Are there differences in cardiothoracic surgery performed by trainees vs trained surgeons?

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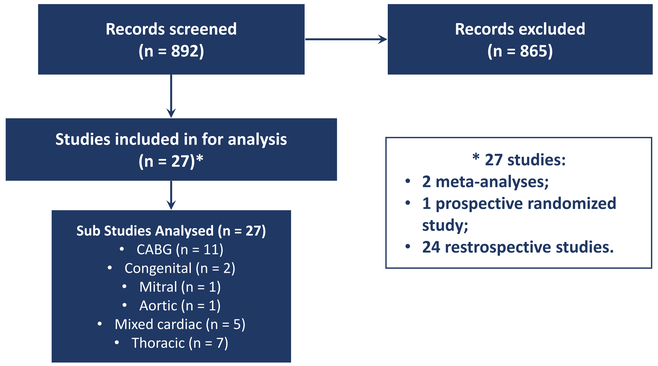
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BACKGROUND

- **Training** in **cardiothoracic surgery** has become increasingly **difficult** and **challenging**.
- There is **increasing scrutiny** of outcomes for surgeons and **public surgical reporting**. Additionally, **age** and **comorbidities** of the patients have increased over time.
- The **purpose** of this review was to **evaluate** all published literature on all cardiothoracic surgery cases performed by **trainee surgeons (TS)** and the patient **outcomes** when compared to cases undertaken by **fully trained surgeons (FTS).**

METHODS

OVID MEDLINE®, EMBASE, SCOPUS and PUBMED were searched from 1946 to August 2021 using the following terms **[cardiothoracic surgery]** AND **[training]** AND **[outcomes]**.



RESULTS

- **474,160** patient outcomes assessed;
- 398,058 cases were performed by TS and 75,943 by FTS (*Table 1*).

Table 1. **Types of Procedures Performed by trainee surgeons (TS) vs fully trained surgeons (FTS)**

Procedure	**TS** *(n = 398,058)*	**FTS** *(n = 75,943)*	**Total** *(n = 474,160)*
CABG	385,532	49,003	434,535
AVR	870	2,220	3,090
MVS	120	1,620	1,740
Combined Cases	8,335	18,098	26,433
Congenital	1,137	2,269	3,565
Thoracic	2,733	2,064	4,797

CABG, AVR and Mitral Valve Surgery

- No statistically significant differences in the patients' pre-operative **EuroSCORE, cardiopulmonary bypass (CPB)** and **cross clamp times (XCT)** between the groups (Table 2).
- The reported **mortality** was **lower** for the TS group. This was due to **appropriate case selection** as in all studies, the high-risk cases were operated on by FTS.

Table 2. **CABG & AVR & MVS Intraoperative & Postoperative Outcomes**

	CABG		**AVR**		**MVS**	
	TS	**FTS**	**TS**	**FTS**	**TS**	**FTS**
EuroSCORE	2.54 (1.83-3.26)	2.70 (1.61-3.79)	5.3 (3-8.11)	5.1 (3-8.81)	6 (4-7)	6 (4-8)
CPB time (min)	95.99 (75-117.5)	93 (66-107.6)	85.8 (69.5-117.93)	78.94 (57.5-104.2)	121 (93.2-146.3)	121 (97-153)
XCT time (min)	63.61 (44.83-81)	63.00 (39.22-69)	62.7 (52.25-88.75)	56.95 (42-73.24)	85 (70-105.3)	84 (67-106)
Mortality rate	1.70% (0.30-2.00)	2.30% (1.20-3.60)	0.25% (0-2.3)	3.05% (1.425-4)	2%	6%

**Variables are shown as median with 25th and 75th percentiles*

Combined cases

- Predominantly represented by **concomitant AVR and CABG**.
- There were **no significance differences** in the **pre-operative risk scores**.
- The **CPB** and **XCT times** were **statistically longer** for TS. This, however, **did not** result in any differences in complication and mortality rates.

Thoracic Surgery

- The most common thoracic procedure was **Video Assisted Thoracoscopic Surgical (VATS) lobectomy**.
- No statistically significance differences in patients' **co-morbidities**.
- The **intra-procedural blood loss**, **conversion to open surgery** and **median length of stay** were similar between the groups.

LIMITATIONS

- The data are predominantly from units where trainees are fully **supported** within the organisation. This might **challenge autonomy** of trainee as an **independent** surgeon.
- All studies had **selection bias** where most complex cases were undertaken by the FTS.

CONCLUSIONS

- The data from this review suggest that **trainees** can perform cardiothoracic surgery with outcomes comparable to those of FTS, provided that there is **careful case selection**.
- These findings are extremely important to reassure the public, trainees, and trainers that high quality training in cardiothoracic surgery can be delivered **safely**.