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Cardiac Surgery in Australia During the COVID-19 Global Pandemic



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In this issue of *Heart, Lung and Circulation*, McNamara and colleagues [1] report a 21% reduction in the cardiac surgical caseload from a single centre during the first Australian wave of the COVID-19 pandemic from March to June 2020. Globally, elective cardiac surgery ground to a halt and as the pandemic rapidly escalated, centres in Australia and New Zealand were able to benefit from the collective experiences of those in the United Kingdom (UK) [2], Canada [3], Italy [4] and the United States [5,6]. A year on, we now have the benefit of not only understanding the immediate effect of pandemic surge but also the implications of elective surgery cancellations in the context of revising the definition of cardiac surgical urgency. As the pandemic continues to unfold, it is essential that we emphasise the importance of the acute benefits of cardiac surgery, that in contrast to many other elective surgeries, disproportionately saves lives.

In March 2020, a global survey of cardiac surgery centres participating in the Randomization of Single vs Multiple Arterial Grafts (ROMA) trial [7] reported a greater than 50% reduction in intensive care unit (ICU) bed availability for cardiac surgery and a median reduction in cardiac surgery case volume of 50% to 75% [8]. In London, a pan-regional service plan was enacted that funnelled emergency cardiac surgery cases to either the Barts Heart Centre or to Harefield Hospital [2] and there was an 83% reduction in index cardiac surgical cases across the UK from March to May 2020 [9]. New York (NY) City was the global epicentre of the pandemic at this time and there was a 92% reduction in cardiac surgical cases compared to 2019 at the NY

Presbyterian Hospital where surgeons led the development and dissemination of revised cardiac surgical priority definitions [6]. Concurrently, the West Coast of the USA had a 62% decline in emergency department presentations, a 35% decline in total hospitalisations and complete cessation of surgery that was not considered an emergency procedure. The estimated impact of these changes equated to a predicted loss of almost US\$15 billion by the end of 2020 in California alone [5].

Cardiac surgery is a resource intensive specialty heavily dependent on ICU bed availability. The approach to maximising the availability of ICU beds to accommodate patients needing cardiac surgery during the pandemic has varied according to the structure of the health service in which ICU beds are situated. Most reports describe the transfer of emergency cases to centres with dedicated ICU bed availability for the specific purpose of managing cardiac surgery patients, in recognition of the fact that there is always a relatively consistent proportion of patients that meet the need for urgent surgery, which could readily escalate to an emergency. The NY Presbyterian Hospital's revised surgical status priorities [6] were based on a history of 40% of cases being urgent. This group reclassified those able to wait for a month or more as elective, those who could wait at home but needed surgery within 3–4 weeks as semi-urgent, high-risk inpatients as urgent and emergent cases requiring immediate intervention. The approach in Canada and the UK was similar.

There were unprecedented multidisciplinary changes in health service delivery in response to the influx of COVID

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Table 1 Patient characteristics.

Patient Characteristic	2016		2017		2018		2019		2020		P-value
Number	12,905	17.9	13,426	18.7	14,340	19.9	15,655	21.8	15,643	21.7	
Age (years)	65.4	12.9	65.5	12.9	65.6	12.8	65.3	13.0	65.3	12.8	0.12
Male	9,553	74.0	9,950	74.1	10,658	74.3	11,560	73.8	11,655	74.5	0.71
Aboriginal and, or Torres Strait Islander	447	3.5	457	3.4	433	3.0	448	3.1	471	3.2	0.13
Preoperative hospital length of stay	1.0	0.0, 4.0	1.0	0.0, 4.0	1.0	0.0, 4.0	1.0	0.0, 4.0	1.0	1.0, 4.0	0.26
Postoperative length of stay	7.0	6, 11.0	7.0	6, 11.0	7.0	6, 11.0	7.0	6, 11.0	7.0	6, 11.0	0.18
Risk (AusScore Total)	4.0	2, 6.0	4.0	2, 6.0	4.0	2, 6.0	4.0	2, 7.0	4.0 ^a	2, 7.0	>0.001
Operative Status											>0.001
Elective	9,081	70.4	9,111	67.9	10,022	69.9	10,352	66.1	9,799	62.6	
Urgent	3,211	24.9	3,641	27.1	3,672	25.6	4,476	28.6	5,101	32.6 ^a	
Emergent/Salvage	604	4.7	673	5.0	643	4.5	827	5.2	743	4.8	
Procedure											
CABG	8,294	64.3 ^a	8,497	63.3	8,752	61.0	9,581	61.2	9,581	61.2	>0.001
Aortic valve surgery	3,067	23.8	3,139	23.4	3,331	23.2	3,407	21.8	3,396	21.7 ^a	>0.001
Mitral valve surgery	917	7.1	946	7.0	1,030	7.2	1,130	7.2	1,159	7.4	0.79
Aortic dissection	96	0.7 ^a	270	2.0	250	1.7	335	2.1	316	2.0	>0.001
Other	1,624	12.6	1,982	14.8	2,329	16.2	2,570	16.4	2,675	17.1	>0.001

Values shown are number/percentage, mean/standard deviation or median/quartiles.

Source: ANZSCTS Cardiac Surgery Database (MH HREC QA Approval 2,021,098).

Abbreviations: CABG, coronary artery bypass graft/s.

^aDenotes point of significant difference.

positive patients requiring hospitalisation and critical care. Scaled staff redeployment for medical and nursing teams was a key feature of strategies to accommodate surge demand for ICU beds and potential increases in urgent cases as a consequence of the cardiopulmonary sequelae of COVID-19. In the UK, dedicated cardiac surgical ICU teams were redeployed to relieve general ICU teams. Of the 20 cardiac surgical units in Italy, 16 closed and all urgent and emergency cases were sent to the remaining four that were staffed by shared surgical teams [4]. Canadian surgeons were provided with a series of guiding statements to triage cases and teams according to waiting list length, urgency and ICU bed demand [3]. In the peak of the initial crisis as clinicians responded to the change in demand, they too contracted the virus. Within 6 months of the first case being detected more than 7,000 health care workers globally had died, 1,500 of whom were nurses [10]. Medical staff and indeed cardiac surgeons were not exempt from risk, volunteering in some instances to cover critical care nursing roles [11].

Not surprisingly, emerging evidence indicates a significant increase in the proportion of patients considered urgent and an increased risk of mortality for COVID-19 positive patients following cardiac surgery [12-17]. The COVIDSurg Collaborative, reported 20.8% mortality in 207 COVID-19 positive patients from 13 countries [18] operated on between March and June, 2020. In a retrospective propensity matched cohort from a similar time frame, an increased mortality persisted,

and the mortality associated with a postoperative COVID-19 diagnosis was significantly higher than that in patients operated after suffering COVID-19 preoperatively [19].

Fortunately, the Australian experience was in stark contrast to that of our international counterparts. Our initial lockdown in 2020 was relatively short-lived and, until recently, there had been relatively low numbers of COVID-19 cases. McNamara and colleagues noted no change in surgical acuity and an overall reduction of only 21% in total caseload when 2020 cases during the 4-month period were compared to those in 2019 at their COVID-19 nominated centre [1]. The Australian and New Zealand Society of Cardiac and Thoracic Surgeons Cardiac Surgery Database has 56 contributing centres from Australia, complemented by the addition of data from Auckland since 2019, with most contributing cases taking place in New South Wales (NSW) and Victoria—the states most affected by COVID-19. In the last 5 years (2016–2020) total case numbers within the database have steadily increased as new centres joined and so has the proportion of patients requiring urgent surgery across Australia (Table 1). Monthly trends of elective and urgent cardiac surgery operations performed over the 5-year period are shown in Figures 1 and 2.

In response to elective cancellations and the creation of dedicated COVID-19 hospitals, some centres were able to redirect public patients to private centres (n=386) from March (n=25, 4.4%) that peaked in April (n=76, 10.1%) and

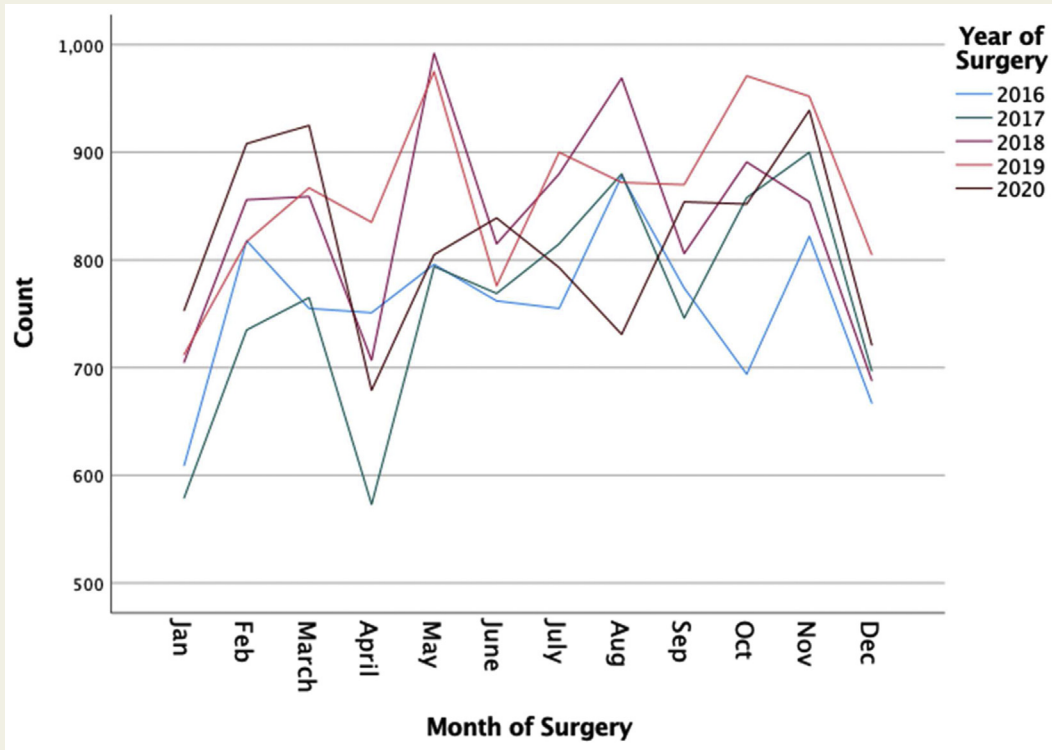


Figure 1 Elective case load 2016 to 2020.

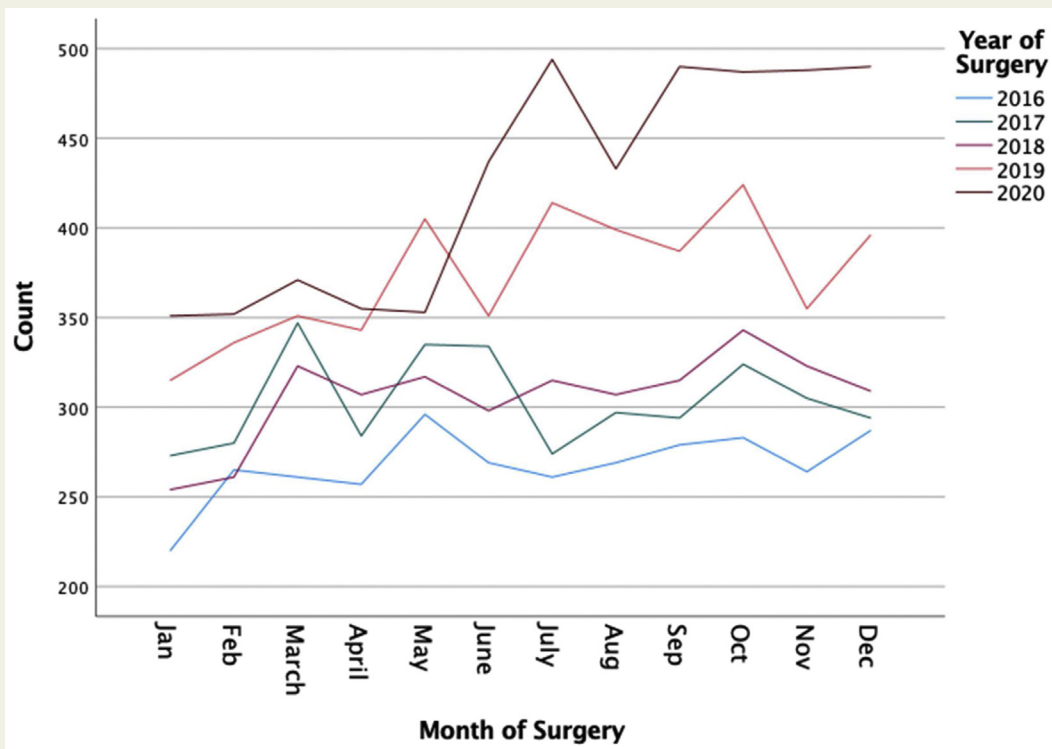


Figure 2 Urgent case load 2016 to 2020.

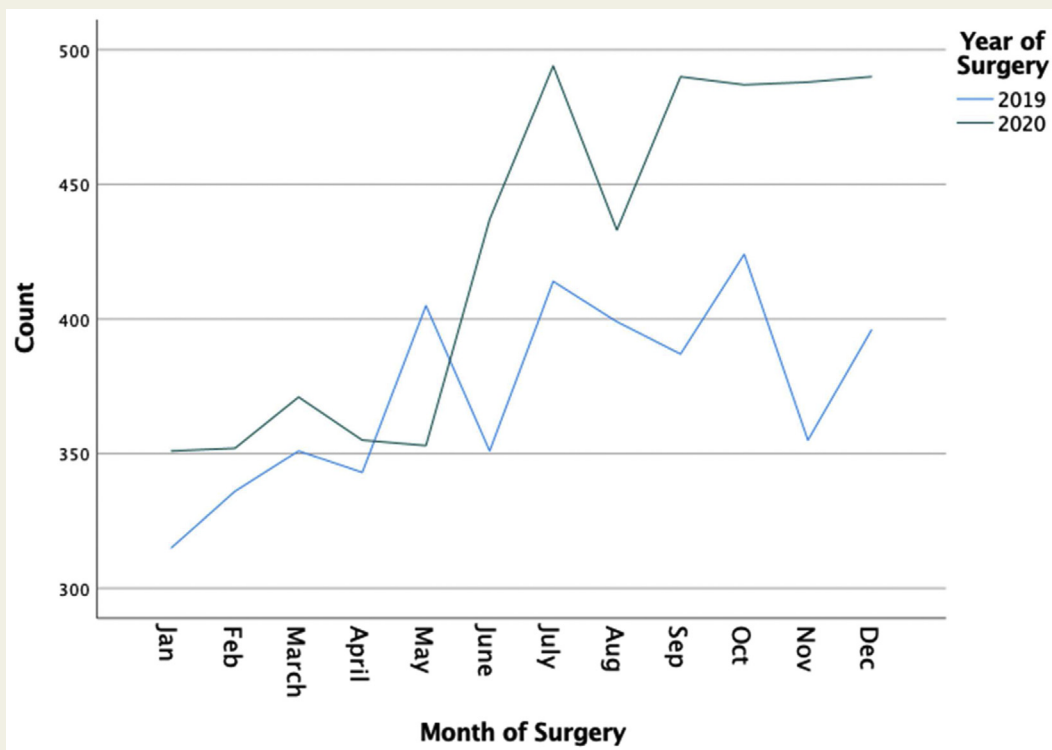


Figure 3 Monthly total of elective and urgent cases in 2019 and 2020.

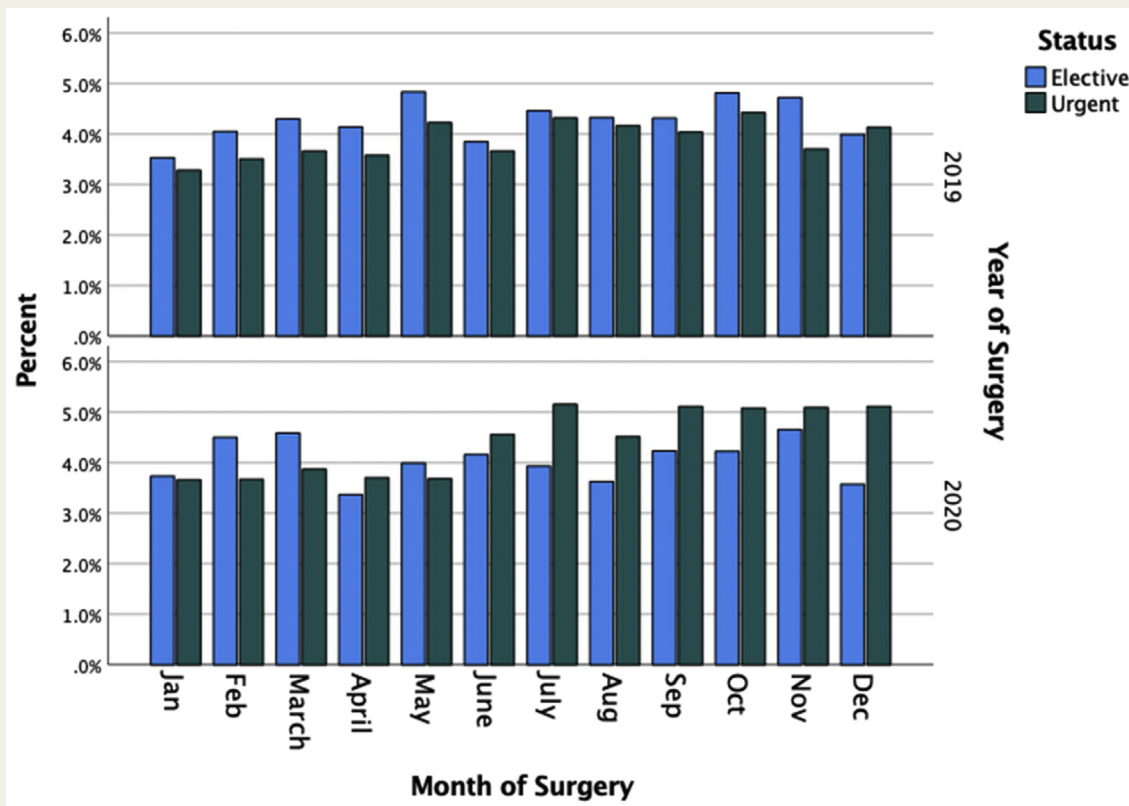


Figure 4 Proportion of monthly elective and urgent case load in 2019 and 2020.

continued to a lesser extent until December. The total national caseload numbers in 2020 (n=14,900) were consistent with 2019 (n=14,828). However, the proportion of patients requiring urgent surgery in 2020 (n=5,101, 34.2%) was higher than in 2019 (n=4,476, 30.2%; χ^2 55.7 (1), $p < 0.001$). When monthly cases numbers were compared across the 2 years (Figures 3 and 4), there was a reduction in elective caseload from April to December, except for June, and a significant increase in the proportion of urgent monthly cases from June that persisted and peaked in December.

Our ability to contain COVID-19 in 2020 provided an opportunity for our health care system to prepare for a more sustained pandemic response. As this Editorial was being written, NSW reported record numbers of COVID-19 cases and implemented ICU pandemic escalation plans to increase bed capacity from their baseline 592 staffed beds [20] to the 947 beds which modelling suggests would be needed by November 2021 [21].

A competent and flexible workforce underpins the capacity for a pandemic surge response and subsequent recovery [22]. The impact of deferring elective surgery in early 2020 appears to have had a 'knock on' effect, as evidenced by the sustained increase in urgent surgical cases for the remainder of the year. It has been argued that nothing in cardiac surgery is truly elective, as operations performed in the absence of symptoms or physiological derangement are a prophylactic or prognostic measure [23]. Revised international surgical priority classifications do not appear to have had a detrimental impact on patients waiting for surgery to date [24] but previous research shows that rates of mortality increase in systems where surgery is routinely deferred because of limited capacity [25]. Intentionally decreasing elective cardiac surgery is one mechanism in the strategy to accommodate increased ICU and hospital bed demand but at what cost to patients, specialist staff and the health care system? Optimal vaccination targets within the general community are seen to be the remedy to balance competing demands within our health care system. As we race to achieve adequate levels of immunity in the community, the assumption that COVID-19 care is more effective at saving lives than cardiac surgery waits to be tested.

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