

## Reflections on a health systems response to delivery of surgery during the COVID-19 pandemic: NSW experience

In NSW, approximately 200 000 patients undergo elective surgery in approximately 90 public hospitals each year. It's population-based and comprehensive information system has been used to support quarterly public reporting of surgical activity, performance, and waitlists.<sup>1</sup> Since 2020, each pandemic wave has presented key challenges that have necessitated customized responses informed by the preceding wave's experience (Table 1). As the pandemic became endemic, NSW saw high numbers of Omicron cases with concurrent relaxation of public health restrictions. Despite the lifting of restrictions, the health system continues to see the lowest percentage of patients seen on time, and the highest number of patients waiting longer than clinically recommended, than at any time on record. With more than 100 000 people on the waiting list and new additions to the waiting list still not reaching a normal rate, clinicians, managers and policymakers must navigate the way forward to mitigate what maybe an impending public health crisis of delayed surgical care. Innovation is essential given staff furloughing and a baseline level of beds required for patients with COVID limits capacity to surge beyond usual surgical activity, and the ongoing risk of future pandemic waves. Interrogation of the health system data provides an opportunity to analyse the impact and trends of repeated suspensions, slowdowns, and surges in elective surgery activity, so vulnerable groups can be monitored, and inequity addressed (Figs. 1–4). This paper presents a systems level reflection on emerging trends over the course of the pandemic to enable surgical systems to anticipate, monitor, respond and learn to support health system resilience, maintain surgical standards and mitigate workforce burnout.<sup>2,3,4</sup>

### System response to the pandemic on surgery

Similar to the reported experience of Victoria,<sup>5</sup> the pandemic forced the surgical community in NSW to explore new avenues to plan, organize and evaluate services (Table 1). This required interdisciplinary leadership between clinicians, managers, and policy makers across Australia. In NSW, based on long term engagement through the Surgical Services Taskforce and the establishment of strong state-wide surgical governance committees, these established networks were scaled into a Surgical Community of Practice. Exchange between other specialty communities also occurred through the newly established Clinical Council. Academics with clinical and policy experience were engaged through the Critical

Intelligence Unit<sup>6</sup> for rapid evidence reviews. The RACS state committee was leveraged to rapidly disseminate information to all fellows (public and private), provide targeted training (e.g., PPE and Value Based Care) and support state-based examinations. The collaborative network was also engaged with international interdisciplinary network to draw on their expertise to support system agility. Such coordinated collaboration between clinicians and administrators locally enabled rapid redesign and dissemination of information to coordinate state and local responses which were able to be adapted to the challenges presented by each variant (Table 1).

### Impact of the pandemic on surgical waiting list

#### Urgent surgery

Importantly, additions for urgent procedures remained relatively stable with small surges in the months after slowdowns and suspensions. This is consistent with trends seen in other states.<sup>7</sup> There was general consensus by the taskforce to prioritize urgent cat 1 and patients in cat 2 at risk of significant deterioration, and Cat 1 for the most part were performed within clinically recommended guidelines.

#### Non-urgent surgery and semi-urgent surgery

The evolving size of a waiting list is impacted by changes in activity, but also an area which is less frequently monitored; the rate at which new patients are added. In NSW stay at home orders resulted in significant slowdowns in activity due to changes in behaviour patterns which occurred prior to directives to suspend non-urgent surgery (Fig. 2). Suspension of non-urgent surgery also impacted rate of new patients added to the waiting list which was further exacerbated by the duration of disruption.<sup>8</sup> This may have resulted from clinical decision-making (e.g., hesitancy to add patients to the list), clinical work practices (e.g., reduced hours due to furlough or safety concerns), disrupted referral patterns (e.g., primary care network focus on vaccination or reduced surgical outpatient volume due to COVID safe practices), healthcare seeking behaviours (e.g., increased fear of accessing care due to high community prevalence of COVID-19) and public policy (e.g. stay at home orders).

During the surge in elective surgery following the alpha wave, activity reached record levels within months and continued in all subsequent quarters until the arrival of the Delta variant wave in mid-2021.<sup>4,8</sup> During that surge, net migration was negligible

**Table 1** Pandemic wave, key challenges, responses and lessons learnt

Wave	Key challenges	Response	Lessons learnt
Alpha Suspension 25th March 2020. Resumption gradually increased from 18th May to July 2020	<ul style="list-style-type: none"> <li>• PPE availability</li> <li>• Uncertainty on hospital demand</li> <li>• Transmission risk</li> </ul>	<ul style="list-style-type: none"> <li>• National slow down on non-urgent elective surgery and procedures</li> <li>• Securing supply of PPE and developing a risk matrix for PPE use in different settings in accordance with College and specialty guidelines</li> <li>• Surge plans: Recruiting temporary workforce</li> <li>• Collaborative Care Contracts – public and private partnership</li> <li>• Establishment of Critical Intelligence Unit (CIU)</li> <li>• Establishment of Community of Practice in numerous specialties including surgery (networking all Local health districts) and NSW Clinical Council (network of chair of each community of practice)</li> <li>• Develop health systems monitoring framework to standardize risk management and responses</li> <li>• Rapid redesign of care models (e.g., expansion of ICU) and education and training (e.g., virtual care) and use of predictable models to balance surgical and non-surgical ICU admissions</li> <li>• Surgical stakeholder meeting: eight working parties for surgical services reform</li> </ul>	<ul style="list-style-type: none"> <li>• Rural surgery: Workforce and private hospital capacity limitations identified to surge capacity</li> <li>• Admissions to waitlist noted to slow down prior to elective surgery pause</li> <li>• Recommencement to full activity slower than cessation</li> </ul>
Delta Suspension 2nd August 2021 Resumption 5th October to 15th November	<ul style="list-style-type: none"> <li>• Increase COVID hospitalization</li> <li>• Significant demand for ICU</li> <li>• Workforce pressure (staff furlough, contact tracing, vaccination)</li> <li>• Significant challenges to fellowship examinations</li> <li>• Vaccine availability</li> </ul>	<ul style="list-style-type: none"> <li>• Targeted slowdown in non-urgent surgery in metropolitan public and private hospitals</li> <li>• Model of care changes</li> <li>• Deployment of private hospital resources</li> <li>• Vaccine mandate introduced for health care workers</li> <li>• Surveillance testing for health care workers and patients</li> <li>• Rapid deployment of health care professionals</li> <li>• Private sector restrictions only critical operators with ICU capacity (day surgery hospitals not affected)</li> <li>• PPE risk matrix adjusted to include vaccination status</li> </ul>	<ul style="list-style-type: none"> <li>• Regional and rural activity continued unabated</li> <li>• Reduced addition to waitlist</li> <li>• Workforce burnout</li> <li>• Border towns with challenges for backlog catch up</li> <li>• High volume specialties repeatedly affected but specialties with day surgery capacity able to recover sooner</li> <li>• Workforce burnout and attrition</li> <li>• Surge management with endemic COVID</li> </ul>
Omicron (BA1 and 2) Suspension 10th January with Resumption 7th February in Private and 7th March in Public sector	<ul style="list-style-type: none"> <li>• Significant increase in hospitalization for COVID-19</li> <li>• Demand for ICU</li> <li>• Significant workforce pressure with large volume of staff furlough</li> <li>• Rapid antigen testing availability</li> </ul>	<ul style="list-style-type: none"> <li>• Slowdown in non-urgent surgery requiring overnight stay (day surgery unrestricted)</li> <li>• Expanded changes to model of care</li> <li>• Deployment of private hospital resources</li> <li>• RACS rural health and equity strategy established</li> </ul>	<ul style="list-style-type: none"> <li>• Repeated cessation starting to impact training</li> <li>• Workforce sustainability</li> <li>• Semi-urgent surgery backlog at record high</li> </ul>

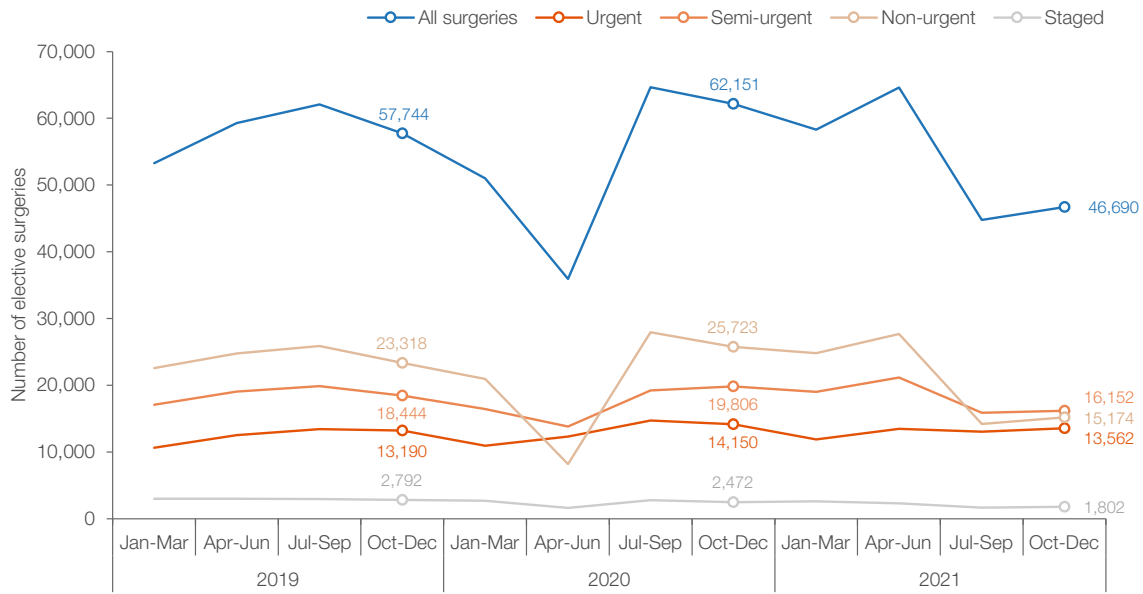


Fig. 1. Elective surgeries performed, by urgency category, NSW, January 2019 to December 2021.

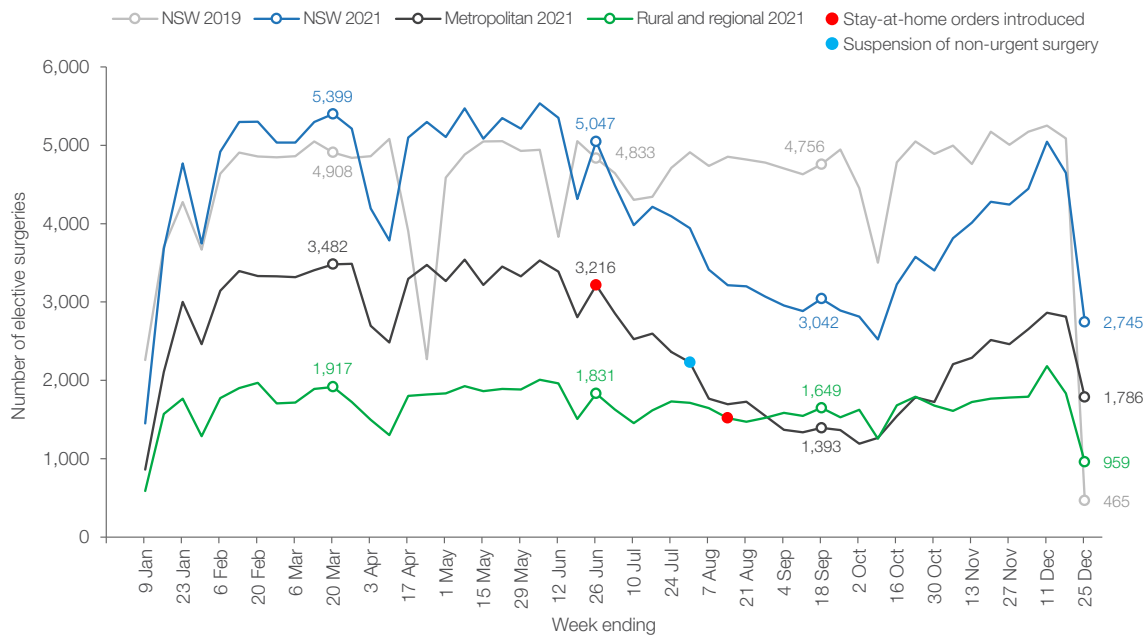


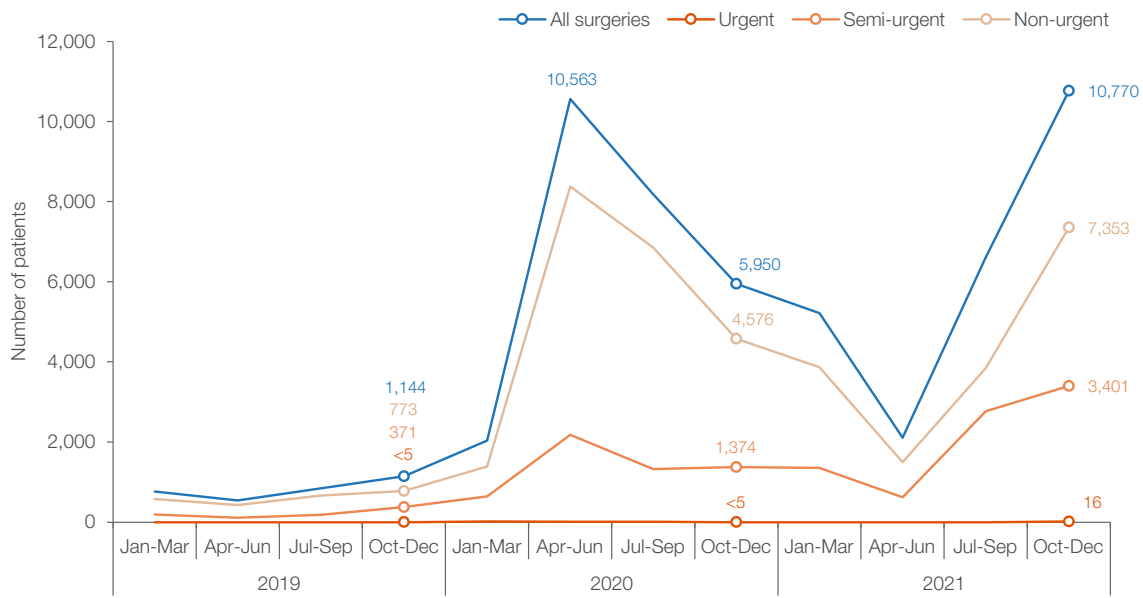
Fig. 2. Elective surgeries performed, by week and geographic region, NSW, January to December 2019 and 2021.

suggesting rates of surgery *per capita* were higher than ever (Fig. 1). However, the impact of Delta and Omicron on waiting time for non-urgent surgery has been long lasting and the rate of growth in overdue patients has accelerated with each subsequent slowdown. Concerningly, the rate of additions at the current time has not returned to pre-pandemic levels,<sup>8</sup> which means that the system has not yet realized the full impact of the true backlog. This has had an impact on semi-urgent surgery as the number and proportion of overdue semi-urgent patients has grown rapidly after multiple slowdowns (Fig. 3).<sup>4</sup> The impact of this on specific

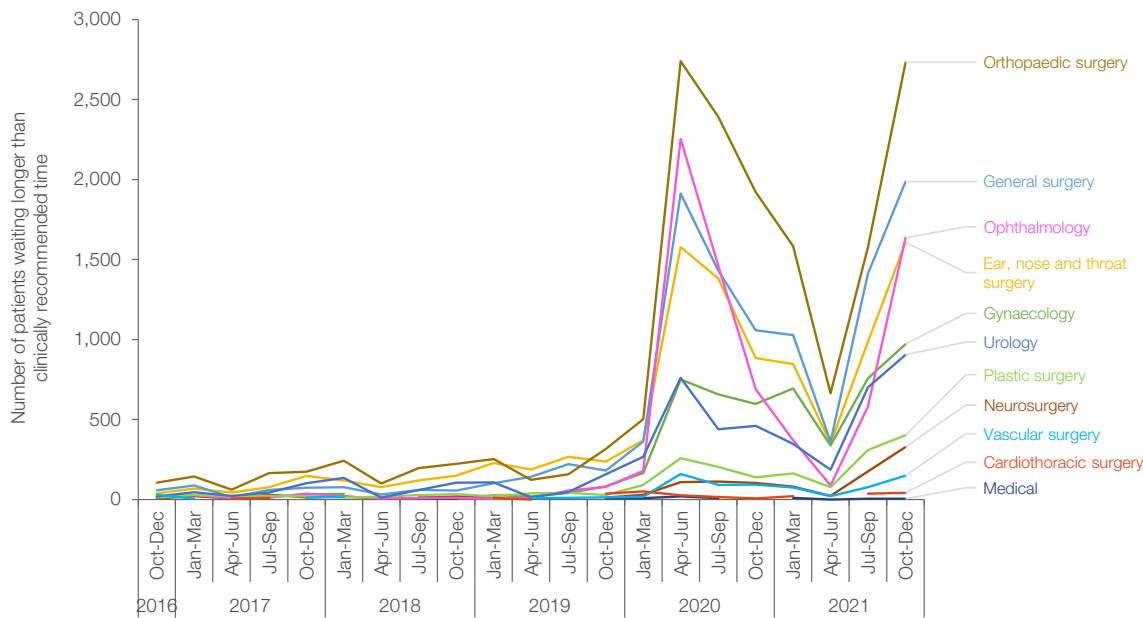
specialties is starting to emerge identifying vulnerable groups.<sup>9</sup> The long-term impact of this on the community is yet to be fully understood but it requires careful monitoring and attention by clinicians, managers and policy makers.

### Identifying system vulnerabilities for focus of future work

With each wave and restriction, it is important that a nuanced policy approach be implemented (detailed in Table 1). For instance,



**Fig. 3.** Patient on the waiting list ready for surgery at the end of the quarter who had waited longer than clinically recommended, by urgency category, NSW, January 2019 to December 2021.



**Fig. 4.** The number of patients waiting longer than clinically recommended time, by select specialties, NSW, January 2019 to December 2021.

geographically circumscribed suspensions during the delta wave resulted in elective surgery continuing unabated in unaffected regions (Fig. 2).<sup>4</sup> During Omicron, targeted suspensions of surgery requiring overnight stays was relatively effective at ensuring day procedures continued, and models of outpatient and day only procedures and care were expanded. Collaborative and contractual arrangements between public and private hospitals were effective at managing demand and waiting lists. However, sustained surge strategies strained resources over time, and despite targeted strategies, geographic and speciality-specific inequities in access continue.

### Specialties specific variation

High-volume specialties such as orthopaedics, otolaryngology, ophthalmology, and general surgery procedures have been impacted disproportionately. Recovery has also varied by speciality and has been slowest in orthopaedics suggesting that specialties with a lower case-mix of day procedures recover slower (Fig. 4).<sup>4</sup> Rapid evolution of new models of care for surgical practice are critical to manage each speciality need. High volume specialties are more vulnerable and where feasible must adopt day surgery models of care while also improving pre-habilitation and rehabilitation services

(e.g., Enhancing Recovery after Surgery and hospital in the home).<sup>10</sup> Changes to surgical practices such as performing day cases first on the list, changes to session length, twilight sessions and procedure specific lists should also be considered. Expanding the value-based approach to support a patient-centred surgical approach will also help improve quality and appropriateness.<sup>10,11</sup>

### Geographic inequities

Several issues challenge the resilience of rural and regional areas compared to metropolitan centres. For example, funding support to engage public-private partnerships seem to provide more support in metropolitan areas where more private hospitals are located. While, suspensions limited to metropolitan areas during the Delta wave ensured that elective surgery in regional and rural areas continued throughout 2021 (Fig. 2), some towns close to state borders were impacted by conflicting state policies and travel restrictions on clinicians and patients reducing efficiency for surgical services. This underscores the need for a national approach to crisis management to mitigating disruption to surgical services in border regions.

Metropolitan centres have different types of challenges. For example, a higher transmission of the Delta wave was seen in areas of Sydney with higher population density, higher proportions of essential workers, lower health literacy and larger cultural and linguistic diversity. While these areas often experience a higher demand on the public system, they also have less private hospital availability. Retaining stability of urgent surgical care during crisis demand strong collaborations between public and private hospitals and between local health districts—working together as one network to innovate and serve local communities. To maintain resilience, a shared strategy for addressing overdue patients requires a similar commitment as a network.

### Workforce supports

While surgical services are run by state health services, surgical training and workforce supply is done by the college and specialist societies at a federal level. Maintaining this standard is vital but long-term variation to surgical services may create variability in the quality of surgical training in different states. Thus, collaboration with state health services and the Royal Australasian College of Surgeons (RACS) is essential to allow sustainability of high-quality workforce supply that is transferable between different jurisdictions.

Surgical safety and outcomes rely on evidence-based standards and protocols that are implemented across the system. While the Alpha wave allowed the implementation of state-wide guidelines, the Delta wave needed a more nuanced approach to policies and protocols to preserve surgical services where possible. Geographic variance in performance between each hospital, rapid changes in policy and practice and uncertainty of the future creates stress. To mitigate this, NSW Health implemented numerous strategies to protect the health workforce and hospitalized patients in ways that impacted elective surgery activity and performance in response to policy directives (Table 1). An ongoing communication strategy and transparency of data is critical to mitigate future workforce burnout.

Resuming elective surgery is more difficult than suspending it<sup>12</sup> because of a cumulative effect of system changes that have to be translated over diverse hospital practices as well as the complex interaction of care seeking and care giving behaviour during periods of uncertainty. These findings highlight that there are likely to be disruptions across the patients' referral pathways that will appear in recovery phases. Surge planning in health systems therefore need to accommodate for (1) a backlog of patients already waiting for surgery, (2) an increase in rate of additions as more patients feel safe to present for care and (3) an increase in presentation of more complex pathology<sup>13</sup> that will utilize more resources. This can also compound workforce burnout during surgical surge. The role of surgical triage<sup>12</sup> and the need to empower clinician judgement is critical to prevent complications.

### Conclusion

A key lesson from this pandemic is to avoid planning a definitive strategy over the medium term which lacks flexibility but communicate the strategy in place at the time to remain agile. Strong clinical engagement process needs to be used to support decision-making. The pandemic and its influence on the health system has continually evolved, driven by the virus, society's use or evolving tolerance of public policies (e.g., stay at home orders), population characteristics (e.g., vaccination rates) and the evolving decisions of clinicians and health-seeking behaviours of citizens. Accordingly, leaders of resilient health and surgical systems need to understand the policy and practice contexts and levers at their disposal and the local factors that drive their suitability and impact. While the impact of COVID-19 has reached an endemic state, its impact on surgery continues to worsen demanding ongoing innovation and agility which only possible with collaboration.




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