

Cardiac surgery during the COVID-19 pandemic: from *vita minima* to recovery

Editor

We write to share our initial experience of running a cardiac surgical service during the COVID-19 pandemic. A standard operating procedure (SOP), patient questionnaire and information leaflet were used to facilitate consent. A ‘virtual’ multidisciplinary team meeting (the Cardiac Hub) was convened daily with colleagues from referring hospitals invited to and present cases. The meetings were chaired jointly by a surgeon and cardiologist. Imaging was reviewed and risk prediction systems used to inform discussion^{1,2}. Patients were triaged to one of four categories: urgent (requiring intervention this admission); red elective (intervention required within 3 months); amber

elective (intervention deferred for 3-6 months); or green elective (can wait 6 months). Where there was either clear advantage, or equipoise, minimal access strategies were preferred. Nevertheless, our goal remained to provide the best long-term treatment option(s) for each patient, taking account of the pandemic, not being dictated by it. Patients over 70 were specifically advised that contracting COVID-19 would likely be associated with a poor prognosis³. As confidence grew, we started cautiously to offer surgery to elective patients on our waiting list(s) as well as those of others.

Patients coming from home were asked to shield. The day before admission, swabs were taken in a drive-through facility on hospital grounds. The process was modified for urgent inter-hospital transfers

and emergencies. Relevant laboratory tests and a chest CT-scan were performed as close as possible to the time of surgery. If COVID-19 status could not be confirmed, the procedure was performed with full PPE.

Surgery was performed by Harefield surgeons and surgeons from other hospitals, using a ‘buddy’ system. Patients were extubated, stepped down, discharged as rapidly as possible and advised to self-isolate for 14 days. *Figure 1* shows the cumulative throughput of the Hub, the numbers of admissions with COVID-19 in London as a whole and to our ICU along the same timescale.

Between March 16th-May 3rd, 132 cases were discussed in the Hub, of whom 66 patients underwent surgery. The median EuroSCORE of the cohort was 3.2(2-7.7)%.

Fig. 1 graph showing cumulative numbers of patients discussed in the Hub and operated upon (urgent/emergency and ‘red elective’), COVID-19 admissions to Harefield ITU and COVID-19 admissions in London vs time

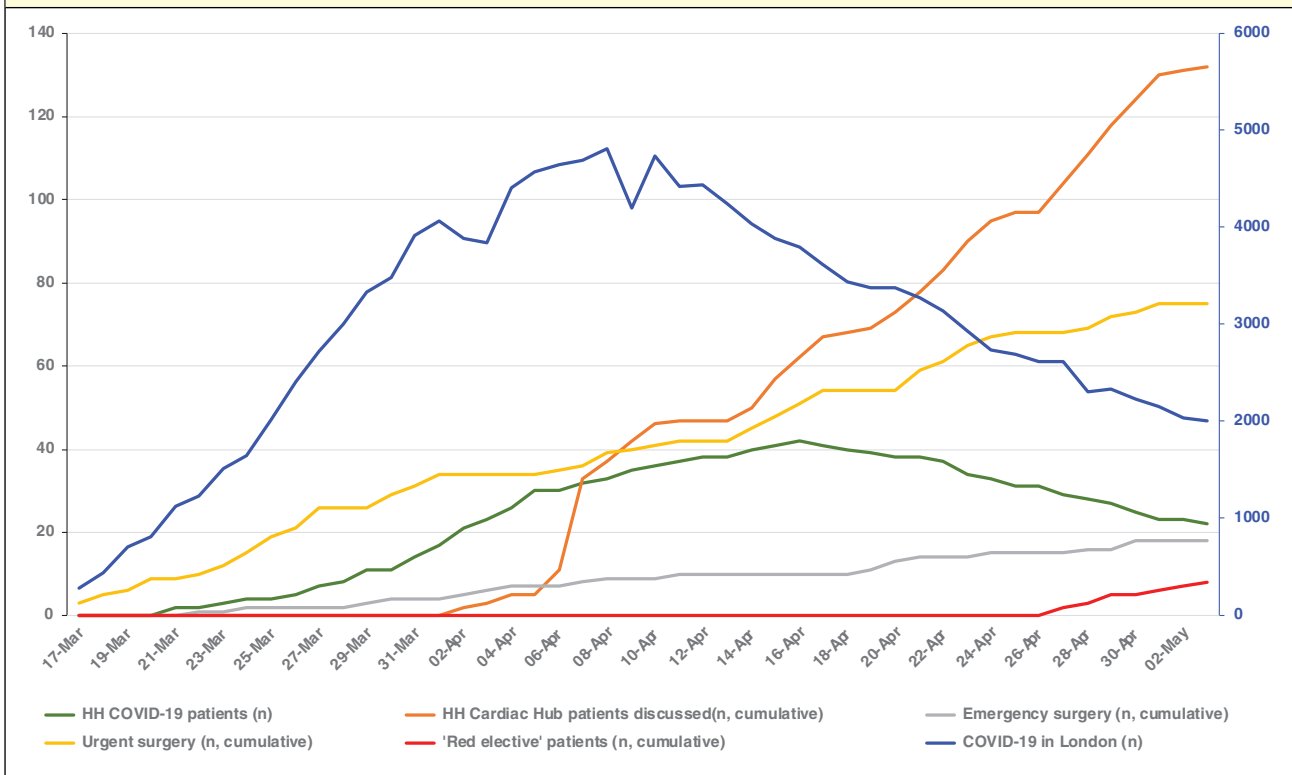


Table 1 major cardiac surgical procedures performed at Harefield Hospital (March 16th-May 3rd, 2020)

Procedure	N (%)	Procedure	N (%)
CABG [‡]	28(43)	LVAD [†]	3(5)
AVR [‡]	10(15)	OCT [§]	1(2)
AVR + CABG	4(6)	Lung tx ^{**}	1(2)
MVR/rep ^{††}	9(14)	Sternal reconstruction	1(2)
AVR + pericardectomy	1(2)	Excision of cardiac tumour	1(2)
AAD ^{‡‡}	6(9)		

*CABG: coronary artery bypass grafts; †LVAD: left ventricular assist device; ‡AVR: aortic valve replacement; §OCT: orthotopic cardiac transplantation; **Lung tx: lung transplantation; ††MVR/rep: mitral valve replacement or repair (isolated 2, combined 7 (MVR/rep + AVR, 2; MVR/rep + tricuspid valve repair + AF ablation, 1; AVR + MVR/rep + tricuspid valve repair, 1; AVR + MVR/rep + AF ablation, 1; MVR/rep + left ventricular myectomy, 1; MVR/rep + tricuspid valve repair, 1); ‡‡AAD: acute aortic dissection.

Pre-operative COVID-19 swabs were obtained in 42(65%) and CT-scans performed in 47(70%). The procedures performed are shown in *Table 1*.

The median preoperative stay was 2 (1-4) days with three in-hospital deaths, from acute Type A aortic dissection. The median duration of stay was 6 (4-8) days.

The initial reduction in acute cardiac surgical referrals has been seen elsewhere^{4,5}. Office for National Statistics (ONS) data from the same timeframe reveal a mortality approximately double the 5-year average⁶ with 8000 additional out-of-hospital deaths, 80% of which were unrelated to COVID-19⁷. 35% of our patients came to theatre without having the results of swabs; reflecting clinical urgency, uncertainty about the process and lack of resources. We came to rely on clinical history and chest CT as screening tools⁸.

Testing post-operatively was driven by symptoms: 16(25%) were tested, two (3%) tested positive: one, who had not been tested pre-operatively, had a mild respiratory illness which presented five days after CABG and was probably already infected at the time of surgery; the other was a patient readmitted to hospital with a wound infection two months after surgery.

In general, the patients had an uncomplicated post-operative course with expected rates of common complications. As far as we are aware, no patients converted acquired COVID-19 during their admission. The three deaths occurred in acute Type A aortic dissection, two of whom presented late, in cardiogenic shock, having delayed seeking medical attention. We are now witnessing the expected rebound in demand with increasing numbers of referrals and late presentations. As far as we are aware, our report, with its focus on the development of an SOP and the need to continue to offer the 'best practice' is the first report of the outcomes. After, a phase of justifiable caution and falling demand, we have developed a system for safe surgery which may be of value to others as the current extraordinary situation metamorphoses into what is now being referred to as the 'new normal'.

In a recent interview, Dr Antonio Dajer, the assistant ER director at NYU Downtown (the hospital closest to Ground Zero) on 9/11, is quoted as saying that his "*big takeaway ... is that if you give trained doctors, nurses, physician assistants, nurse practitioners, and all medical providers clear direction and adequate resources, they will self-organize*

*and do a very impressive job. The key is to have clear direction and a clear allocation of space and resources"*⁹. Our urgent message to patients is that they should be reassured about our ability to protect them from COVID-19 and that the consequences of delaying treatment for cardiac surgical conditions may be lethal.

Data sharing submission

All of the authors agree that any of the data that has formed the basis for this project can be made available, in an anonymised fashion, from the date of publication of the paper and for one year thereafter, by emailing a request to the corresponding author, Jullien Gaer (j.gaer@rbht.nhs.uk)

Competing interests

The corresponding author (JG) affirms that all authors have completed the ICMJE disclosure of potential conflicts of interest, that he (JG) retains signed copies of these disclosures to be made available as required. Whilst, in the opinion of the corresponding author, none of the potentially competing interests detailed below have, in any way, influenced the content of this paper, the authors have made the following declarations:


JG is an advisor to and shareholder in Hutman Diagnostics AG, Basel, Switzerland and an advisor to Clarges Capital Limited and Innovator Capital Limited, London, UK.

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*The experience at Harefield Hospital, a regional
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