






# Surgical curriculum concordance: requiem for the educational dream

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## ABSTRACT

This study aimed to analyse the degree of relative variation in speciality-specific competencies required for Certification of Completion of Training (CCT) set by the UK Joint Committee for Surgical Training (JCST) 2021 curriculum. Regulatory body guidance related to operative and non-operative surgical skill competencies required for CCT were analysed and compared. Wide inter-speciality variation was demonstrated in the minimum number of logbook cases (median 815; range 54 to 2100), indexed operations (8; 5 to 24) and procedure-based assessments (35; 6 to 110). Academic competencies related to peer-reviewed publications, communications to learned societies and audits were aligned at zero, zero and three across specialities, respectively. Mandatory courses have been standardised with Advanced Trauma Life Support being the sole pre-requisite CCT for all. JCST certification guidelines have broadly standardised competency domains, yet large discrepancies persist regarding operative indicative numbers and assessments. This article serves as a definitive CCT guide regarding prevailing changes.

## INTRODUCTION

Formal education has three principal elements: curriculum, teaching and assessment. The essential strategy is usually to standardise these as much as possible.<sup>1</sup> Yet, education is a hot political topic, it runs deep, and for four main reasons: economic, cultural, social and personal. The current surgical curricula have received criticism for too heavy a reliance on competency-based training, a numbered focussed stress, yet inadequate emphasis on the holistic professional judgement of experienced clinical trainers.

Ten individual surgical specialities are recognised by the UK Joint Committee for Surgical Training (JCST): Cardiothoracic Surgery (including Congenital Cardiac Surgery), General Surgery, Otolaryngology, Neurosurgery, Oral and Maxillofacial Surgery (OMFS), Paediatric Surgery, Plastic Surgery, Trauma and Orthopaedic Surgery, Urology and Vascular Surgery.<sup>2</sup> In addition, General Surgery trainees must nominate their choice from eight *specialist interests*: Breast, Colorectal, Upper Gastrointestinal, Vascular, Transplant, Endocrine, General Surgery of Childhood and Advanced Trauma.<sup>3</sup> When the relevant competencies required for certification between surgical speciality curricula were compared recently, wide variations were reported.<sup>4</sup> With regard to clinical domains, minimum operative caseload requirements differed

35-fold, numbers of indicative operations differed 11-fold and procedure-based assessment requirements differed over 8-fold between specialities. Demonstration of academic performance by peer-reviewed article publication differed over 4-fold, while communications to professional associations and audits both differed over 6-fold. In contrast, requirements for non-technical skills and continued professional development, including educational course attendance or teaching skills were similar.

In most healthcare systems, curricula are regularly scrutinised with repetitive iterative appraisal and transformation. In the UK, the JCST has recently revised and published all 10 surgical speciality curricula and the aims of this study were twofold: first, to analyse the extent of variation in the speciality-specific competencies required for Certification of Completion of Training (CCT) by the JCST across surgical specialities; second, to compare the 2021 iteration with the immediate past versions to test whether variations had been corrected.

## METHODS

Certification guidelines for all 10 surgical specialities (2021 update) were obtained via the JCST website.<sup>2</sup> These guidelines for CCT are produced by each of the 10 Speciality Advisory Committees (SACs) and published under the auspices of their parent body, the JCST. Each guideline incorporates the same broad aspects and domains including objective measures such as minimum number of operative logbook cases, work-based assessments including clinical case-based discussions and procedural-based assessments (PBAs) at a denoted competence level, peer-reviewed publications, communications to learned societies, audits and continued professional development by means of mandatory courses. These documents were analysed in a quantitative and qualitative manner and the findings compared between specialities. When the minimum number of PBAs was not specified, it was calculated as the need to demonstrate competence at a given level on a single occasion for each indexed operation in that speciality.

In the case of General Surgery, there are two distinct elements to certification requirements; those relating to elective and emergency general surgery, and those relating to a trainee's chosen specialist interest. For the purposes of analysis, both components were analysed independently.

Statistical analysis appropriate for non-parametric data was performed using SPSS V.26 (SPSS, IBM



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**Table 1** Summary of mandatory operative experience, indicative operations and PBAs related to speciality

Speciality	Publications	Presentations	Audit	Operative logbook	Indicative operations	PBA	Critical conditions	WBA
CT	0	0	3	250	6	6	9	9
(CTC)	0	0	3	100	7	7	9	9
General	0	0	3	250*	5†	15	19	19
ENT	0	0	3	2000	7	7	10	10
Neuro	0	0	3	1200	8	8	10	10
OMFS	0	0	3	815	17	51	5	5
Paediatrics	0	0	3	1990	24	72	123	123
Plastics	0	0	3	2100	14	42	6	6
T&O	0	0	3	1800	13	35	14	14
Urology	0	0	3	54*	6	54	14	14
Vascular	0	0	3	110	11	110	3	3
Median (range)	0 (0 to 0)	0 (0 to 0)	3 (3 to 3)	815 (54 to 2100)	8 (5 to 24)	35 (6 to 110)	10 (3 to 123)	10 (3 to 123)

\*Minimum operative logbook numbers are not directly stated for either General Surgery or Urology however accounting for minimal requirements of indicative operations and PBA completion a minimum number has been assigned to these specialities.

†General surgery trainees have five indexed 'General Surgery' procedures but must also demonstrate competence in additional procedures according to their stated 'specialist interest' at phase 3; see [table 2](#).

CCT, Certification of Completion of Training; ENT, Ear, Nose and Throat; OMFS, Oral and Maxillofacial Surgery; PBAs, procedural-based assessments; T&O, Trauma and Orthopaedic Surgery; WBAs, work-based assessments.

Corp, Armonk, New York). Bivariate correlation was calculated with Spearman's rho (non-parametric), with statistical significance set at  $p < 0.05$ .

## RESULTS

Complete certification guidelines were identified for each of the 10 specialities. Minimum operative caseload, number of indicative operations and the minimum number of PBAs required in indexed operations are summarised in [table 1](#).

A wide variety of logbook cases were required, ranging from 54 in Urological Surgery to 2100 in Plastic Surgery (median 815). General Surgery, when considered separately from its subspeciality components, had the least number of indexed operations (five), compared with 24 in Paediatric Surgery (median eight). Vascular Surgery required the largest number of PBAs (110), compared with a minimum of six in Cardiothoracic Surgery (median 35). Cardiothoracic indexed operations were divided between two broad groups, Cardiac and Thoracic; thus a minimum of six indexed operations could be performed (three per group), these groups are broad and cover many aspects of surgery.

There are distinct variations in specialist interest requirements for General Surgery trainees as outlined in [table 2](#).

Emerging subspecialities (Transplant, Endocrine, General Surgery of Childhood) have now provided minimum operative caseload requirements, which were previously unavailable, because of low trainee numbers. Advanced Trauma remains unable to provide a total logbook number requirement, but has set clear indicative procedures and PBA requirements. No significant inter-speciality correlation now exists between indicative surgical procedures or PBAs.

Academic requirements for CCT including peer-reviewed publications, communications to learnt societies, both regional and national, and audit completion have been standardised. Leadership and management competencies now only require documented evidence. No specialities require speciality-specific courses. Instead, Advanced Trauma Life Support (ATLS) is mandatory for all specialities with Advanced Paediatric Life Support (APLS) necessary for both Trauma and Orthopaedic, and Paediatric surgery.

[Table 3](#) shows statistically significant correlation observed between the number of indicative operations and PBAs required

for each speciality ( $\rho = 0.602$ ,  $p = 0.036$ ). Correlation was also noted between logbook numbers and indicative operations related to speciality ( $\rho = 0.634$ ,  $p = 0.050$ ).

## DISCUSSION

This study has reviewed, described and compared the contemporary competencies mandated for certification by all 10 surgical speciality curricula in UK training. The salient findings were that the wide variation in competencies needed to satisfy the different specific curricula described previously have been addressed, aligned and improved.<sup>4</sup> Yet, some idiosyncrasies remain, in particular with regard to inter-speciality clinical domains: minimum operative caseload requirements differed 39-fold (up from 35-fold), numbers of indicative operations differed 5-fold

**Table 2** Additional competency requirements by specialist interest for general surgery trainees

Subspeciality	Operative logbook	Indicative operations	PBA total
Emergency general surgery	250	4	12
Breast	415	8	24
Colorectal	315	4 (+colonoscopy)	12
Upper gastrointestinal	345	4 (+upper gastrointestinal endoscopy)	12
HPB	145	3	9
Vascular	110	11	110
Transplant kidney	150	4	15
Transplant pancreas	140	5	12
Transplant liver	200	4	9
Endocrine	90	4	9
General surgery of childhood	580	5	9
Advanced trauma	N/A	N/A	12
Median (range)	200 (90 to 580)	4 (3 to 11)	12 (9 to 110)

Indicative operations requiring a minimum operative caseload differ to those operations requiring PBAs according to certification guidelines.  
HPB, Hepato-pancreato-biliary; N/A, not applicable; PBAs, procedural-based assessments.

**Table 3** Correlation between clinical CCT requirements related to surgical speciality

	Logbook	IndOp	PBA	CC/WBA
<b>Logbook</b>				
rho		0.602	-0.023	-0.053
P value		0.050	0.947	0.878
<b>IndOp</b>				
rho	<b>0.602</b>		<b>0.634</b>	-0.157
P value	<b>0.050</b>		<b>0.036*</b>	0.645
<b>PBA</b>				
rho	-0.023	<b>0.634</b>		-0.023
P value	0.947	<b>0.036*</b>		0.947
<b>CC/WBA</b>				
rho	-0.053	-0.157	-0.023	
P value	0.878	0.645	0.947	

\*Correlation significant at p<0.05 level (two-tailed).  
CC, Critical Condition; CCT, Certification of Completion of Training; IndOp, indexed operations; PBAs, procedural-based assessments; WBAs, work-based assessments.

(down from 11-fold) and procedure-based assessment requirements differed over 18-fold (up from 8-fold). Non-technical surgical skills including continued professional development, educational course attendance, teaching skills, academic performance by peer-reviewed article publication, communications to professional associations and audits performed have been standardised and are now identical.

The canopy organisation for all UK surgical training is the JCST, but each SAC is responsible for its own standard setting, with no common process of assessing achievement, but all are nevertheless overseen and regulated by the General Medical Council (GMC). The drivers for the new curriculum are threefold, and founded on three key GMC publications: first, Excellence by design; second, Generic professional capabilities framework; and third, the report from the UK Shape of Training Steering Group.<sup>5-7</sup> Excellence by design describes principles for all curricula in terms of five themes including: purpose, governance and strategic support, learning programmes, assessment programmes and finally quality assurance and improvement. From August 2021, the aim is that UK surgical training will become fully outcomes-based, with trainees assessed against the essential capabilities required of consultant independent practitioners. CCT will be gauged against day-one consultant performance: the abilities to manage an unselected emergency shift, inpatient ward care, outpatient clinic work, operating lists and multidisciplinary working, while demonstrating the generic professional behaviours demanded of all medical doctors. Central to these upgrades is the value that the skills vital to everyday clinical practice should be properly assessed. The existing curriculum was criticised for too heavy a reliance on competency-based training with inadequate emphasis on the holistic professional judgement of experienced clinical trainers. In light of this, a new assessment tool termed the Multiple Consultant Report (MCR) encompassing the new concepts of Generic Professional Capabilities and Capabilities in Practice has been developed. These changes follow consultation with trainees, trainers, stakeholders including National Health Service employers, service providers, patient and lay groups, statutory education bodies and experts in curriculum and assessment design.

As a consequence, surgical training will be arranged into three phases, with each having a critical, evidence based progression end point: *phase 1*, core surgical training curriculum (indicative time

- 2 years); *phase 2*, to develop the professional skills of a day-one emergency safe consultant, and eligible to sit the Intercollegiate Speciality Board examination (indicative time - 4 years); *phase 3*, all capabilities necessary for day-one consultant practice (indicative time - 2 years) and once achieved Annual Review of Competence Progression (ARCP) outcome 6 facilitates CCT.

From a holistic perspective, especially with regard to non-technical skills for surgeons, and academic competencies in particular, all 10 curricula now concur well and run in parallel. Academic performance is widely considered integral to surgical training and career progression. The benchmark used to judge such performance frequently defaults to peer-reviewed scientific publications, and in 2013, attainment in this arena was embedded in most speciality curricula. Yet the process by which peer-reviewed publications are achieved is well recognised to be deeply flawed,<sup>8,9</sup> and with university-aligned surgical academic departments on the wane, peer-reviewed publications and other academic metrics—higher degrees—once deemed essential for career progression in General Surgery, this track is now tougher than ever to navigate. Standardisation of the academic component of training should ensure that all reaching CCT, possess the skills in research methodology and ethics required to critically appraise literature to guide best practice.

Yet, there remains discordance related to numbers of indicative procedures and optimum caseloads. Previous requirements have been derived using a quasi-quantitative model, for example, General Surgery, where indicative number thresholds were originally founded on historical trainee cohort lower quartile eLogbook figures. Even when defined criteria were used to instruct guidance, inconsistencies arose between certification and competence levels. Indeed, in the arena of General Surgery, the number of indexed procedures required for CCT was reported to correspond poorly with independent practice competence indicators assessed by PBAs.<sup>10</sup> Moreover, this variation in general surgical training competencies is evident from an international perspective, ranging from no specified minimum operations (Canada, India and Italy), to a lower threshold of 60 when specified (South Korea), to a maximum of 1600 (UK).<sup>11,12</sup> For operative competency, some variation between specialities should be expected because of the nature and complexity of the procedures involved, but a 39-fold variance in logbook requirements is surely outwith the CI, and inconsistent with a competency-based curriculum. Even if learning curves are consistently steep (equating to easy and rapid learning), it is arguably unrealistic to expect trainees to have proven competence for independent practice in as many as 55 indicative procedures as described in the OMFS curriculum.

This study has limitations. Surgical specialities are inherently different, and in light of the current drive and emphasis towards competence-based training, caseloads and numbers estimated to reach competency are unlikely similar. Simple numerical variations may not be that important, and no attempt was made to categorise logbook numbers by degree of operative complexity. It is, nevertheless, one thing to be judged as being competent in a small number of easy procedures, but more experience is needed to acquire advanced technical strategies for complex difficulties. Further research is required akin to that described by Brown *et al* into the relationship between learning curve trajectories, inflection point recognition and standardised definitions of competence.<sup>10</sup> The final arbiter will be trainee and trainer feedback and the biggest challenge, MCR input.

In conclusion, variations in the competencies needed to complete surgical training persist and unsurprisingly relate to the crux of the matter: operative experience and skill. But the age of measured accountability has arrived, of reward for measured performance, belief in the virtues of publicising metrics and

improving institutional transparency and function. Nowhere have the virtues of accountability, performance metrics and transparency been more touted than in surgery; understandably so, as seldom are stakes higher, because lives are on the line. Metaphorical vectors do not appeal to all, yet in this scenario seem appropriate; the old biblical adage states:

“By your works ye shall be known”.<sup>13</sup>

If the new iteration of the curriculum works well, then never was a sincerer word said.

### Learning points

- ⇒ The UK Joint Committee for Surgical Training Certification of Completion of Training (CCT) guidelines 2021 has standardised inter-speciality competencies across academic domains.
- ⇒ AdvancedTrauma Life Support is now the sole mandatory course for CCT across all specialities.
- ⇒ There is still a large disparity between indicative operative cases, required operative logbook numbers and work-based assessments required for CCT across the 10 recognised surgical specialities in the UK.

**Correction notice** This article has been corrected since it first published. The provenance and peer review statement has been included.

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