK/Ire among junior doctors working in CTS. Early exposure is a key determinant for attracting

trainees into the specialty. We have shown that there is a possible correlation whereby the lack of exposure could lead to low levels of interest in CCS. Enhancing exposure to CCS is also key to providing well-rounded training in CTS. We also outline proposals to make sure CCS is accessible to all trainees during training, as well steps to improve perception about the specialty.

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CONFLICTS OF INTEREST

The authors have declared that no competing interests exist.

DATA AVAILABILITY

The data underlying this article will be shared on reasonable request to the corresponding author.

Author contributions

Joseph George: Conceptualization; Methodology; Writing—Original Draft Preparation; Writing—Review & Editing; **Attilio Lotto:** Conceptualization; Methodology; Supervision; Writing—Original Draft Preparation; Writing—Review & Editing.

REFERENCES

- [1] ACGME Thoracic Surgery. 2022 [accessed 2022]. Available from <https://www.acgme.org/specialties/thoracic-surgery/program-requirements-and-faqs-and-applications/>.
- [2] GMC Congenital cardiac surgery curriculum. 2021 [accessed 2022]. Available from <https://www.gmc-uk.org/education/standards-guidance-and-curricula/curricula/congenital-cardiac-surgery-curriculum>.
- [3] Cardiothoracic Surgery Curriculum. 2021.
- [4] Coyan GN, Kilcoyne M, Castro-Medina M, Viegas M, Da Fonseca Da Silva L, Romano JC *et al*. Congenital Heart Surgery Training Experiences and Perceptions Among Cardiothoracic Surgery Residents. *Semin Thorac Cardiovasc Surg* 2023;35:148–55.
- [5] Lebastchi AH, Yuh DD. Nationwide survey of US integrated 6-year cardiothoracic surgical residents. *J Thorac Cardiovasc Surg* 2014;148:401–7.
- [6] Tchantchaleishvili V, LaPar DJ, Odell DD, Stein W, Aftab M, Berfield KS *et al*. Predictors of Career Choice Among Cardiothoracic Surgery Trainees. *Ann Thorac Surg* 2015;100:1849–54; discussion 1853.
- [7] Han JJ, Mays JC, Sukhvasi A, Patrick WL, Helmers MR, Iyengar A *et al*. Characteristics and Attitudes of Aspiring Cardiothoracic Surgeons: a Survey Study. *Ann Thorac Surg* 2021;112:2063–9.
- [8] Ungerleider RM, Verghese GR, Ririe DG, Ungerleider JD. Selection, training and mentoring of cardiac surgeons. *Pediatric and Congenital Cardiac Care: Volume 2: Quality Improvement and Patient Safety* Springer-Verlag London Ltd 2015;9–38.
- [9] Kogon B, Karamlou T, Baumgartner W, Merrill W, Backer C. Congenital cardiac surgery fellowship training: a status update. *J Thorac Cardiovasc Surg* 2016;151:1488–95.

- [10] Crossland DS, Ferguson R, Magee A, Jenkins P, Bullock FA, Parry A *et al.* Consultant staffing in UK congenital cardiac services: a 10-year survey of leavers and joiners. *Open Heart* 2021;8:e001723.
- [11] Kohno T, Kohsaka S, Ohshima K, Takei Y, Yamashina A, Fukuda K. Attitudes of Early-Career Cardiologists in Japan About Their Cardiovascular Training Programs. *Am J Cardiol* 2014;114:629–34.
- [12] SCTS Congenital Heart Disease course. 2022 [accessed 2022]. Available from https://scts.org/events/139/scts_congenital_heart_disease_course/.
- [13] George J, Combella T, Lopez-Marco A, Aslam U, Ahmed Y, Nanjiah P *et al.* Winning Hearts and Minds: inspiring Medical Students into Cardiothoracic Surgery Through Highly Interactive Workshops. *J Surg Educ* 2017;74:372–6.
- [14] SCTS NTN Course Curriculum. 2022 [accessed 2022]. Available from https://scts.org/professionals/education/career_groups/ntn_trainees/courses.aspx.