March 2023

Information request

Safer Care Victoria (SCV) scoping proposal 4:

Targeted high throughput approaches to theatre list management:

Making best use of existing theatre capacity to safely deliver more surgical procedures.

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Making best use of existing theatre capacity to safely deliver more surgical procedures.

Context

On 3 April 2022, the Victorian Government announced a $1.5 billion Surgery Recovery and Reform program to boost surgical activity across the state. A key component of the strategy is the need to systemically reform the way that the health system delivers surgical services in Victoria on an enduring and sustainable basis.

Safer Care Victoria (SCV) has been resourced to assist the Surgery Recovery and Reform Branch in the Department of Health (DH) to progress its reform agenda. SCV has established the Perioperative Learning Health Network (LHN) and the Perioperative LHN Advisory Group, being led by Professor David Watters to assist with this work.

This report was requested to provide clinical advice to support the implementation of high throughput approaches to theatre list management, such as high intensity theatre (HIT) lists (or similar).

Executive Summary

The Victorian Department of Health (DH) requested Safer Care Victoria (SCV) Perioperative Learning Health Network (LHN) provide clinical advice on high throughput models and approaches to theatre list management. We have reviewed the literature, consulted experts and exemplar health services in how to better utilise existing theatre capacity to safely deliver more surgical procedures across Victoria.

There are risks to implementing high-throughput models including lack of available resources (e.g. equipment, staff, beds); delayed response to the deteriorating patient; reduced access to emergency theatre; and reduced training opportunities for surgical teams. These risks can be mitigated with effective planning; engaged perioperative staff and performing low complexity procedures at an appropriate site, for selected patients, with clear escalation pathways.

There are several options for health services to improve theatre throughput that are safe, feasible and deliverable in Victoria. These have been reviewed for safety, effectiveness, risks, and suitability for implementation in Victoria.

Recommended Safe high throughput models for Victoria

These recommendations are supported by examples of best practice in Victoria and in other jurisdictions.

Models that are effective to deliver additional low to medium complexity surgical procedures include:

1. **Additional surgical lists** such as 'Super Saturdays' and 'Perfect weeks' (page 7) utilising a 'Green/Service List' (Consultant led) (page 9) is recommended for all sites based on capacity, capability and available resources. They can not limit access to emergency theatre. These lists are for certain patients based on clear selection criteria.

2. **'Green/Service Lists'** (page 9) are recommended for sites within health services that are not dedicated training facilities. This is to ensure surgical training is not compromised whilst still improving overall efficiency and productivity. This model should be applied within individual site capability and resources.

Other models investigated but **not recommended:**

1. Concurrent surgery (page 5).
2. Overlapping surgery (page 5).

There is no evidence to support that these two models increase throughput and there are significant risks of adverse events if the surgeon is unable to dedicate their full attention to one patient (RACS 2020, Health innovation network 2022, ACS 2016, Pandit et al 2022, Theriault et al 2019).

Enablers for safe, sustainable implementation of high surgical throughput approaches to theatre list management.

Enablers to safely implement high throughput models of care include:

1. Understanding current utilisation and capability of individual theatres.
2. Engaging with well organised, and motivated perioperative teams.
3. Selecting sites based on; capability; available resources (e.g. beds, equipment, staffing) and existing speciality.
4. Selecting patients based on risk assessment, procedure complexity and site capability, ensuring clear escalation pathways are in place should complications occur.
5. Collecting and using data to monitor for safety, quality and to drive continuous improvement by using the recommended measures (appendix 1).

Full detailed steps for safe implementation can be found on (page 14).

There are opportunities within Victoria to safely implement high throughput surgical approaches as well as improve theatre efficiency. High throughput models need to be applied with effective planning and monitoring to ensure safety and quality.

Our review has found that the model should be determined by individual health services and health service partnerships (HSP) who must assess their

own theatre capacity, utilisation, capability, and resources, to meet the demands of their own waitlist.

Introduction

High throughput approaches to theatre list management have been used in healthcare settings locally, nationally, and internationally. There are various models of theatre list management at individual health sites across Victoria. Each site has a unique combination of resources, skilled staff, bed availability, and surgical waitlists requirements. The efficiency of each theatre relies on how well these elements are managed to provide optimal patient outcomes.

There are various approaches to theatre list management that aim to increase surgical throughput but may not be appropriate for the Victorian healthcare setting. There are significant risks of implementing a high throughput approach to surgery that could have an impact at the patient, the health service, and the health system level. Increasing theatre throughput involves consideration of the whole patient journey (Queensland Health 2017).

This report examines both theatre efficiency/utilisation, and high throughput models of care. We examine these with a view of the delivery of care that is safe, high quality and effective. Our findings are the result of extensive investigation from a rapid literature review, health service partnership survey, and engagement with stakeholders across the health system in Victoria and nationally.

Theatre efficiency and utilisation within Victoria

Theatre capacity – how many operating theatres are there in Victoria?

Available data does not provide central oversight of the total number of operating theatres that are currently in use, or available within Victoria. These are known to individual hospitals and health services.

Mapping is required to inform how many theatres there are, how many are being used and any spare capacity. This will show current capacity to facilitate effective HSP planning.

Theatre efficiency and utilisation – can we increase the surgical throughput in existing theatres?

As informed by sector engagement, many health services can improve theatre utilisation and efficiency. One contributing factor is an inconsistent approach to the measurement of these indicators. The Victorian Auditor-General's Office (VAGO) report into public hospital efficiency in 2017, recognised that there are a variety of measures that are used to assess theatre efficiency at different health services - Victorian Public Hospital Operating Theatre Efficiency | Victorian Auditor-General's Office) <

https://www.audit.vic.gov.au/report/victorian-public-hospital-operating-theatre-efficiency?section=32604--1-audit-context> Without an agreed centralised dataset, benchmarks, or monitoring, DH and health services are compromised in their ability to effectively share data and learnings to improve theatre efficiency and improve access to surgical services across the state (Greaves 2017).

There is considerable consensus between services as to what metrics should be used, with some variability due to different theatre infrastructure (e.g. anaesthetic room) and layouts between hospitals.

Suggested metrics to monitor theatre efficiency and increase theatre utilisation can be found in appendix 1. These include, theatre contact hours, anaesthetic care time, length of surgery, start on time, turnaround time (time between cases), unused capacity, finishing on time, and cancellations on the day of surgery. These metrics are already used by many Victorian health services to measure theatre utilisation.

Concurrent, overlapping, and sequential surgery

Concurrent: *Where the primary surgeon is responsible for the 'critical' portions of two procedures that are happening at the same time (Royal Australasian College of Surgeons (RACS) 2020). This requires a second qualified or competent assistant such as a surgical fellow performing the procedure, rather than necessarily the primary surgeon.*

The practice of concurrent surgery is not supported by RACS, American College of Surgeons (ACS) or within literature (RACS 2020, Health innovation network 2022, ACS 2016, Pandit et al 2022, Theriault et al 2019). There are significant risks with concurrent surgery (table 1). Working across two theatres may contribute to an increased risk of adverse events if the surgeon is unable to dedicate their full attention to one patient (RACS 2020, ACS 2016).

Overlapping: *When two surgical procedures overlap in their start and finish times, but the 'critical' portions or those activities which require the skill and expertise of the primary surgeon do not overlap (RACS 2020).*

There are risks in applying an overlapping model such as having unclear definition of which parts are the 'overlapping' and 'critical' portions (Pugh 2022, RACS 2016, Pandit et al 2022). There is no evidence of increased productivity or throughput of an overlapping model when compared with two surgeons working in parallel (RACS 2016). This model is occasionally facilitated in private health services to accommodate the surgeon's private list.

In some health services an emergency list may be scheduled alongside a planned list to enable the senior surgeon to provide advice/support to a junior surgeon capable of performing the cases on the emergency list. These

arrangements have been established by some health services to facilitate timely emergency surgery access. This report has not investigated the safety of the application over overlapping surgery in this context.

Sequential surgery: *When two theatres utilised by the one surgical team to reduce downtime between cases so that surgery finishes in one theatre and commences in another while the first theatre is cleaned.*

Sequential surgery requires two separate theatre spaces, and one surgical team. This model is limited by the availability of spare theatre space. However, this model is appropriate for sites that have theatre capacity but are unable to staff two theatres.

Table 1: Benefits, risks/ barriers and resources required for concurrent, overlapping, or sequential surgery lists.

Benefits	• Utilises the surgeons time effectively. • Can be effective for emergency surgical procedures.
Risks/Barriers	• Increased complication rates (Sun et al 2019, RACS 2020). • Increased total anesthesia/positioning/surgical time (Theriault et al 2019). • The need for a surgeon to return to a patient for an unexpected problem when the other surgery has started (RACS 2020). • Reduced training opportunities. • Relies on operations with shorter duration and critical portion is <50% of the procedure (RACS 2020).
Resources	• Two theatres. • Two full teams of theatre support. • Second surgeon available for if unforeseen complication occurs.

Induction (anaesthetic) room: *A room or bay adjacent to the operating theatre that allows for the anaesthetic process to begin while another procedure is ending (Basto, Chahal, Riedal 2019).*

Clinicians and literature see this approach as a safe way to increase theatre efficiency (Basto, Chahal, Riedal 2019; Advisory Group 2023). This approach has limited application within Victoria due to the lack of available infrastructure.

Table 2: Benefits, risks/ barriers and resources required for induction rooms.

Benefits	• Utilises the surgeons time effectively. • Induction rooms reduce non-operative time.
Risks/Barriers	• Increased total anesthesia/positioning/surgical time (Theriault et al 2019).
Resources	• A separate space for anaesthesia to begin (two theatres, induction room, anaesthetic bay)

Surgical high intensity theatre (HIT) list, 'Super Saturdays' and 'Perfect Weeks'

A HIT list is an extra surgical list which is supported by additional resources and staff to achieve a quick turnover of procedures. This list is often aimed at low to medium complexity planned surgical procedures, with longer waitlists. They often run for a short period of time when the theatre would otherwise not be utilised (e.g. Saturday, evening, holiday periods) (Pugh 2022; National Health Service (NHS) 2022).

HIT list models were initially informed by the High-Volume Low Complexity (HVLC) NHS initiative led by Getting it Right First Time (GIRFT) to increase planned surgical activity in the UK (NHS 2021). The biggest barriers to this approach are having the appropriate workforce to undertake extra work and the bed supply to meet demand.

Austin Health recently used this approach. They completed their 'Bone and Joint Week' in early 2023 where they completed approximately 10% of their annual joint replacements within that week. They achieved this by extensive planning, engaging their workforce in a joint mission with shared goals, capitalising on the success of their enhanced recovery program, and by selecting a site that did not compete with other bed demands such as emergency theatre or medical admissions.

Table 3: Benefits, risks/ barriers and resources required for HIT lists.

Benefits	• Directly improves waitlist management. • Patient and staff experience.
Risks/ Barriers	• Unexpected complications requiring unplanned overnight stays or unexpected multi-night stays. • Bed flow challenges. • Potential to compete with emergency surgery. • Staffing availability. • Cost 50% more than two normal conventional lists (Pugh 2022).
Resources	• Designated staff for planning, selection of appropriate patients and administration. • Extra equipment and appropriate storage space for equipment. • Requires 50% more theatre staff needed compared with two conventional lists. Also, extra allied health staff. • Planning for pre-operative and post-operative care.

Surgical hubs and dedicated planned surgery centres

These are dedicated sites to create extra capacity and increase throughput for planned procedures so that emergency cases do not disrupt planned surgery lists and cause further delays (Health innovation network 2022). They require pooling capacity, resources and agreed system-wide operating

theatre principles and efficiencies (Practice plus group 2022, NHS 2021, Health innovation network 2022).

Fast Track Surgical Hubs formed part of the GIRFT program across the NHS UK to address the number of waitlisted patients requiring planned surgery (Practice Plus Group 2022, NHS 2021, Health Innovation Network 2022). These surgical hubs were created to cover twenty-nine routine procedures, including cataract removal, hysterectomies, and hip and knee replacements (NHS 2021). They have been particularly successful as cataract hubs (The Royal College of Ophthalmologists 2021).

In Victoria, eight **Rapid Access Hubs (RAH)** have been funded by DH and are at different stages of implementation (March 2023). Each RAH has targeted procedures according to the resources, specialist availability, and long waiter requirements of each site.

Two **Public Surgery Centres** have also been funded by DH. These sites were originally private hospitals and are now running dedicated planned surgery lists which do not compete with emergency surgery admissions.

The biggest safety concern with a dedicated site model is the restricted ability to respond to a critical, deteriorating patient in a timely manner. Some sites do not have High Dependency Unit (HDU)/ Intensive Care Unit (ICU) capacity and would require transfer off site. To mitigate these risks, it is essential to, select procedures and patients based on site capability and establish escalation pathway/s for a patient who may unexpectedly deteriorate, requiring higher level of care and transfer.

Table 4: Benefits, risks/ barriers and resources required for surgical hubs.

Benefits	• Dedicated beds for planned surgery that do not compete with emergency theatre or beds. • Increased throughput. • Streamlined processes. • Creates space for complex procedures and high-risk patients at other health services. • Staff experience.
Risks/barrier	• Unable to respond in a timely manner to the deteriorating patient
Resources	• Designated centres. • Purpose built or refurbished theatres/infrastructure. • High numbers of skilled staff.

Green Lists and Service Lists

The **'Green List'** model adopted by the NHS (UK) aims to increase predictability and streamlining based on the concept of repetition and use of 'Lean Thinking' principles: the least wasteful way to provide better, safer healthcare to patients with no delays (NHS 2007).

The **'Service List'** model forms part of Queensland's 'The Productive Operating Theatre Program' and is based on the 'Green List' model, with an additional focus of using consistent teams for dedicated non-training consultant led lists. Whilst training and education of staff is recognised as being fundamental to the delivery of sustainable, safe and quality services, this model offers opportunities to consolidate efficient processes and maximise patient throughput with minimal opportunity for training (Queensland Health 2017). The employment of staff surgeons and anaesthetists, instead of Visiting Medical Officers (VMO), in Queensland has helped facilitate staffing of Service Lists.

Principles of a Green List and Service List:

- Increase efficiency and productivity within existing resources.
- Consistent teams, case mix, equipment, and session times will cultivate familiarity to increase knowledge and speed.
- Appropriate patient selection and preoperative assessment are pivotal for the effectiveness and safety of these lists.
- Regular review of lists is fundamental to improving processes and developing sustainable, efficient practices.

Characteristics of a Green List and Service List:

- Consultant led lists.
- Same number and type of cases.
- Agreed anaesthetic and surgery times.
- Start, finish and break times are agreed in advance.
- Consistent theatre team (surgeon, anaesthetist, theatre nurses etc.).
- No (or very minimal) opportunities for training.
- Lists are planned and confirmed well in advance (3 weeks).
- Selected patients have undergone necessary preoperative and pre-anaesthetic preparation.
- List order is set prior to day of surgery and is not changed.
- All patients are admitted on the day of surgery.
- A team debrief is undertaken at the end of each list to reflect and report any issues to the theatre management committee for further review.
- Equipment is readily available for high turnover lists.

Kyneton Campus of Central Highlands has been successful in utilising a 'Service List' approach and have demonstrated lower than the state average in postoperative readmissions, Emergency Department (ED) representations and hospital acquired complications (HAC). They have good staff retention and attribute this to consistent teams working towards a shared vision and always starting and finishing on time.

Table 5: Benefits, risks/ barriers and resources required for green lists/service lists.

Benefits	• Dedicated lists that directly increases throughput. • Cost efficiency. • Patient experience. • Staff experience. • Uses existing resources.
Risks/Barriers	• Bed flow issues. • Competes with emergency surgery. • Staffing availability.
Resources	• Equipment is readily available. • These procedures require extensive planning for preoperative and postoperative care. • Multidisciplinary meetings for planning for selection of appropriate patients.

Priority low-medium complexity procedures appropriate for high throughput lists

Several priority procedures (table 6) have been identified from review of literature and consultation with key stakeholders (NHS 2021). A high throughput list should select cohorts according to the long waiters, the skills, and resources of each site.

Table 6: Priority low-medium complexity procedures appropriate for high throughput lists.

Specialty	Procedure
ENT	• Endo sinus surgery • Nasal airway surgery • Myringoplasty • Tonsillectomy
General Surgery	• Inguinal Hernia • Laparoscopic Cholecystectomy • Paraumbilical Hernia • Colonoscopy and gastroscopy (not currently listed in ESIS)
Gynaecology	• Operative laparoscopy • Endometrial ablation • Hysteroscopy • Laparoscopic hysterectomy (with or without removal of ovaries) • Vaginal hysterectomy (anterior/posterior vaginal wall repair)
Urology	• TURP • TURBT • Hydrocele

	• Epididymal cyst excision • Ureteroscopy and laser • Vasectomy • Cystoscopy and stent change • Cystoscopy plus biopsy • Cytolitholapaxy
Ophthalmology	• Cataract
Orthopaedics	• Anterior Cruciate Ligament Reconstruction • Bunions • Therapeutic Shoulder Arthroscopy • Hip Arthroplasty • Knee Arthroplasty
Spinal	• Microdiscectomy/posterior decompression • ACDF or posterior cervical decompression • Interbody fusion

Risks of implementing a high throughput model of care

High risk patients have an increased risk of complications and are not usually appropriate for a high throughput model. Patients should not be expected to require HDU or ICU postoperatively, but there should be a clear escalation pathway should complications occur.

High risk patients should be managed on a pathway that can provide safe care to meet their individual needs. Diverting low risk patients to an alternative model allows higher risk patients to receive the right care in the right place.

Table 7: Risks of implementing a high throughput model of care.

Risks	Mitigations
Supply chain disruption leading to inability to access required equipment.	• Early identification of equipment needs. • Work with the DH Supply Chain Taskforce to identify solutions. • Develop a statewide equipment bank that can be loaned by health services who are preforming extra lists.
Reduced access to skilled staff for pre-existing surgical requirements if staff are being utilised for high throughput work.	• Early workforce engagement • Develop rostering rules that ensure usual theatre lists are fully staffed before scheduling additional lists. • Invest in post graduate education to develop a sustainable workforce.
Increased readmission and representations to ED. Impacted by access to GP if patients	• Close monitoring of readmission and representations to ED. • Clear patient selection criteria. • Early discharge plan with prearranged follow up. • Clear post-op escalation pathway.

discharged on a weekend.	• Effective and timely discharge communication to GP. • Pre-arranged follow up and post op phone call/home visit within 24-48hrs.
Delayed response to the deteriorating patient due to potential need to transfer patient offsite.	• Careful patient selection using inclusion and exclusion criteria. • Clear internal escalation pathways. • Monitoring the number of patients who are transferred for care escalation. • Internal MDT meeting to discuss patients who have deteriorated to review safety processes.
Patient and carer anxiety.	• Detailed planning and education with clear expectations of best care.
Lack of training options for junior surgeons due to consultant-based lists.	• Ensure training lists cover the required range of surgical procedures. • Ensure additional work does not impact on training opportunities.
Unexpected complications requiring unplanned overnight stays or unexpected multi-night stays.	• Factor a percentage of patients to require an unplanned admission into bed allocation. • Maintain clear criteria for low complexity patients to minimise this risk.
Unconscious bias for selection of low-risk patients	• Clear inclusion and exclusion criteria that promotes equity of care to include populations (when possible) who may be disadvantaged e.g. older adults living with frailty.

Barriers and enablers to increasing surgical throughput

There are several barriers to implementing a high throughput approach for surgery. This table shows the enablers which would be required to safely increase the volume of surgery completed at a site or with an additional surgical list.

Table 8: Barriers and enablers.

Barriers	Enablers
Bed capacity	• Dedicated (ring fenced) beds for additional work. • Site with no emergency department. • Well planned lists to match bed supply. • Extended day ward hours. • Expand day surgery pathways.
Set-up time for theatre	• Dedicated theatre list for each procedure/specialty.
Variation leading to inefficiency	• 'Green List/ Service List' approach. • Customised theatre packs. • Increase nursing/theatre staff. • Multiple sets of instruments.

Appropriate patient selection	• Clear inclusion and exclusion criteria to match the health service. • Preadmission planning. • Risk assessment. • Set patient expectation.

Appropriate site selection	• Select sites based on resources;
	  ○ skilled staff
	  ○ equipment
	  ○ existing clinical champions
	  ○ existing enhanced recovery programs.

Lack of skilled and available workforce	• Dedicated planner to co-ordinate additional lists. • Opportunities for upskilling outside of high throughput list. • Training pathways internal and tertiary. • Pre planning intensive weeks by scheduling lists around staff leave. • Anticipate unplanned leave with extra staffing. • Increased allied health to enable 7 day a week service. • Consultation of the workforce to review motivation/ moral before scheduling additional lists.
Lack of incentive to do extra work	• Fee for service model (surgeons and anaesthetists). • Flexible rostering for nursing.

Recommendations

These recommendations need to be applied in a way that does not impact access to emergency theatre or surgical teaching opportunities across Victoria. These approaches are intended to be applied to additional work above business-as-usual and used to address the current backlog and long-wait patients. These recommendations are supported by examples of best practice in Victoria and in other jurisdictions.

Recommended safe high throughput models for Victoria.

Models that are effective to deliver additional low to medium complexity surgical procedures include:

1. **Additional surgical lists** such as 'Super Saturdays' and 'Perfect Weeks' utilising a 'Green List/ Service List' (Consultant led) approach is recommended for all sites based on capacity, capability, and available resources with the following requirements:

   i. Extensive planning.

ii. Patient selection based on inclusion/exclusion criteria set in accordance with individual capability assessment of each service.

iii. Do not limit access to emergency theatre.

iv. Do not compromise surgical training opportunities.

v. Close monitoring of recommended quality and safety measures.

2. **'Green List/ Service Lists'** are recommended for all sites within health services that are not dedicated training facilities. This is to ensure surgical training is not compromised whilst still improving overall efficiency and productivity. This approach should be applied within individual site capability and resources.

Other models investigated but **not recommended:**

1. Concurrent surgery (page 5).
2. Overlapping surgery (page 5).

There is no evidence to support that these two models increase throughput and there are significant risks of adverse events if the surgeon is unable to dedicate their full attention to one patient (RACS 2020, Health innovation network 2022, ACS 2016, Pandit et al 2022, Theriault et al 2019).

Enablers for safe, sustainable implementation of high surgical throughput approaches to theatre list management.

The following enablers take into consideration the entire patient journey and outline the steps that are required to safely implement and sustain high throughput approaches.

1) Review current utilisation and capability of individual theatres by:

I. Mapping the number of theatres in the state and record individual utilisation rate.

II. Reviewing theatre schedules to identify times when there is opportunity to undertake additional work (e.g. Saturday, twilight, or holiday periods).

III. Allocating specific times for emergency theatre lists (if the site undertakes emergency surgery).

IV. Assessing individual theatre capability using the Perioperative service capability framework for Victoria- Perioperative service capability framework for Victoria | health.vic.gov.au <https://www.health.vic.gov.au/health-system-design-planning/perioperative-service-capability-framework-for-victoria>

V. Reviewing credentials of perioperative teams to ensure that they are operating within their scope and the capability of each individual theatre.

VI. Standardising monitoring of theatre efficiency by using recommended measures (appendix 1).

VII. Ensuring future infrastructure supports theatre efficiency by including induction rooms or anaesthetic bays in all in theatre builds using the Australasian Health Facility Guidelines (AHFG 2016).

2) Engage well organised, and motivated perioperative teams by:

I. Providing a dedicated planner and administration staff to support additional lists.

II. Anticipating additional staffing requirements including planned and unplanned leave.

III. Ensuring staffing availability to take on extra work. Services who engage in this work need to have less than 5% vacancy rate to show stable workforce prior to taking on additional work (SCV Chief Nurse and Midwifery Officer 23).

IV. Health services and the Australian Nursing and Midwifery Federation (ANMF) partnering to develop staffing models that meet the needs of the health service and the staff.

   a. SCV to continue to lead this work under the guidance of the Chief Nurse and Midwifery Officer.

   b. Discussions should consider options such as flexible working arrangements (e.g. long or short shifts, flexible start and finish times) and short term incentives (e.g. bonus payments), for taking shifts to support extra work.

   c. Rostering rules need to be in place to ensure that staff are not taken from usual work to take on extra lists.

   d. Review options to determine the potential scope for use of an alternative workforce within the theatre environment.

V. Increasing allied health resourcing to enable a seven day a week service.

VI. Investing in training pathways (internal and tertiary) to support development and ongoing sustainability of a skilled workforce.

3) Select sites based on, capability, available resources, and existing speciality by:

I. Selecting a site that already does a procedure well with established and efficient patient pathways (e.g. day surgery model or enhanced

recovery program). Existing routine procedures at a site suggest staff and resourcing that can support a higher throughput model.

II. Identifying and sourcing additional equipment to facilitate increased throughput (e.g. instruments sets).

III. Work with the Supply Chain Taskforce to identify solutions to supply chain disruption.

IV. Reviewing bed availability within the health service. Ensure that beds are pre-allocated (ring-fenced) for a targeted surgical list and are not in competition with emergency beds.

V. Extending day procedure unit opening hours to support additional work.

VI. Ensuring access to suitably skilled after-hours medical support (particularly important to rural and regional services).

VII. Exploring opportunities within Health Service Partnerships (HSP) to create safe patient pathways to streamline patients to a nominated service for a particular procedure.

4) **Select patients based on risk assessment, procedure complexity and site capability by:**

I. Updating the ESIS wait list to include American Society of Anaesthesiology (ASA) score and the ability to perform a Surgical Outcomes Risk Tool (SORT) score to assist with early identification of patients.

II. Providing multidisciplinary team (MDT) preadmission clinics for risk assessment to identify appropriate patients and provide optimisation.

III. Developing inclusion/exclusion criteria for each site based on capability assessment (Victoria state government 2019) and available resources. Consider patient factors such as:

   a. ASA score
   b. Comorbidities
   c. Cognitive function
   d. Discharge destination and support on discharge

   See appendix 2 for example inclusion/exclusion criteria based on individual site capability.

IV. Developing a process for filling last minute cancelations with pre-selected patients, who have had the appropriate preadmission assessments and optimisation who agree to be contacted within 48hrs of admission.

V. Ensuring early planning for post operative care requirements including pre-arranged services and follow up.

5) **Collect and use data to monitor for theatre efficiency, safety, quality and to drive continuous improvement.**

Appendix 1 outlines the measures required to monitor theatre efficiency and the safety and quality of high throughput approaches to theatre list management. The following principles should underpin all reporting and monitoring to ensure data quality and usability of data.

I. Collect data based on statewide agreed operational definitions of time stamps to assess the surgical pathway.

II. Reports should be easily accessible, relatable, and easy to understand.

III. Reports need to provide meaningful information that can be used to drive change.

IV. Reports should be provided in a timely manner.

V. Reports and data should be visible and available to staff responsible for and involved in delivery of services.

VI. All members of the team including executives, managers and all craft groups should have access to and read reports. All members should actively participate in developing improvement initiatives.

VII. Complete regular auditing, training, and education with staff to ensure accuracy and reliability of data.

Conclusion

There are opportunities within Victoria to implement safe high-throughput models to theatre list management. The most sustainable gains in theatre throughput will be achieved by safely improving theatre utilisation and efficiency. This will lead to more planned surgery, and more timely access for emergency surgical cases year on year. High throughput models are of great value in addressing backlogs but generally require a targeted, time-limited approach, rather than business as usual. They place a higher, but temporary demand on the workforce, but can be very good for morale, and can deliver safe, effective surgery.

Publicly available resources

- Austin Health Bones Week <https://www.linkedin.com/posts/austin-health_for-the-first-time-at-austin-health-one-activity-7026050869003460609-T-NV?utm_source=share&utm_medium=member_desktop>

- Rachel Pugh. Surgical HIT Lists Do 'a Month's Worth' of Surgeries in a Day - Medscape - 02 August 2022. <https://www.medscape.co.uk/viewarticle/surgical-hit-lists-do-month-s-surgery-day-2022a1001wuk>
- Getting It Right First Time (GIRFT). Elective recovery high volume low complexity (HVLC): guide for systems. May 2021. <https://www.gettingitrightfirsttime.co.uk/wp-content/uploads/2021/05/GIRFT-HVLC-Guide-Final-V6.pdf>
- Bones Project Review (BHRUT Orthopaedics NHS Elective Surgery) <https://www.gettingitrightfirsttime.co.uk/wp-content/uploads/2022/04/BONES-Project-review-v1.5-Final-Nov-2.pdf>
- Health Innovation Network. High Volume Low complexity Hubs – patient and staff insights. <https://healthinnovationnetwork.com/wp-content/uploads/2022/12/HVLC-insights-report_Final.pdf>
- Operating Theatre Efficiency Guideline and Statewide Key Performance Indicators- Queensland Health <https://www.health.qld.gov.au/__data/assets/pdf_file/0022/640138/qh-gdl-443.pdf>
- Operating Theatre Efficiency Guidelines – New South Wales Government <https://aci.health.nsw.gov.au/__data/assets/pdf_file/0004/252436/operating-theatre-efficiency-guidelines.pdf>
- Victoria state government 2023, 'Perioperative service capability framework for Victoria' Melbourne' < https://www.health.vic.gov.au/health-system-design-planning/perioperative-service-capability-framework-for-victoria>

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Consultation:

ACI (Agency for Clinical Innovation), NSW

Clinical Excellence Queensland

Surgical Directors of Victoria

Victorian theatre nurse unit manager focus group

Surgical Treatment and Rehabilitation Service (STARS)

Northern Health

Royal Victorian Eye and Ear Hospital

Epworth HealthCare

Bendigo Hospital

St Vincent's Private

Austin Health

Kyneton Health

Moorabbin Hospital

Ballarat Base Hospital

SCV Perioperative LHN Advisory Group (Appendix 3)

Appendices

Appendix 1

Proposed measures for theatre efficiency and quality and safety of high throughput approaches to theatre list management

These measures were developed from consultation with key stakeholders and using best practice theatre efficiency guidelines and definitions. These have been supported by the Perioperative LHN data group.

This table outlines existing and new measures which are proposed to be standardised for use at all Victorian health services.

Theatre efficiency measures

Measure	Definition	Purpose/rationale	New/existing
Utilisation rate - Theatre contact hours	The proportion of time surgery is performed during a planned surgical session Vs emergency surgical session. Contact hours 'in hours', 'evening' (6-12pm) and 'night' (12-7am) Theatre contact hours should be measured from 'in' Operating theatre (OT) to 'out' of OT.	Monitoring efficiency and utilisation of theatres. Ensure supply meets demand. To monitor where there are opportunities to increase theatre usage	New To be measure at **state level**
Anaesthetic care time	This period is from anaesthesia start (from the point of anaesthesia continuous care) to anaesthesia stop (when care is safely handed over to recovery room staff or intensive care) (ANZCA 2017). Relative length of anaesthetic care time may be greater than 100% of OT session if anaesthetic/induction room is available. (ACI 2014; Queensland Health 2017).	Monitoring theatre efficiency. Balancing measure to assess if anaesthetic care time is disproportionate to other theatre efficiency data.	New To be measured at **health service** level
Length of surgery	Relative length of operation occurring. Surgical start time to patient leaving theatre. Surgical start time is defined as when the surgeon accepts care of the patient.	To enable comparison/benchmarking of surgical length time across health services	New To be measured at **state level**
First case start on time	Percentage of planned sessions where the first case is on or before the scheduled session start time. A late start is defined as any session where the first case starts 10 mins after the scheduled session start. Session start time is defined as when the surgeon accepts care of the first patient within the operating theatre.	Delays in theatre start time impacts on the ability to complete list and to finish on time. Directly impacting on the amount of surgery that can be delivered	New To be measured at **health service** level and used to drive improvement

Average change over time/ turnover time	The average time between cases treated in planned sessions measured from previous case 'out of OR' to next case 'In OR' time	Theatre efficiency. Aim to see decreasing turnover times	New To be measured at **health service** level and used to drive improvement
Unused capacity	The number of days on which an operating theatre is closed	To measure theatre utilisation across the state	New To be measured at **state level**
Finishing on time - underruns (early finishes) - overruns (late finishes)	The percentage of planned sessions where the last case exits the theatre 45 minutes or more before the scheduled session end time (underrun) or where the last case exists the theatre 30 minutes after the schedule session end time (overruns)	Monitors for effective list planning. If lists are running over or under the reason for this may then be identified and addressed at a health service level to improve theatre utilisation	New To be measured at **health service** level and used to drive improvement
Quality and Safety measures			
Measure	**Definition**	**Purpose/rationale**	**New/existing**
Cancellation on the day of surgery	The percentage of all elective patients cancelled on the day of surgery for both hospital and patient initiated	Monitor for cancellation rate and reason behind cancellation	Existing
Patient transfer to another health service/ campus	Transfer of a planned surgical patient from one site to another and reason for transfer	Monitor for any unexcepted patient deterioration that cannot be managed at treating hospital	Existing
Unplanned admissions (planned day surgery cases)	Number of patients who were planned day cases who require overnight bed	To monitor the unforeseen need for a hospital beds for planned day cases. Helps to measure effective patient selection for day surgery	Existing
Unplanned readmission	Readmission within 48hrs and 28 days post discharge from surgical admission	Quality and safety measure. To monitor for unforeseen complications.	Existing
Representations to Emergency department	Representations to the emergency department within 30 days of procedure and reason for presenting	Quality and safety measure. To monitor for re-distribution of patients from one	Existing

		part of the system to another.	
Mortality	Mortality at 30, 90 days and 12 months	Quality and safety measure	Existing
Hospital acquired complications (HAC)	As per national HAC definitions	Quality and safety measure	Existing
Major medical complications	Major medical complications within 30 days (Stroke, myocardial infarct and pulmonary embolism)	Quality and safety measure	Existing
Patient experience	Patient survey to capture feedback on patient experience	How have the changes effected the patient's experience. Not currently able to review patient experience in relation to different surgical cohorts from a state level.	New: Patient experience is often captured at health service level

(Greaves 2017; Queensland Health 2017; ACI 2014)

Appendix 2

Example patient Inclusion/Exclusion criteria based on site capability

Austin Health – Rapid access hub

Exclusion criteria
Local anaesthesia only: Need for a 2-way transfer (from one acute health service to the hub and back to the acute health service) Spinal cord injury above T10 Automatic implantable cardioverter defibrillator (AICD) or pacemaker that requires pre-procedure reprogramming Active psychosis or behavioural disturbances requiring 1:1 care (except for ECT) Sedation - any criterion above plus: Age <4 years old or <2 years old for grommets and similar magnitude surgery Pregnancy gestation >23 weeks Risk factors for needing a fibreoptic intubation e.g. previous fibreoptic intubation, previous major head and neck cancer surgery, previous neck radiotherapy (note: if after these red flags patient has had a grade 1 or 2 laryngoscopy, these risk factors can be ignored) Left ventricular ejection fraction <35% Severe cardiac valvular disease

Severe pulmonary hypertension
Non-invasive ventilation, home oxygen or resting oxygen saturations <92% with an unknown cause
Exercise tolerance <50m limited by chest pain or breathlessness
Suspected anaphylaxis to anaesthetic medication and is awaiting allergy testing
BMI >60 or weight >150kg
Obesity hypoventilation syndrome
Child-Pugh B or C liver disease

General / Regional Anaesthesia - any criterion above plus:
End stage kidney disease or dialysis
Myocardial infarction <6 weeks ago
BMI >48 for men or >56 for women
Need for epidural analgesia or anticipated need for 24-hour access to pain services
Severe obstructive sleep apnoea, untreated

Central highlands rural health service (CHRH)

VMO's will be credentialed for CHRH as an organisation, but the procedures they perform at a site will be specific to the capability of that site. Capability assessments, in combination with patient comorbidities and staff skill mix mean that some procedures for which VMO's are credentialed can only be performed at one site. In general, only endoscopic procedures and minor soft-tissue procedures including Dupuytren's Contracture and Carpal Tunnel release are performed at one site, and requests to perform other procedures must be discussed with the Peri-operative Manager and Director of Medical Services.

Fitness for surgery criteria:

Table 1. Site 1 (level 3 capability): ASA and BMI requirements for procedures

Anaesthetic type	ASA I	ASA II	ASA III	ASA IV	BMI
Local	✓	✓	✓	✓	NA*
Sedation	✓	✓	✓	✖	
General – minor surgery	✓	✓	✓	✖	≤ 40
General Intermediate/major surgery	✓	✓	✖	✖	≤ 35
*Must be able to mobilise with minimal assistance, lie flat and maintain haemodynamic stability.					

Table 2. Site 2 (level 2 capability): Age and BMI requirements for procedures

Anaesthetic type	Age	Weight	BMI	Other
Local	≥ 7 years	≥ 25kg	NA	
Sedation	≥ 7 years	≥ 25kg	≥ 35-40*	
General – minor surgery	≥ 7 years	≥ 25kg	≤ 35	No significant comorbidities
*Must be discussed with surgeon, anaesthetist and operative unity NUM.				

Appendix 3
Perioperative LHN Advisory Group

Prof David Watters	SCV Perioperative Director; Alfred Deakin Professor	SCV; University Hospital Geelong, Barwon Health; Deakin University
Denice Spence	Consumer advocate	SCV, VPCC
Jen Morris	Consumer advocate	SCV
Briana Baass	Chief Allied Health Officer, Victoria	SCV
Prof Adam Elshaug	Director, Melbourne School of Population and Global Health; Professor of Health Policy	Melbourne University
Dr John Elcock	CMO	Goulburn Valley Health
Paula Foran	Perioperative Nurse; VPCC	Mercy Hospital for Women, VPCC
Dr Kate Gregorovic	Chronic Disease Physician; Chronic and Prevention Clinical Lead, Centre of Clinical Excellence, SCV	Royal Melbourne Hospital; SCV
Dr Andrew Hardidge	Orthopaedic Surgeon	Austin Health
Dr Richard Horton	Anaesthetist; Chair of Victorian Anaesthesia Directors' Group	Western Health
Dr Vahid Masoumi	Primary Care Physician (GP)	RACGP Victoria
Dr Margot Lodge	Geriatrician; Completing PhD in geriatrics periop	Peninsula Health, Alfred Health
Sharyn Milnes	Clinical Nurse with expertise in ICU, goals of care, limitations of treatment	Barwon Health
Dr Gerard O'Reilly	Emergency Medicine Physician; Acute Care LHN Clinical Lead, Centre of Clinical Excellence SCV	Alfred Health, SCV
Uyen Phan	Associate Director Allied Health – Physiotherapy & Exercise Physiology	Northern Health
Prof Ben Thomson	Director of Surgery; Department of Health Chief Surgical Advisor, Surgery Recovery and Reform Taskforce	Melbourne Health, Department of Health
Dr Deb Harley	Primary Care Physician (GP)	Western Victoria PHN
Prof Zoe Wainer	Enterprise Professor (Hon); Deputy Secretary, Public Health	The University of Melbourne; Department of Health
Simone Redpath	General Manager of Critical Services	La Trobe Regional Hospital
A/Prof Paul Cashin	Service Director of General Surgery; Senior Upper Gastrointestinal Surgeon; A/Prof of surgery in the Dept. Of Surgery, Southern Clinical School, Monash University	Monash Health, Jessie McPherson Private Hospital, Monash University
Mardi Durling	Perioperative Project Lead VMIA	VMIA
Professor David Scott	Director of Anaesthesia and acute pain medicine at St Vincent's Hospital. Current Chair of VPPC	SCV, VPCC, St Vincent's Hospital, University of Melbourne

Appendix 4

Perioperative LHN data group

Prof David Watters	Director of Surgery, SCV, Alfred Deakin Professor	
Prof Adam Elshaug	Academic, Healthcare policy & researcher	SCV; University Hospital Geelong, Barwon Health; Deakin University; VPCC
Benjamin Thomson	Chief Surgical advisor, Victorian Department of Health	Melbourne University
A/Prof Alasdair Sutherland	Orthopaedic Surgeon, Director of Orthopaedics South-West Healthcare A/Prof Deakin University Medical school	Melbourne Health, Department of Health
Gerard O'Reilly	Emergency Medicine Physician; Acute learning health network Clinical Lead, Centre of Clinical Excellence SCV, Alfred Health	South-West Healthcare
A/Prof Paul Cashin	Upper Gastrointestinal Surgeon, Service Director of General and Gastrointestinal Surgery, Monash Health	Alfred Health, SCV
Dr Tim Coulson	Anaesthetist, Senior Fellow (Honorary) Centre for Integrated Critical Care, University of Melbourne, Senior Lecturer (Adjunct) | School of Public Health and Preventive Medicine, Monash University	Monash Health
Prof Bernhard Riedel	Director, Department of Anaesthesia, Perioperative and Pain Medicine	Alfred Health, University of Melbourne, Monash University
Prof Andrew Georgiou	Australian Institute of Health Innovation.	Peter MacCallum Cancer Centre
Jennifer Reilly	Anaesthetist	Alfred Health
Janelle Penno	Senior Perioperative Pharmacist	Monash Health
A/Prof Vijaya Sundararajan	Research fellow SCV, A/Prof of Medicine Department of Medicine St Vincent's Hospital Melbourne	Peter MacCallum Cancer Centre
Prof Linda Denehy	Physiotherapist	St Vincents Hospital, University of Melbourne, SCV research fellow
Dr Hilmy Ismail	Anaesthetist and Lead Clinician for Prehabilitation, Digital Health	Peter MacCallum Cancer Centre
Dr Tom Poulton	Anaesthetist, Data Scientist	Peter MacCallum Cancer Centre
Dr Jeff Urquhart	GP	Peter MacCallum Cancer Centre
Elsa Lapiz	VAHI rep	Westvic PHN, Barwon health
Jennifer Anderson	VAHI rep	VAHI

Ray Beaton	Consumer Rep	SCV

Safer Care Victoria