Detailed Services Plan for the Dunedin Hospital Campus
Part B

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## Glossary

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<td>ACC</td>
<td>Accident Compensation Corporation</td>
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<tr>
<td>ALOS</td>
<td>Average Length of Stay</td>
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<td>AMD</td>
<td>Age-related Macular Degeneration</td>
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<td>AROC</td>
<td>Australasian Rehabilitation Outcomes Centre</td>
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<td>ASPRO</td>
<td>Acute Stroke Potential Reversible Outcome pathway</td>
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<td>COPD</td>
<td>Chronic Obstructive Pulmonary Disease</td>
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<td>CPAC</td>
<td>Clinical Priority Assessment Criteria</td>
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<td>CT</td>
<td>Computerised Tomography scan</td>
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<td>DHB</td>
<td>District Health Board</td>
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<td>DRG</td>
<td>Diagnostic Related Group</td>
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<td>ED</td>
<td>Emergency Department</td>
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<td>ENT</td>
<td>Ear, Nose and Throat</td>
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<td>EPS</td>
<td>Emergency Psychiatric Service</td>
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<td>ERAS</td>
<td>Enhanced Recovery After Surgery</td>
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<td>FCT</td>
<td>Faster Cancer Treatment</td>
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<td>FSA</td>
<td>First Specialist Assessment</td>
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<td>GP</td>
<td>General Practitioner</td>
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<td>GPS</td>
<td>Global Positioning System</td>
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<td>HDU</td>
<td>High Dependency Unit</td>
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<td>HRT</td>
<td>Health Roundtable</td>
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<td>ICU</td>
<td>Intensive Care Unit</td>
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<td>ISIS Centre</td>
<td>1 Site 1 Service specialist rehabilitation centre</td>
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<td>IT</td>
<td>Information Technology</td>
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<td>LMC</td>
<td>Lead Maternity Carer</td>
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<td>Abbreviation</td>
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<tr>
<td>LOS</td>
<td>Length of Stay</td>
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<td>MAPU</td>
<td>Medical Assessment &amp; Planning Unit</td>
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<td>MDT</td>
<td>Multi-Disciplinary Team</td>
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<td>MRI</td>
<td>Magnetic Resonance Imaging</td>
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<td>NMDS</td>
<td>National Minimum Data Set</td>
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<td>NNPAC</td>
<td>National Non-admitted Patient Collection</td>
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<td>NOF</td>
<td>Neck of Femur</td>
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<td>OPH</td>
<td>Older Person’s Health (service)</td>
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<td>OPP</td>
<td>Orthopaedic Patient Pathway</td>
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<td>PET CT</td>
<td>Positron Emission Tomography – Computerised Tomography</td>
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<td>RPTI</td>
<td>Relative Procedure Time Index</td>
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<td>RSI</td>
<td>Relative Stay Index</td>
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<tr>
<td>SMO</td>
<td>Senior Medical Officer</td>
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<td>TA</td>
<td>Territorial Authority</td>
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<td>TPOT</td>
<td>The Productive Operating Theatre</td>
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Executive summary

The purpose of this Detailed Services Plan B is to draw a picture of what the hospital could look like, in terms of service flows and model of organisation. We contrast this with Detailed Services Plan A that set out what the hospital currently is. To form this view, we draw on further meetings with the various hospital departments; submissions from directorates and some senior doctors, and on comparisons with other district health boards or hospitals.

Taken together, there is a considerable opportunity for the DHB in the way it reorganises the hospital and the health system it works within.

A different way of organising
We cannot easily see all of the future but we at least can observe what has happened in hospitals over time. When we do, we see an increasing emphasis on primary care as the medical home for patients, a rapid increase in outpatient activity separate from inpatient activity, and we observe highly efficient hospitals focussing on production planning and integrating with community services. The current Dunedin hospital is “stuck in time” for a number of reasons:

• Partly because of its ongoing deficit and therefore a lack of ability to invest;
• Partly because of a fragmented model of care stuck in an inflexible 1980s building, and
• Partly because of cultural issues in the way the district health system works together.

As a result, there is a once in a generation opportunity to revisit how the hospital operates and is organised in this broader context. Clearly, this much-needed re-organisation sits within the context of a wider, whole of health system change, driven by what is sustainable clinically, financially, and by what is best for patients.

Material efficiencies and improvements for patients are possible
The patient journeys were highly instructive of the scope for efficiencies within the hospital and the health system more widely; and all those participating, including doctors, nurses, other health and community workers and patients worked hard to reveal a wide range of opportunities. Many of these inefficiencies have negative consequences for patients to a greater or lesser degree, from higher rates of avoidable harm to a generally poor experience due to rundown facilities. Many gains can be realised prior to a hospital build, but the hospital construction adds a degree of urgency; procedural and process changes will need to be implemented or identified to inform the detailed design of the hospital in the coming two to three years.

We acknowledge the large number of issues identified by participants in the various fact-finding processes and identify three levels of priority:

• The need to integrate older person’s health with the medical directorate; the introduction of a rapid assessment and discharge function, and strong partnership with primary and community care. Thus, there will be substantial reductions in bed day requirements, but only with offsetting investment in primary care. The role of the sub-specialist will change and there will be collaboration with primary care to manage long-term conditions. Rehabilitation will take place from the time the event happens
and will be based around where the patient lives. There will be a much more integrated and increasingly sophisticated and data-rich discussion about maintaining the functional capacity of the elderly, probably also leading to a reduction in home care costs. We believe volumes into ED can be held for five years at least, that the rate of increase in bed demand for general medicine can be held, and that the requirement for rehabilitation beds can be reduced materially.

- There are serious patient flow issues and the patient journey workshops identified the need to organise flows around the patients and not around the service. In surgery, in particular, there is less room to reduce demand and a much greater need to focus on theatre efficiency. This efficiency needs to be read against a canvas, including modern and up-to-date theatres and an appropriately sized Intensive Care Unit (ICU). With those changes and changes to the way the workforces are currently organised, we believe there is still a significant piece of work to reengineer the flows to surgery with any sort of precision. The surgical directorate needs the resources to be able to undertaken that production planning assignment. We also believe demand for hospital intervention may be leavened with a demand management programme around falls, but the reduction in orthopaedic volumes will be slight. All the same, a small reduction in the most costly service over the forecast period is well worth the effort.

- Finally, there are material service issues in:
  - Women’s and children’s health – e.g. midwife led primary birthing),
  - ENT – needs a good review and a different model of service for skin lesions;
  - Ophthalmology – is experiencing exponential demand for injections into the eyeball for treatment of wet macular degeneration;
  - Mental health – buildings are very run down, and
  - Blood and cancer services – appears to be well organised and thoughtful of the need to deliver follow-on infusions as close to the patient as possible.

However, these service issues will have a minor impact on this hospital design and build, and we set them aside for the present in light of the priority of the first two issues.

**Change capacity and more work on data**

There is no easy way to achieve these changes and one of the major issues for the DHB will be the cost of change and the ability to instruct change, including its ability to realise the benefits our modelling indicates are possible. The DHB needs to set its own level of ambition and we encourage it to be “best of breed” rather than average. We encourage clinicians to look for innovative solutions in a tertiary hospital that, for that kind of hospital, is boutique in size. The DHB itself has concerns about its ability to deliver, including its ability to make the changes needed with primary care.

There are idiosyncrasies in some of the hospital data sets, which need to be addressed. We understand the DHB is considering a project to better standardise the outpatient data set. The surgical directorate has made it clear it will work with its data to provide much greater relevance and accuracy, immediately, so the data can be better understood in the work-up through the business case process. In addition, clearly, there needs to be a rework of ICU data once the interim works are completed and operational, since a 33 percent increase in
ICU capacity is a very material change, although we have now resolved data issues that were confusing the picture of ICU utilisation.

Re-engineering the surgical pathway means analysing time stamped data and commenting on stocks and flows of patients, to identify opportunities to do things differently. This is a time and resource intensive exercise, but one that needs to be done. Now, however, there is an unresolved issue in theatre hours and one senior surgeon indicates his data is approximately 400 hours (or 7.5 percent) higher than the data forwarded to us by the surgical directorate. This seems odd, as the data is presumably “wheels in and wheels out” from the same theatre management system. Clearly, discussions around the nature of the data, where it comes from, and how it is used will be particularly useful in the surgical directorate and we acknowledge the leadership it is taking in resolving these issues.

Finally, this plan is a further step to inform the Indicative Business Case and selection of short list options and is not by any means the final word. The DHB will have time to think further about its service planning, but will need to move at pace since the level of service planning is behind what could be expected at this stage. We are impressed with the readiness of the clinical teams to take on that challenge.

Where we end up:

1. We pose a modest challenge to ED to hold its attendances for a period of years until 2025. Primary care will need to be more active for the ED to achieve this reduction in growth of around 10 percent from the expected baseline over the forecast period, and we believe it likely the DHB will exceed this reduction if primary care is more active.

2. We have generated three scenarios for internal medicine with a mix of changes in average length of stay and decreases in intervention rates. The forecast we prefer is holding bed days flat for ten years versus a predicted increase of 2.7 percent per year. Again, we feel this is a very achievable challenge and, with reduced discharges and a shorter length of stay over ten years, bed days could decrease by 0.7 percent per year (scenario two). An ambitious reduction in discharges could hold bed days constant for a longer period. We make suggestions about other medical specialties with increases in outpatients and modest improvements, but nothing as material as the changes possible in internal medicine.

3. The forecast growth in rehabilitation bed days can be halved.

4. We forecast rapid growth in complex imaging to assist with configuration decisions.

5. There is likely a material reduction in acute average length of stay in the large surgical specialties, being around 10 percent over seven to ten years.

6. There is a smaller length of stay decrease in elective surgery of 2 to 3 percent per annum.

7. We assume elective surgery will grow strongly with an increase of 3 percent per year increased funding of discharges.

8. We find it difficult to estimate the likely increase on theatre efficiency because of the difficulty of data inconsistencies in theatre time data sets. We have no doubt with a modern and appropriate theatre that the efficiency index can fall
9. We have forecast ICU hours and assumed additional increases to reflect the planned expansion of resourced ICU beds from the current highly constrained level, and elements of increased demand arising from an ageing population. However, there will be an element of waiting for the currently planned ICU changes to take effect before further modelling takes place.
1. Introduction

1.1 Purpose, scope and approach

This draft Detailed Services Plan: Part B has been commissioned by the Ministry of Health on behalf of the Southern Partnership Group. The report sits within a suite of planning documents preceding the development of a series of business cases (as per the Treasury Better Business Case process) for the redevelopment of the Dunedin Hospital campus. This draft report builds on, and should be read in conjunction with the following preceding documents:

- Strategic Services Plan
- Strategic Assessment
- Detailed Services Plan: Part A

Those reports, combined with this once completed, will feed into the Indicative Business Case for the redevelopment of Dunedin Hospital.

The purpose of the Detailed Services Plan: Part A was to paint an initial picture of services, future demand, and where there are opportunities for change to models of care. This Part B identifies more specific areas of opportunity for improving the way in which services work, both individually and together, for better patient-centred and efficient care.

This report outlines the opportunities for improving service delivery and patient flow. It modifies service projections presented in Part A based largely on planning assumptions formed through a series of patient journey workshops (see below), clinical directorate and wider stakeholder feedback, and service trends in general across developed health systems.

Many of the planning assumptions point to the need to invest in other parts of the Otago/Southland health system. In summary, we set out:

- Major assumptions in reducing medical flows through the hospital primarily by strengthening primary and community care and through close integration with services for the elderly;
- A material increase in surgical efficiency through changes in processes and facilities, and
- Incremental improvements in women and children’s services.

The approach used to develop this report included:

- A series of seven patient journey workshops with significant stakeholder input from a wide range of stakeholders;
- Baseline forecasting, followed by modifications that model “what if” scenarios;
- Meetings with each of the Dunedin Hospital directorates;
- Further stakeholder meetings;
- Discussion with the Clinical Leadership Group and other clinical forums;
- A large stakeholder workshop;
- Discussion with Ministry of Health staff, and
• Written feedback from stakeholders on the draft report.

1.2 Guide to this report

This report is presented in a number of major sections:

• Designing the hospital that could be – this section recaps the demand side pressures facing the DHB through demographic changes alone. It then draws on material developed through a series of seven patient journey workshops outlining the transformational changes to service design and configuration, along with a series of quick wins.

• What would happen if the DHB does not change – we document the substantive issues identified by stakeholders that need focussed attention to areas that need to improve.

• Medicine and older person’s health – we consider medicine and its relationship to older people’s health and primary care the most critical issue for the future of the hospital. We set out a series of major planning assumptions upon which changes to the demand curve rely. The methodology for producing a modified service forecast is outlined, followed by rationale that is more detailed and modelling assumptions, and an illustration of their impact on the baseline forecast.

• As above, we step though the major planning assumptions and modelling detail for surgical flows and a residual cluster of other services.

Supplementary information on the methodology for baseline forecasting and patient journey mapping is contained in appendices.
2. Designing “the hospital that could be”

There is little point in redesigning Dunedin Hospital in the way it is currently configured. Rather, the opportunity for the DHB and its clinicians is to design the hospital best able to meet the needs of the future population, dominated by the frail elderly, who will be in need of the facility and its services for the term of its life.

This section of the report provides an overview of the key challenges that participants identified the DHB needs to incorporate into its planning of a new hospital build and, in general, future service configuration and delivery. Before setting these challenges out, it is worthwhile recapping on the demand side growth rates forecast for the district as presented in the Detailed Services Plan: Part A.

2.1 Forecast growth

The forecasts underlying this plan are based upon expected demographic change as estimated in Statistics New Zealand medium series population projections. Thus, they are likely to capture the main effects of population ageing, which is likely the main determinant of service demand in the forecast period.

The following graphs illustrate the pressures that future growth will have on the Dunedin Hospital Campus, staff, and the wider health system.

Figure 1 Projected increase in inpatient events due to demographic change
Figure 1 shows the increase in **discharges**. The growth in older person’s health and general medicine is caused by the changing nature of the population pyramid. These effects are felt in different ways in different services. In general medicine, the growth is in **bed days**.

**Figure 2** Projected increase in bed days due to demographic change

In terms of **case-weights**, the most expensive activity is orthopaedic surgery.

**Figure 3** Projected increase in case-weights due to demographic change
Other services grow in outpatient activity.

**Figure 4** Projected growth in outpatient events due to demographic change

These rates of growth and the reality of flat or minimal growth in health sector funding present both a challenge and an opportunity for the DHB. This opportunity needs to be taken as the DHB steps into the design of a hospital having a life span of around 40 years.

It is worth noting these forecasts are not the final word. They do not allow for changes in demand for care, which arise from technological change or from changing epidemiology. Some of these effects are reasonably well known, whereas others are not and are entirely speculative. However, increases in obesity across the population present an overarching challenge for future service demand. The impact of obesity is likely to be felt as both increased incidence of the diseases with which it is associated, as well as increased risk and complexity when obese patients present, increasing time needed for surgery and extending the time needed in critical care. It is beyond the scope of this high-level demand estimate to model the specific impacts of obesity or other changes in disease, but these issues should be considered as more detailed service modelling takes place with more reliable data. For example, it could be appropriate to conduct a set of micro-simulations allowing sensitivity analysis around a range of assumptions on obesity and disease impact across different services.

### 2.2 Participant views from patient journey workshops

In July and August of this year, patient journey workshops were held with DHB and wider stakeholders, including consumers and their support people to map patient journeys across a range of services from entry into the hospital through to discharge back into the community. Seven patient journeys were worked through and a significant amount of material (on the
current state, the future state, and initiatives to close this gap) emerged for the DHB to take forward.

Participant views on the future state can be organised into strategic issues for further consideration by the DHB and relative ‘quick wins’ for the DHB to progress. Some of the strategic issues challenge current roles and responsibilities and present alternative views on how to organise patient flows.

All participants at the workshops understood that resolving these issues is partly about the need for a new facility, but largely about the need to better focus on collectively managing patient flows and outcomes.

2.2.1 Transformational improvements identified

This following section presents those improvements workshop participants identified as transformation changes that were needed.

Fit hospital processes around the patient journey rather than the patient journey around the hospital

Generally, it was agreed that patients largely fit around hospital processes and that this should be the other way around.

In the future, more patients are likely to have co-morbidities and will be better managed with support wrapped around them in the hospital as well as in the community. Under the status quo model of care, there will be greater pressure on general medicine in particular, as elderly frail patients increasingly present with co-morbidities and complex care requirements.

Participants promoted a model of care centred on the patient's journey through the system. Under this model, a care team would follow the patient through their whole journey from the acute stage to the rehabilitation stage. A wraparound service would reduce wastage in transfers and improve continuity of care.

Participants identified the need for a seven-day a week hospital, with allied health support and discharges on the weekend to improve patient flow through the system.

The role of general medicine needs to evolve

There is a growing frail elderly population presenting to the hospital, with increasing co-morbidities and complex care requirements. The way in which the DHB organises how it delivers medical services in the future, across the health system, will therefore need to reflect this changing pattern of demand.

Some participants suggested that Dunedin Hospital take a more generalist approach, with appropriate specialist input. We note that not all participants agreed with this view. However, as we have emphasised in previous reports, the balance between general medicine and sub-specialty roles in terms of admitting and managing patients is a key issue for future model of care planning and design.

As with overseas hospital models, some participants suggested that Dunedin Hospital move to operating generalist wards, where clinically appropriate, and configured according to complexity rather than disease, with clinical teams moving to the patient.
In one patient journey, participants questioned whether many patients should be managed in a hospital at all, and whether many of the sub-specialties need to be seen as a role supporting primary care and delivering in primary care. Presumably, these comments were targeted at the less complex, non-acute spectrum of care needed.

**Workforce needs will change**

A renewed focus on workforce planning, including recruitment, retention, and training, will be required to support future demand, which is likely to be based around different patient needs.

A recurring theme through the patient journey workshops was the limited provision of allied health staff, particularly during out-of-hours, which often means patient flows through the system are delayed. Participants also highlighted the lack of specially trained nurses in some areas, for example theatre nurses and rural community nurses.

Allied health services will require significant focus and further investment if they are to perform their critical role in keeping people out of hospital (avoid admission, reduce length of stay and avoid readmission), and well in the community.

**Good design will reduce inefficiency and improve staff and patient experience**

Participants suggested that the following factors should be taken into account in any future redesign of the ED:

- Co-location of radiology
- Co-location of other services, for example Emergency Psychiatric Services (EPS)
- More private spaces and noise reduction
- Separate area for children waiting in ED
- Redesigned front entry for ED to make it clear to patients where they need to go
- Places for families waiting for news and updates

Other design suggestions for other parts of the hospital include:

- Green spaces for rehabilitation and general wellbeing
- Soundproofing and privacy for ICU and wards, where possible
- More isolation rooms

**Telemedicine potential recognised**

Where clinically appropriate, telemedicine was raised often by participants as a way of using health resources more efficiently, and creating a more patient-focused service. As we identified in the Strategic Services Plan, services can be more responsive to patient and community need by being less hospital-centric. However, we note that telemedicine may come with some additional cost (equipment, training) and the DHB will need to balance system gains with that additional cost.

For instance, the use of telemedicine has the potential to reduce monetary and time costs that patients and their families face when travelling to Dunedin for ongoing care.
In addition, relatively expensive senior medical staff time could be saved by reducing the need for travel to for outpatient clinics. As long as suitable clinicians (e.g. nurse, GP) are available on the other end with the patient, telemedicine can help free up senior medical staff time.

The current infrastructure to ensure connectivity in the region is not always reliable and requires investment for telemedicine to work. A cultural shift, for some clinicians and patients, will need to happen before the benefits of telemedicine are fully realised. The socialisation of telemedicine as a viable alternative to face-to-face appointments where clinically appropriate will be a key enabler.

These are ‘quick wins’ that participants identified Southern DHB could investigate:

- Official reading of x-rays. Participants indicated there is a two-week delay in official results of x-rays sent from ED. This does not happen in other hospitals and the reasons behind the situation need to be investigated and remedied.
- While participants look forward to the upcoming Health Connect South, they note that not all GPs will be able to sign up to the platform, mainly due to incompatible patient administration systems. Southern DHB may need to investigate ways to enable and ensure all GP practices sign up.
- GPs are often the primary care provider for patients once they are discharged from hospital and are there to ensure continuity of care for the patient. Participants identified that involving GPs in Multi-Disciplinary Teams would help improve the ongoing care of patients.
- Effective implementation of HealthPathways – creating closer relationships with primary care, allied health to avoid the current disconnect and lack of knowledge.
- Establishing consistent and standardised hospital admission criteria – we understand these were developed by each medical department without a consensus process between groups. Admission criteria are critical in a tertiary hospital where the relationship between general medicine and a large number of sub-specialty services is critical to patient management.
- There are a number of internal processes that Southern DHB could clarify and improve – from ACC form filling through to discharge planning.
- Patient flow management in theatres, including organising acute and elective flows. Participants highlighted numerous times that procedures are often delayed or cancelled.
- While participants identified that established pathways and protocols exist, they suggested that they are not always followed. This may lead to inconsistency of care between patients.
- Encourage the use of telemedicine, where appropriate, and where infrastructure allows.

2.2.2 The importance of IT

Increasingly, health systems are data focused and process driven. The backbone of this activity is the electronic patient record and the hospital’s Patient Management System. The
South Island has a co-ordinated approach to both and it is inconceivable the hospital would be rebuilt without a contemporaneous spend on IT, to allow the process gains and efficiencies to be released. Clearly, issues of process flow management and the requisite IT support feature in every patient journey. There is little point in spending on a modern facility without modern IT.

2.3 What is working well?

In addition to the suggestions documented above, workshop participants also gave positive comments on aspects of service delivery and patient flow. There were services and processes highlighted, often more than once, as examples of what works well and need to be retained and built on. As evidenced below, there are areas in the hospital and beyond that have developed or refined processes or roles with a focus on quality improvement. The challenge will be to extend these examples of innovation and quality across all processes in the patient journey.

2.3.1 External services perform well

- **Both ambulance and police services have close and well-established relationships** with health services. Participants were very positive about these services, their processes, and how they work closely with the hospital.
- Participants often highlighted the positive provision of paramedic services, including the availability of a helicopter. It was noted that ambulance services are regarded as having good protocols and options for treatment. For instance, participants discussed the fact that ambulance officers gather as much information about patients as possible, including medications, and are good at contacting the hospital en-route with relevant information such as timing and injury details, to enable the hospital to ready its response.
- Participants described the service that police provide as excellent. They were regarded as experienced at managing people with mental health issues and as having a good relationship with health staff. For instance, it was noted that police are excellent at ensuring areas are safe before other emergency services enter and have well-established systems in place to communicate any alerts on persons to the police responding to the incident (e.g. histories of mental health).

2.3.2 Dedication of staff and some critical pathways

- Throughout the workshops, participants praised health professionals for their dedication and commitment to patient care. In particular, clinical nurse specialists (e.g. cardiac nurses) were regarded as particularly valuable and integral to high quality patient-centred care. Their communication with patients was noted across a number of workshops as very positive.
- For the certain percentage of stroke patients suitable for the Acute Stroke Potential Reversible Outcome (ASPRO) pathway, participants commented that this process works very well, with excellent CT availability and interpretation.
- The patient flow co-ordinator was identified as an important part of the patient journey, helping to manage delays to theatre and improve the patient experience.
Within the cardiology and colorectal services, participants commented that the treatment plans provided to GPs from cardiologists were regarded as positive and a good way to help ensure the patient receives the best possible care in the community.

Regarding the interface between primary and secondary services, participants welcomed Health Connect South as a way to improve clinician access to GP notes after hours. The access to online referrals for most GPs was also highlighted as a positive way to improve the interface.

Other processes and roles that were identified include (this is not exhaustive):
- Good access to hospital security for when staff need assistance with managing patients.
- A single triage point for gastroenterology services for the whole of district helps to ensure that all referrals are processed and managed consistently.
- Handover process from theatre to ICU works well.
- Good activation of the trauma team and associated protocol.

### 2.3.3 Facilities and services

The rehabilitation facilities and services at ISIS were generally regarded as excellent. One patient’s experience of ISIS stated that the environment, with grass and outdoor spaces, was crucial to recovery. The multidisciplinary approach in ISIS was highlighted as very helpful for patient families to prepare them for what was waiting for them outside of rehab.

Other highlighted services include:
- The dedicated stroke unit and the specialist respiratory ward, with specially trained nurses provides specialised care to patients.
- Some availability for colonoscopies outside of Dunedin Hospital meaning rural patients do not always have to travel as far.
3. What would happen if the DHB does not change…

While participants at the patient journey workshops identified some of what is working well, the weight of commentary fell on the side of issues that need to be addressed. Many of these issues were also identified and documented in previous reports we have prepared and, it is fair to say, have reached saturation.

In short, our interpretation of the workshop outcomes is that the hospital is organised in a fragmented and inefficient way, and that change is particularly difficult given the characteristics of the building. Taken further in the context of the Strategic Assessment, the building is crumbling and the spaces available are sub-optimal to the point that they create clinical and patient risk, as well as providing a poor patient experience.

3.1 Key issues identified

As mentioned, despite the considerable effort going into the delivery of health services, the issues identified by patient journey workshop participants heavily outweigh the positive aspects of what currently happens. A hospital rebuild creates a strategic opportunity to redesign flows and address process issues in a manner quite unlike any other; there is an imperative to get it as right as possible for this and the next generation of patients and clinicians.

In a full lean process, we would identify the time spent on duplication of effort, on wasted process steps and on untimely actions leading to additional patient time in hospital. In addition, that lean process would look across primary care at the whole of the patient journey. However, in this DHB, with the available data, the available resource, and in the available time, we can point at directions rather than being able to measure the level of inefficiency. That level of inefficiency, whether caused by poor process, poor facilities or out of date methods of organising staff, and often all three, is very material. This level of inefficiency, in the eyes of the participants, clearly provided an opportunity to change.

In this next section, we detail the issues clustered as themes that were identified across the patient journey workshops. Many of these issues have reached a level of saturation, having been raised and documented in both the Strategic Services Plan and the Detailed Services Plan: Part A.

3.1.1 Processes do not assist patient flows

In the majority of cases, processes were based around the services rather than the patient flow:

- Participants frequently expressed concern that the hospital operates as a series of siloed services, with inconsistent processes and pathways resulting in repetition and inefficient co-ordination of services and resources. For example, admission criteria and processes vary based on the service that the patient is being admitted to. In the multiple trauma patient journey workshops, participants commented that the specialty that takes the first
call tends to get the patient admitted to that service regardless of their main injury (we note that this comment requires verification and may not be representative).

Further, and again in the multiple trauma scenario, the patient required a CT scan to rule out neurological injury and despite this being clear, it was still recorded as potentially being admitted to neurology, even though the patient had a broken leg and required orthopaedic care.

- Participants often raised their frustration at needing to discharge and readmit patients when transferring between services. This creates duplication of paperwork and means the patient may need to repeat information – much to their frustration. It is hard for services to access patient records from previous episodes of care at any time because they are often closed and filed. Participants suggested that this process was in place due to funding and administrative arrangements.

- In many services, a lot of effort has been invested into developing pathways. Unfortunately, it was commented in some of the workshops (e.g. COPD and fractured neck of femur) that these pathways are not always understood or followed, which may lead to inconsistent journeys for patients.

There was further comment about the low level of uptake of HealthPathways and concerns about the approach to developing and implementing these across primary and secondary care.

Some relatively high profile initiatives, such as the Faster Cancer Treatment (FCT) pathway, were unknown among some general practices, and referrals into services (e.g. the gastroenterology unit for colonoscopy) are often handwritten with insufficient information rather than through the e-referral function.

Medicine reconciliation was often raised as a service that does not happen very often and is only available for a subset of the population (those aged over 75 years). This is likely due to (among other things) insufficient hospital pharmacist capacity.

Participants in one of the workshops raised the issue of needing to rely on “wet reads” for x-rays in ED, stating that they may need to wait up to two weeks for an official reading to be completed. We note this would seem unusual and would need to be verified and qualified in the more general sense. Notwithstanding that caveat, this issue came through clearly in the workshop feedback.

### 3.1.2 Workforce capacity and capability constraints

The patient journeys flagged a number of issues around hours of operation, availability of staff at the right time and in the right place, shortages of staff, and a possible need for deepening training. Following is more detail:

- Inadequate capacity of some key staff, both in the hospital and in the community, as well as after hours and weekends, was persistently raised as an issue in all workshops. The flow on effect of this shortfall to patient flow, experience, and outcomes was raised as a significant concern to participants. This issue also has a negative impact on staff and patient satisfaction and experience. The impacts were explored in specific terms through these workshops and examples are provided throughout this report. The professions most discussed in the workshops were allied health, nursing, and orderly.
- **Allied health:** All workshops identified that allied health capacity is limited in both the hospital and community. This is felt more strongly in rural areas, and indeed the further away one lives from Dunedin city. The capacity is particularly constrained in the evenings and weekends. By way of examples, it was noted that a patient who received a surgical repair of a fractured neck of femur on a Saturday might not be mobilised until Monday. Patients under 75 years are unlikely to have their medicines reconciled, and patients needing rehabilitation may be prioritised down the queue when acute cases present.

The patient journeys identified delays in receiving a broad range of specialist allied health services and that these delays can negatively affect patient experience and outcomes, including impacting a patient’s length of stay in hospital. Further, a shortage of staff in the community can also lead to increased length of stay, as patients may not be discharged until the appropriate supports are available for them. Patients funded by ACC may have better access to some allied health services than patients may on a Ministry of Health-funded pathway. Participants felt strongly that improved access and co-ordination of allied health services, both in the hospital and the community, would improve patient rehabilitation, enable earlier discharge into the community thereby decreasing the average length of stay, and free up beds and resource. With an ageing population, it would seem further investment/focus on allied health workforce is extremely important for coping with future demand.

- **Nurses:** A less prominent, but still strong feeling among many participants is the lack of nursing resource; primarily specialty trained nurses. For example, it was felt that a lack of theatre nurses is one of the main constraints on theatre capacity over the weekends. Resource nurses may not be trained on processes and procedures in some areas (e.g. a resource nurse filling in on the stroke ward). There was some discussion and debate among participants regarding whether nurses more generally should be trained across one or more specialities (e.g. respiratory) to support a move to supporting increasingly fragile patients. Some participants commented that delays occur in admitting patients onto wards because ward nurses are often too busy to receive a handover from ED for instance. The general lack of community nurses in rural areas was also identified as an issue.

- **Orderlies:** Lack of orderly support means delays in transporting patients throughout the hospital. This can introduce delays in the patient journey pathway. It was noted that other personnel (e.g. nurses) might need to transport the patient if orderlies are not available. The specific issues seemed to be about transfer from ED, particularly for radiology, and orderly coverage when orderlies are required on the helipad for retrieval.

### 3.1.3 Co-ordination issues and bed and theatre capacity

There is a mix of co-ordination issues, and issues of bed, ICU, and theatre capacity.

Many participants expressed concern at the apparent pressure on hospital beds and the impact this has on the patient pathway. Lack of access to appropriate community and primary care, increasing age and complexity of illness, delays in accessing diagnostics and allied health when admitted, were all discussed as contributing to the increasing pressure on hospital beds. Examples were given of patients waiting longer than they should for a bed on
a ward, and of patients that were shifted from a bed earlier than they perhaps should have been in order to make room for another patient. Some patients end up in other specialty wards. Of particular note in the workshops was the pressure on ICU beds (although it was noted this issue is being addressed with the redevelopment of the ICU).

Participants also noted that discharges often take place on Mondays and so the wards tend to fill up over the weekends. Any patient that relies on services in the community is typically not discharged until those services are organised. Community services are generally not available over the weekend.

SMOs also reported it is not uncommon to do “safari rounds”, meaning that they must travel around the ward block when their patients are in different wards.

### 3.1.4 Theatres and the surgical flow

Participants raised theatre postponement and delays as a significant issue. A number of reasons were given such as constraints on ICU, bed and nursing capacity, introduction of new surgical services such as plastics, the increasing complexity of cases presenting, and inadequate facilities for outpatient procedures (e.g. cataracts). While workforce capacity was identified as the main constraint on the weekend (e.g. a lack of theatre nurses), the main constraint during the week was identified as theatre space.

When acute cases present, arranged and elective cases are often postponed. For instance, as mentioned above, participants noted that a patient admitted for a fractured neck of femur repair might have their surgery delayed because of acute cases presenting. This delay can negatively affect both patient experience (e.g. patients may be repeatedly nil by mouth while waiting for theatre) and outcomes.

### 3.1.5 Poor facility design inhibits patient flow and reduces staff and patient satisfaction

Participants in the patient journey workshops identified shortcomings in the current ED design:

- A lack of privacy for both those waiting and those being assessed.
- The temperature was often described as too cold.
- There are no separate waiting and assessment areas for children.
- A lack of space.
- The design of the front-end can be confusing and patients may not know where to go.

The ED is often busy and noisy, and taken together with the design issues identified above can create a more stressful environment for patients and their families.

Every workshop identified a range of issues relating to the physical distance between the ED and radiology facilities. For instance, the patient may need to be stabilised first before being transported to radiology. The distance creates delays in diagnosing patients and the long journey can put patients at further risk. Additional staff time is also required to transport the person to and from radiology. Further, one workshop identified there was inadequate space with the CT scanner service, meaning patients cannot be scanned in their
entirety at once and need to be manoeuvred in and out of the facility to complete the process.

Physical dislocation of ED and EPS makes patient management difficult. Patients need to be escorted outside and into EPS. This means that additional staff time is required to transport the person to EPS. This building is located some distance from the ED and is somewhat isolated outside of working hours. It was generally felt that Southern DHB needs to be clear about how to integrate mental health with ED.

Participants in the workshops stated that rehabilitation facilities varied between wards and locations, which can lead to variation in the quality of service a patient may receive. The lack of green outdoor spaces at Dunedin Hospital was often identified as an issue for rehabilitating patients and their families. Conversely, the ability to take patients outside into the gardens at Wakari was appreciated by patient family and supporters. Participants expressed a desire for a hospital that was designed with rehab in mind. However, other participants challenged whether rehabilitation should be happening in the hospital. Though not specifically stated, we assume that the degree to which rehabilitation should occur in a hospital setting versus a community setting would depend on the nature of rehabilitation required (e.g. acute versus longer-term rehabilitation).

### 3.1.6 Communication needs to improve

#### Between primary and secondary...

Workshop participants gave many examples of poor communication between hospital staff and general practice. These ranged from not being able to access patient notes, discharge summaries not being sent to GPs (or arriving significantly post discharge), and discharge summaries and referrals into hospital lacking important information. Participants identified that GPs are typically not involved in Multi-Disciplinary Team (MDT) meetings, even though the GP will be the main point of care for the patient after discharge. Again, it was noted that the inconsistent implementation of HealthPathways reflects the general disconnect between primary and secondary care.

#### Within the hospital...

Participants gave examples of poor communication between services within the hospital. For example, in a situation where the CT is stood down for an urgent patient, sometimes radiology would not be contacted when the ED identified that the CT was no longer needed. This leads to delays in patient flow through the system.

Communication between staff and patients and their families was identified as an area that, overall, was done well. However, there were some issues identified:

- Some clinicians need to tailor their discussions with family members. For example, if the patient journey is a particularly long one, families will become well educated, so the clinician does not need to start from scratch each time.
- Decisions to be made by the family and the consequences of such decisions need to be clearly explained with enough time for the family to absorb and consider the information.
• Inconsistency about what patients are told, and when, are often influenced by staff workload. Participants often raised the issue of having limited private spaces to support communication with families, for example, in the ICU.

3.1.7 Information technology

As already mentioned, participants identified that it is difficult to obtain patient records from GPs after hours. They also identified that current systems within the hospital are sometimes unable to ‘talk’ to each other, for example, ED not being able to electronically access EPS records.

The transfer of records from one part of the hospital to another was also identified as an issue. For example, some participants had some difficulty accessing previously filed records from another service when a patient was transferred.

Participants frequently cited the upcoming rollout of Health Connect South as a way to improve the availability of patient records between primary and secondary care. However, not all GPs will be participating in the initiative due to incompatible patient administration systems at their practices.
4. Medicine assumes integration with OPH and strong primary care

The first and primary collection of issues identified in the Detailed Services Plan: Part A related to the manner in which medical services worked with primary care and within the hospital more generally. Further discussions with the Older Persons Health (OPH) Directorate and the Medical Directorate highlight a major opportunity to change the manner in which these services work, with a renewed focus on preserving functional performance of the elderly in particular.

4.1 Medical planning assumptions

An initial set of service planning assumptions have been generated through patient journey workshops and directorate meetings. The planning assumptions are critical in expressing the nature of the health system that the DHB will operate. The DHB operates in a complex system and needs to work across community, primary, and secondary care with a concerted effort to locate the right services in the right place and at the right time for patients. The configuration of services in and around the hospital is critical to meeting this need and, in fact, is more critical than any percentage change in service volumes.

The primary assumptions identified to us that apply to medicine are as follows:

• The DHB will work together to provide strong, resilient, and proactive models of primary care. In particular, there will be sufficient GPs operating in a sustainable model, with appropriate facilities, supported by other elements of the primary and community health team.
  – General practices organised in this way will provide extended hours of care and will have sufficient casual acute consultations available. Some will offer short stay observation facilities.
  – Clinical pathways will be fully implemented and primary care will have funding available to make full use of those pathways with funding packages for primary care options.

• Long-term conditions will be managed in partnership with hospital consultants and pathways from primary care through to secondary and tertiary care. The DHB will actively manage these pathways, including those for COPD, heart failure, stroke, diabetes, etc.

• The hospital will be organised very differently. There will be some form of acute assessment as an alternative to the current Emergency Department pathway and there will be some sort of rapid assessment and discharge functionality, which might be a MAPU, although other mechanisms to achieve this should also be considered.

• Allied health and geriatricians would be integrated at the point of entry to assist with managing the increasing numbers of frail elderly patients. Allied health would
begin discharge planning at the point of admission and occupational therapy, physio, social work, and geriatricians would work closely to avoid admissions.

- This multidisciplinary group would be **proactive and screen elderly patients**, then start to see the younger people. That group would work with the consultants to identify patient goals and to get people in the right beds at the right time.

- ED and any admissions unit would have close links with community services.

• Wards are likely to be **general wards (to the extent that this is clinically appropriate), with specialist teams across wards**, appropriately trained nurses, and appropriate specialist nursing.

• **Rehabilitation would take place in the community as much as possible.** The frail elderly would be managed actively in both primary care (thus reducing intervention rates) and with integration of general medicine and geriatrics (thus reducing length of stay).

• There would be a **partnership model with home based support for support of the frail elderly in the community**, integrating across agencies, including upskilling home care workers to provide a greater level of care, and can develop models to support with transports, home tube feeding, etc.

Supporting this way of organising services, there would be clarity of management of each patient. There would also be active and continuous process improvement to remove duplication, ensure administration is completed efficiently, and that patient movements in the hospital are minimised.

There are a considerable number of older person’s health initiatives either currently underway or being proposed. Many reference other DHB initiatives.

### 4.2 Older Person’s Health impresses as being willing to move forward with substantial change

The service seeks to be reintegrated on the main hospital campus. The assumptions in management of older persons we have recorded are as follows:

• The residential care population will be actively managed. There is a view that the residential care population could be managed quite differently with more rapid assessment, which the OPH directorate believes could be 10 percent of those admitted. The alternative would be more effective assessment in residential care. The service could offer a 21-day package of more intensive care, which reverses if there is not an assessment.

• Additional older persons’ pathway work will be fully completed. For instance, the cognitive assessment protocol will be fully implemented. This will positively affect both medicine and surgery.

• The intended poly-pharmacy database will be implemented and will be used to instruct additional assessments of high-risk individuals. There will be sufficient clinical pharmacy capacity to undertake this work.
• Clinical pathways for the elderly will be developed and systemised across primary and community care.

• Critical protocols will be implemented fully. OPH has a cognitive assessment protocol, which is partially implemented and will be implemented across all of medicine and surgery. Delirium will likely need to be managed much more “sharply”. Possibly, OPH could establish models for managing delirium in the community.

• Tele-health will support medical and older person health assessments and follow ups, but will likely substitute for ambulatory attendances rather than offset hospital admissions.

4.3 Modified service demand

We have modelled the possible impact of planning assumptions on hospital service demand in the future. The model takes, as its starting point, the baseline forecast that reflects change in population size and age structure. Note that the baseline forecast is for activity at Dunedin only. From this base, for each service cluster, we may apply a number of ‘modifiers’ that assume a percentage change in volume that may be achieved over a period from the 2018 financial year.

Modifiers may assume a move to the rate of a better performing hospital or DHB based on standardised intervention rates. In some cases, we have indicated a range within which future demand might be expected to fall.

There may be cases where either consistent, reliable data is not available across DHBs or hospitals, or where Dunedin already compares favourably with peers; yet a reduction in hospital volume is expected as a result of anticipated service change. The approach in this instance is to adopt an aspirational target based on what has been achieved in other areas or advice from the service on what level of change might be possible.

In the sections below, we outline the rationale for each modification to the forecast and set out the scenario we have applied to the base forecast. We then demonstrate the impact of the modifications and describe the difference from the baseline.

4.3.1 Emergency department – we pose a modest challenge

Rationale
The Strategic Services Plan for Southern DHB noted that the emergency department (ED) is often overused during the day and early evening. More often than not, for low acuity patients, the ED is the wrong place to manage patients and disrupts continuity of care.

1 Dunedin facilities are defined by Facility Codes 4211 – Dunedin Hospital and 4212 – Wakari Hospital.
We have modelled the impact of a reduction in the ED intervention rate to a similar rate to Capital & Coast and Canterbury DHBs. The age-adjusted 2014/15 rates for those DHBs were 11 percent and 13 percent lower respectively, compared to the rate for the Otago constituency\(^2\) (a proxy for the Dunedin ED catchment population). Both DHBs have acute demand management programmes operating; Canterbury’s is longer established and more comprehensive with a large volume going through the primary options for acute care programme or being seen at the 24-hour urgent medical and accident centre.

Further work within the scope of an acute demand service level alliance, if not already available, should include further analysis of ED presentations from internal data sources. This could consider referral source, patient characteristics (including registered practice), time of day, presenting complaints and diagnoses, etc.

<table>
<thead>
<tr>
<th>Scenario</th>
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<tr>
<td>• Ten percent reduction in the forecast ED attendance rate over five years</td>
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<th>Impact</th>
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<tr>
<td><strong>Figure 5 ED attendances - base vs alternate forecast</strong></td>
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</table>

Moving to a 10 percent lower ED attendance rate than projected over five years means volumes would decrease slightly in absolute terms (0.2 percent per year on average) over the period 2018 to 2023. Remaining at the status quo and taking into account an increased pressure from transient populations in Central Otago, the number of attendances at ED could be expected to increase at 1.5 percent per year over the same period. After a period of holding volumes relatively static, they would again start to increase with population change.\(^3\)

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\(^2\) Otago constituency is approximate to the old Otago DHB boundary. It includes the territorial authorities of Waitaki District, Dunedin City, Clutha District, Central Otago District, and some areas of Queenstown-Lakes District.

\(^3\) This forecast assumes that volumes of patients from outside the DHB, both New Zealand and international residents, increase at a rate proportionate to MBIE’s forecast for tourist numbers in Queenstown and Central Otago.
The table below sets out the number of bed days in the 2015 (base data), 2018, and 2033 financial years, for both the baseline forecast and the modelled scenarios. We have applied modifications from the 2018 financial year onwards.

**Table 1 Modelled number of ED attendances 2015-2033**

<table>
<thead>
<tr>
<th>Scenario</th>
<th>2015</th>
<th>2018</th>
<th>2033</th>
</tr>
</thead>
<tbody>
<tr>
<td>Base forecast</td>
<td>41,911</td>
<td>43,515</td>
<td>58,236</td>
</tr>
<tr>
<td>Scenario one</td>
<td>41,911</td>
<td>43,515</td>
<td>53,935</td>
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**Emergency department attendance rate**

**Figure 6 ED attendance rates by patient domicile 2014/15**

![ED attendance rates by patient domicile 2014/15](image)

*Source: National Non-Admitted Patient Collection*

### 4.3.2 General medicine has significant efficiency opportunities

Investment in primary care is greater in other DHBs than what we have observed in Southern DHB – with SMOs working in partnership with general practice to manage disease outside of the hospital through the use of predictive risk models to identify vulnerable patients needing tailored packages of care, care pathways (e.g. HealthPathways), and enhanced discharge packages to reduce the rate of patient readmission. In other areas, primary care has also been assisted to reorganise into larger operating units to offer enhanced services such as extended hours, medical infusions, and short-stay observation beds.
Rationale

Benchmarking of internal medicine intervention rates against other DHBs is difficult due to the mix of urban and rural hospitals, differing specialty structures, and treatment of data. Standardised intervention rates (with the above caveats) suggest that Dunedin compares favourably against most other DHBs; however, rates are higher than those observed in Canterbury.

The question we are seeking to address at this stage of planning is what level of change might be possible, given not only comparison against benchmarks, but considering the scope for improvement suggested by what we know about the primary and community care system and the level of ambition expressed by Southern DHB and its partners.

Diagnostic related groups where Dunedin has a high relative stay compared to its peers include respiratory infection/inflammation, chronic obstructive airways disease, and heart failure and shock. Dunedin also has a high emergency readmission rate compared to other hospitals.

Below, we set out and demonstrate the impact of three scenarios that describe a combination of intervention rate and length of stay assumptions.

<table>
<thead>
<tr>
<th>Scenario one</th>
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<tr>
<td>• Hold bed days flat for ten years then increase with demographics</td>
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<table>
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<tr>
<th>Scenario two</th>
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<tr>
<td>• 15 percent decrease in intervention rate over seven to ten years, and</td>
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<td>• 16 percent decrease in length of stay over seven to ten years</td>
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<table>
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<tr>
<th>Scenario three</th>
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<tr>
<td>• 30 percent decrease in intervention rate over 15 years</td>
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Impact

Scenario one

Figure 7 Internal medicine bed days - base forecast vs scenario one

Holding bed days flat over ten years compares to a projected increase of 2.7 percent per year if the status quo continued. After a period of static volumes, bed days would then begin to increase again with demographic change, but on a lower overall demand curve.

Scenario two

Figure 8 Internal Medicine discharges - base vs scenario two

Figure 9 Internal Medicine bed days - base vs scenario two

Achieving a 15 percent lower intervention rate at over a seven to ten year period would constrain the growth in absolute discharges to just below 1 percent per year. At the status quo, discharges would increase at approximately 2.5 percent per year.

Figure 9 shows the bed day impact of the reduced discharges – holding bed days to very low growth, and a reduction in length of stay – decreasing bed days by 0.7 percent per year over ten years.
Scenario three describes an ambitious reduction in intervention rate, but assumes it over 15 years. We have assumed that reducing the intervention rate to this level would increase the complexity mix of the inpatient service, meaning length of stay reductions may not be possible. Achieving an intervention rate that is 30 percent lower than forecast would hold discharges and bed days almost flat (0.4 percent increase per year) over the 15-year period.

The table below sets out the number of bed days in the 2015 (base data), 2018, and 2033 financial years, for both the baseline forecast and the modelled scenarios. We have applied modifications from the 2018 financial year onwards. The three alternative scenarios end up within 1,700 bed days of each other by 2033.

### Table 2 Modelled Internal Medicine bed days 2015-2033

<table>
<thead>
<tr>
<th>Scenario</th>
<th>2015</th>
<th>2018</th>
<th>2033</th>
</tr>
</thead>
<tbody>
<tr>
<td>Base forecast</td>
<td>16,009</td>
<td>17,009</td>
<td>25,918</td>
</tr>
<tr>
<td>Scenario one</td>
<td>16,009</td>
<td>17,009</td>
<td>19,832</td>
</tr>
<tr>
<td>Scenario two</td>
<td>16,009</td>
<td>17,009</td>
<td>18,505</td>
</tr>
<tr>
<td>Scenario three</td>
<td>16,009</td>
<td>17,009</td>
<td>18,142</td>
</tr>
</tbody>
</table>
Standardised discharge ratios

Figure 12 Internal Medicine standardised discharge ratios - Canterbury DHB benchmark 2014/15

Source: National Minimum Data Set, Ministry of Health

1. Includes events under the M00 Health Specialty Code

Figure 13 below provides an interesting view of non-same day cases across all of medicine. Most short stay admitted ED events (3+ hours) would be excluded.

Figure 13 Standardised discharge ratios, all medicine with LOS>0 - Canterbury DHB benchmark 2014/15

Source: National Minimum Data Set, Ministry of Health
Figure 14 Canterbury DHB acute medical discharges

Source: Canterbury DHB
4.3.3 Cardiology stay index is already low

Rationale
We expect any changes in cardiology to be marginal with less complex patients already being dealt with in general medicine.

Scenario
• 5 percent reduction in forecast length of stay over five years

Impact

Figure 16 Cardiology bed days - base vs alternate forecast

Moving to a 5 percent shorter length of stay than forecast would slow the growth in bed days between 2018 and 2023 from 2.3 percent per year (on average) to 1.2 percent per year. The table below sets out the number of bed days in the 2015 (base data), 2018, and 2033 financial years, for both the baseline forecast and modelled scenarios. We have applied modifications from the 2018 financial year.

Table 3 Modelled cardiology bed days 2015-2033

<table>
<thead>
<tr>
<th>Scenario</th>
<th>2015</th>
<th>2018</th>
<th>2033</th>
</tr>
</thead>
<tbody>
<tr>
<td>Base forecast</td>
<td>4,273</td>
<td>4,556</td>
<td>6,151</td>
</tr>
<tr>
<td>Scenario one</td>
<td>4,273</td>
<td>4,556</td>
<td>5,827</td>
</tr>
</tbody>
</table>
4.3.4 Gastroenterology volumes will grow in outpatients

Rationale
The future model of care is well understood and will be increasingly outpatient and sometimes general practitioner based (in the case of liver disease). In the absence of comparable data across New Zealand hospitals, we have modelled what a 5 percent reduction in the discharge rate would look like:

Scenario
- 5 percent decrease in forecast intervention rate over seven years
Moving to a 5 percent lower than forecast discharge rate would hold growth in volumes to 0.4 percent per year over seven years. Remaining at the status quo, we would expect to see a 1.1 percent increase each year. The reduced number of discharges would slow the growth in bed days to less than 1 percent per year, compared to 1.6 percent per year if nothing changed. As shown in the table below, the overall difference in bed days by 2033 is relatively small.

### Table 4 Modelled gastroenterology bed days 2015-2033

<table>
<thead>
<tr>
<th>Scenario</th>
<th>2015</th>
<th>2018</th>
<th>2033</th>
</tr>
</thead>
<tbody>
<tr>
<td>Base forecast</td>
<td>1,200</td>
<td>1,266</td>
<td>1,578</td>
</tr>
<tr>
<td>Scenario one</td>
<td>1,200</td>
<td>1,266</td>
<td>1,499</td>
</tr>
</tbody>
</table>

### Bowel screening increase drive gastro outpatient events

Growth in Gastroenterology is likely to be largely in further outpatient services, and there will be a considerable challenge in supporting the bowel-screening programme as this is rolled out nationally.

Figure 20 provides an indicative estimate of the growth in colonoscopies at Dunedin because of the bowel cancer-screening programme, based on screening the population and providing ongoing surveillance colonoscopies to a proportion of people found to have high risk. This estimate is based on a population from the territorial areas of Central Otago, Clutha, Dunedin, and Waitaki, with 32 percent of Queenstown-Lakes, based on the proportion belonging to the former Otago DHB and therefore expected to attend Dunedin.

Note that these estimates assume the same parameters as the Waitemata bowel-screening pilot. The initial rollout of the programme is likely to be for a narrower age-band and a less sensitive test level, reducing the numbers from these estimates. The Ministry of Health and Health Workforce New Zealand are working with individual DHBs to estimate the demand arising from screening as the specifics of the programme are further developed. Those estimates should be regarded as definitive.
4.3.5 Other medical sub-specialties

Scenario one
• 5 percent decrease in forecast intervention rate over seven years, and
• 5 percent decrease in forecast ALOS over seven years

Scenario two
• 5 percent decrease in forecast intervention rate over seven years, and
• 10 percent decrease in forecast ALOS over ten years
Impact

Figure 21 Medical sub-specialties discharges - base vs alternate forecast

Figure 22 Medical sub-specialties bed days - base vs alternate forecast

The combined effect of a 5 percent reduction in both forecast intervention rate and average length of stay under scenario one would hold growth in bed days to 0.3 percent per year, compared to 1.1 percent growth in the baseline forecast.

Scenario two assumes a greater reduction in average length of stay (10 percent) achieved over a ten-year period. Under this scenario growth in bed days would be held nearly flat (0.1 percent per year) for ten years.

The table below sets out the number of bed days in the 2015 (base data), 2018, and 2033 financial years, for both the baseline forecast and modelled scenarios. We have applied modifications from the 2018 financial year.

Table 5 Modelled medical sub-specialty bed days 2015-2033

<table>
<thead>
<tr>
<th>Scenario</th>
<th>2015</th>
<th>2018</th>
<th>2033</th>
</tr>
</thead>
<tbody>
<tr>
<td>Base forecast</td>
<td>6,626</td>
<td>6,969</td>
<td>8,689</td>
</tr>
<tr>
<td>Scenario one</td>
<td>6,626</td>
<td>6,969</td>
<td>7,842</td>
</tr>
<tr>
<td>Scenario two</td>
<td>6,626</td>
<td>6,969</td>
<td>7,429</td>
</tr>
</tbody>
</table>
4.3.6 Rehabilitation

The future configuration of Older Person’s Health (OPH) needs to be planned alongside the resolution of issues in general medicine. The two services must work closely together to achieve shorter patient stays and improve outcomes for the frail elderly. OPH recognises it needs to be better at in-reaching to the ED and medical ward. In an example from Counties Manukau, the older person’s team has collaborated with medicine to create an acute ward featuring rapid assessment and a rehabilitation model.

Rationale

There is a hospital view that the residential care population could be managed with more effective assessment in care facilities, and with rapid assessment at hospital. A good team for stroke can decrease inpatient stay by 4 to 5 percent, and once they do not need 24-hour nursing, a patient can go home with a community package of care. The older person who falls probably needs a pathway like a stroke pathway. In terms of surgical patients, treatment spaces in surgical wards are required so rehabilitation can start early on the ward.

The service clearly expressed a desire to be much more community focused where it can be, with a ‘pull model’ from hospital into the community. A partnership approach with the community home based support provider and maximising use of the unregulated workforce would enhance recovery and independence at home, allowing earlier discharge from hospital after acute events.

OPH submits data on around 80 percent of its inpatient rehab events to the Australasian Rehabilitation Outcomes Centre (AROC), for standardised benchmarking against other facilities. The rehab ward on the Dunedin campus currently has a significantly shorter length of stay than average, but also a significantly lower functional improvement for patients. This general pattern holds across orthopaedic fractures and reconditioning; however, for stroke, functional improvement is slightly better than average (not significant). Around a third of events are orthopaedic cases and another third for ‘reconditioning’. However, Older Person’s Health believes the issues of lower functional performance lie mainly with practice rather than with time in inpatient rehabilitation and that there remains an opportunity to reduce bed days whilst improving level of function. OPH agreed that constraining future growth to half the baseline forecast was a reasonable aim.

The ISIS Centre at Wakari is held up as a centre of excellence and has been submitting data to AROC for a longer period. It compares favourably against other centres, with a shorter length of stay than expected and a greater functional improvement for patients overall. The picture varies by impairment:

- Stroke patients have a greater than average functional improvement, but they also have a significantly longer length of stay;
- Patients with traumatic brain injury have a significantly greater functional improvement and a significantly shorter length of stay, and
- Patients with non-traumatic brain injury have a significantly shorter length of stay, but a slightly lower functional improvement (not significant).
Scenario
• Halve the forecast growth in rehabilitation bed days over 15 years

Impact
Figure 25 Rehabilitation bed days – base vs alternate forecast

Under the baseline forecast, rehabilitation bed days would increase at an average of 3 percent per year from 2018 onwards. The table below sets out the number of bed days by 2033 if growth was held to an average of 1.5 percent per year.

Table 6 Modelled rehabilitation bed days 2015-2033

<table>
<thead>
<tr>
<th>Scenario</th>
<th>2015</th>
<th>2018</th>
<th>2033</th>
</tr>
</thead>
<tbody>
<tr>
<td>Base forecast</td>
<td>16,269</td>
<td>17,281</td>
<td>25,899</td>
</tr>
<tr>
<td>Scenario one</td>
<td>16,269</td>
<td>17,281</td>
<td>21,590</td>
</tr>
</tbody>
</table>
Inpatient rehabilitation

Figure 26 Case-mix adjusted relative means - Dunedin Hospital OPH

Source: Australasian Rehabilitation Outcomes Centre

Figure 27 Case-mix adjusted relative means - stroke - Dunedin Hospital OPH

Source: Australasian Rehabilitation Outcomes Centre

Figure 28 Case-mix adjusted relative means – ISIS

Source: Australasian Rehabilitation Outcomes Centre
4.3.7 Radiology volumes likely to surge in complex imaging

Long-standing constraints mean there is unmet demand that will not be reflected in a baseline forecast. The volume of radiological investigations over the past five years in Dunedin have declined (with the exception of MRI and mammography) reflecting these constraints.

Figure 31 shows a delay in the completion of final reports for x-rays ordered by ED compared to all other x-rays; with relatively few reports completed in the first three days. Other issues raised were the increasing demand for theatre imaging and interventional cardiology. The service is working on referral pathways, which should help sort out referrals for inappropriate modalities. Considerations for the future include the probable need for PET CT scanning in Dunedin.
Figure 31 Days from x-ray to report, 2015/16

Source: Southern DHB

Baseline forecast

Figure 32 Demographic forecast of x-rays

Figure 33 Demographic forecast of other modalities

Modified service demand

The charts above reflect the impact demographic change would have on radiology volumes. The view from the service is that plain film x-ray is the most likely to follow the population trend in future, whereas demand for MRI is dependent on technological advances. MRI has by far the longest waiting time and unmet need. A review from the United Kingdom reported year on year increases of 10 percent for CT and 12 percent for MRI. Figure 34 illustrates the impact of a high growth scenario set out below.

Scenario

* 10 percent per annum increase in CT and MRI for ten years

Figure 34 CT and MRI forecast - high growth assumptions

Under this high growth scenario, volumes would increase by more than three-and-a-half times between 2015 and 2033. Demand will be rapid and substantial, with actual volumes in the future dependent on technological change.
5. Surgical efficiency is about efficient design of process and facility

The patient journey workshops and previous fact finding set out in the Detailed Services Plan A identified some important questions for the DHB to address on its way to describing what the hospital might look like when it is rebuilt rather than what it is like now. New, fit-for-purpose facilities have the potential to support improved flows and efficiency across a range of surgical services.

5.1 Surgical planning assumptions

An initial set of service planning assumptions have been generated through patient journey workshops and directorate meetings. A range of issues were identified from a need for a different facility, to critical resource constraints, to the manner in which the acute and elective services organise themselves. In terms of what a new service could look like, we have had identified to us a number of key assumptions that would enhance productivity, make services more sustainable and deliver a better outcome for patients. Our list is as follows:

- **There will be an appropriate physical configuration of surgery** and pre-operative spaces allowing patient workup in a sterile environment prior to being wheeled in to the theatres.

- **There will be adequate access to treatment and procedure rooms** for scopes and other therapeutic interventions such as injections for wet age-related macular degeneration (AMD). Treatment rooms would be available in community spaces and integrated primary care centres as well as in outpatient areas. These treatment rooms would allow scopes from bowel-screening, injections for wet AMD and skin lesion removals to be undertaken in a number of settings.

- **There will be adequate and efficient rosters of surgeons** so there are no issues with clinician staffing during the week and weekend, such that the most operationally efficient lists can be instructed.

- **There will be sufficient and appropriately trained nursing capacity** to staff those shifts, at the times needed. If necessary, a second nursing shift will be implemented.

- **ICU capacity will be sufficient to respond to acute needs without constraining elective delivery.** There will be a range of other options such as HDU.

- **List management will change** and will identify acute and elective patient flows end-to-end and will have full responsibility for identifying patients and managing lists.

There are a set of process and management assumptions. To achieve maximum benefit from the rebuild, the surgical team will undertake a review of processes using TPO'T or a similar management technology to accelerate change. The DHB may want to GPS data to track patients; however, more properly, would likely ensure business rules around time stamps are standardised and used correctly.
In terms of surgical demand, we make the following assumptions:

- Elective rates will continue to increase. We take the point that, in orthopaedics, it would seem we are treating an increasingly higher level of acuity. It is difficult to pinpoint where elective funding will go in future years, so as a pragmatic holding assumption, we have assumed elective cases will at least increase in line with population growth and ageing and consider the impact of a 3 percent growth per year in discharges.
- Acute surgical volumes have less potential for management in the community than is the case in medicine, but there is some possibility of avoiding fractures in the elderly with falls prevention programmes.

### 5.2 Modified service demand

We have modelled the possible impact of planning assumptions on hospital service demand in the future. The model takes, as its starting point, the baseline forecast that reflects change in population size and age structure. Note that the baseline forecast is for activity at Dunedin only. From this base, for each service cluster, we may apply a number of ‘modifiers’ that assume a percentage change in volume that may be achieved over a period from the 2018 financial year.

Modifiers may assume a move to the rate of a better performing hospital or DHB based on standardised intervention rates. In some cases, we have indicated a range within which future demand might be expected to fall.

There may be cases where either consistent, reliable data is not available across DHBs or hospitals, or where Dunedin already compares favourably with peers; yet a reduction in hospital volume is expected as a result of anticipated service change. The approach in this instance is to adopt an aspirational target based on what has been achieved in other areas or advice from the service on what level of change might be possible.

In the sections below, we outline the rationale for each modification to the forecast and set out the scenario we have applied to the base forecast. We then demonstrate the impact of the modifications and describe the difference from the baseline.

#### 5.2.1 Orthopaedics

**Rationale**

**Elective provision**

The current orthopaedic intervention rate for Southern is significantly higher than the national average (Figure 35). Despite the higher than average rate, unmet need for orthopaedic surgery, although presently difficult to capture completely, has been well...
documented. The intervention rate for major joint replacement remains below the national target (Figure 36).

Southern DHB’s Orthopaedic Patient Pathway (OPP) work found that 4 percent of referrals were returned from Dunedin Hospital in 2013/14 because of a lack of information or patient tests not done. Thirty percent of referrals were returned because of a lack of capacity.

**Figure 35 Orthopaedics elective standardised intervention rates 2015/16**

![Orthopaedics Intervention Rates](image)

*Source: Ministry of Health*

**Figure 36 Major joint replacement standardised intervention rates 2015/16**

![Major Joint Surgery Intervention Rates](image)

*Source: Ministry of Health*
Acute events

The Health Quality and Safety Commission’s Atlas of Healthcare Variation shows that Southern DHB’s falls hospitalisation rate for people aged 50 years and over, is 9 percent higher than the national average, presenting an opportunity to reduce the incidence of falls amongst older people. The DHB will likely include a focus on falls prevention programmes and proactive management of the frail elderly into the future, which may be expected to reduce acute admissions to hospital. Information from Canterbury (Figure 37 and Figure 38) on the impact of their community falls prevention programme demonstrates that halting the growth of admissions and associated bed days for fractured neck of femurs (NOF) is possible with investment in prevention programmes.

Although the impact of fewer fractures NOFs is small in the context of overall discharges, orthopaedics will be the highest cost service in the future in terms of case-weights and the burden on patients is significant. Initiatives that achieve even small gains may still be worthwhile.

Figure 37 Acute inpatient events for fractured NOF, Canterbury DHB

Source: Canterbury DHB

Length of stay
The main efficiency gain through the Orthopaedic Patient Pathway work was a reduction in average length of stay. Elective ALOS reduced from 4.4 days in 2011/12 to 3.5 days in 2013/14. The Enhanced Recovery after Surgery (ERAS) initiative is well embedded and further gains in the already short length of stay may be marginal.

The service acknowledges there is potential to reduce acute length of stay. The patient pathway work noted that patients presenting with fractured neck of femur do not all get to surgery within the optimum timeframe from admission. Based on feedback from the service we have modelled a 10 percent reduction in average length of stay for acute patients.

Scenario - acute patients
- 1 percent per annum increase in acute discharges, and
- 10 percent reduction in forecast acute ALOS over seven to ten years

Scenario – electives
- 3 percent per annum increase in elective discharges, and
- 2 percent reduction in forecast elective ALOS over five years

Source: Canterbury DHB

---

Southern DHB. Orthopaedic Pathway Programme Transformational Change. September 2014.
Impact

A 1 percent growth in acute discharges each year is very close to what the demographic forecast would predict. If average length of stay were reduced by 10 percent from forecast, then bed day growth would be held to an average of 0.6 percent per year over ten years, compared to 1.7 percent at the status quo.

For electives, a 3 percent growth per year for ten years outstrips demographic demand alone, which would suggest an average increase of 1.2 percent per year. In bed day terms, the modelled scenario would see an increase of 3.3 percent over five years, compared to an expected 2.1 percent at the status quo.

The table below sets out the number of bed days in the 2015 (base data), 2018, and 2033 financial years, for both the baseline forecast and modelled scenarios. We have applied modifications from the 2018 financial year onwards.

Table 7 Modelled orthopaedic bed days 2015-2033

<table>
<thead>
<tr>
<th>Scenario</th>
<th>2015</th>
<th>2018</th>
<th>2033</th>
</tr>
</thead>
<tbody>
<tr>
<td>Base forecast acute</td>
<td>8,588</td>
<td>9,013</td>
<td>11,588</td>
</tr>
<tr>
<td>Scenario – acute</td>
<td>8,588</td>
<td>9,013</td>
<td>10,384</td>
</tr>
<tr>
<td>Base forecast elective</td>
<td>3,447</td>
<td>3,663</td>
<td>4,691</td>
</tr>
<tr>
<td>Scenario – elective</td>
<td>3,447</td>
<td>3,663</td>
<td>5,484</td>
</tr>
</tbody>
</table>
5.2.2 General surgery

Rationale

Elective provision

General surgery is concerned its intervention rate is low. Although the elective intervention rate is slightly below the national average, it is comparable to many other medium to large DHBs (Figure 41). Our modelling considers two scenarios: a demographic forecast that assumes the current elective intervention rate continues, and a modified forecast that describes the impact of a 3 percent increase in elective volumes year on year.

Figure 41 General surgery elective standardised intervention rates 2015/16

Source: Ministry of Health

There may be other factors that influence the mix of acute versus elective work in the future. One example given was a situation where surgery may not be performed acutely currently due to constrained radiology.

Acute events

We have assumed a modest reduction of 2 percent in the acute intervention rate as the goal.

Length of stay

We note that ERAS is well embedded in
the service, e.g. colorectal surgery, and have modelled a scenario with a 10 percent reduction in average length of stay for acute cases only.

**Scenario - acute patients**

- 2 percent reduction in forecast acute intervention rate over five years, **and**
- 10 percent reduction in forecast acute ALOS over seven to ten years

**Scenario – electives**

- 3 percent per annum increase in elective discharges

**Impact**

**Figure 42 General surgery discharges - base**

**Figure 43 General surgery bed days - base vs alternate forecast**

A small reduction in the acute intervention rate over five years would hold growth in discharges to 0.7 percent per year, compared to an expected growth of 1.1 percent per year following demographics. If average length of stay were reduced by 10 percent from forecast, then bed day growth would be held to an average of 0.4 percent per year over ten years, compared to 1.7 percent at the status quo.

For electives, a 3 percent growth per year for ten years outstrips demographic demand alone, which would suggest an average increase of 1.1 percent per year. In bed day terms, this would see an increase of 3.9 percent over ten years, compared to an expected 2.0 percent at the status quo.

The table below sets out the number of bed days in the 2015 (base data), 2018, and 2033 financial years, for both the baseline forecast and modelled scenarios. We have applied modifications from the 2018 financial year onwards.
Table 8 Modelled general surgery bed days 2015-2033

<table>
<thead>
<tr>
<th>Scenario</th>
<th>2015</th>
<th>2018</th>
<th>2033</th>
</tr>
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<tbody>
<tr>
<td>Base forecast acute</td>
<td>9,302</td>
<td>9,752</td>
<td>12,348</td>
</tr>
<tr>
<td>Scenario – acute</td>
<td>9,302</td>
<td>9,752</td>
<td>10,891</td>
</tr>
<tr>
<td>Base forecast elective</td>
<td>2,360</td>
<td>2,494</td>
<td>3,294</td>
</tr>
<tr>
<td>Scenario – elective</td>
<td>2,360</td>
<td>2,494</td>
<td>3,958</td>
</tr>
</tbody>
</table>

5.2.3 Rest of surgery

Rationale

- 5 percent reduction in forecast acute ALOS over five years

Impact

Figure 44 Rest of surgery bed days - base vs alternate forecast
A 5 percent decrease in acute length of stay achieved over five years would reduce growth in bed days to an average of 0.7 percent per year, where they would otherwise be expected to grow at 1.8 percent per year. Elective bed days would continue to increase by 1.8 percent per year.

The table below sets out the number of bed days in the 2015 (base data), 2018, and 2033 financial years, for both the baseline forecast and modelled scenarios. We have applied modifications from the 2018 financial year onwards.

Table 9 Modelled bed days for rest of surgery 2015-2033

<table>
<thead>
<tr>
<th>Scenario</th>
<th>2015</th>
<th>2018</th>
<th>2033</th>
</tr>
</thead>
<tbody>
<tr>
<td>Base forecast acute</td>
<td>9,492</td>
<td>10,025</td>
<td>12,674</td>
</tr>
<tr>
<td>Scenario – acute</td>
<td>9,492</td>
<td>10,025</td>
<td>12,040</td>
</tr>
<tr>
<td>Base forecast elective</td>
<td>5,665</td>
<td>6,005</td>
<td>7,608</td>
</tr>
</tbody>
</table>
5.3 Theatre efficiency will change with practice and facilities

The patient journeys, directorate discussions, and additional information received indicate material gains in efficiency are possible. The surgical directorate outlines the following drivers to achieve the gains:

- Standardised data collection, and review and interpretation managed through a directorate data council. This will benefit the clinical engagement and partnership in achieving that target and is currently within the directorate service plan.
- The refresh of The Productive Operating Theatre (TPOT) principles and activity that will be supported by the embedded theatre leadership structure.
- Improvement of the management of the acute patients to minimise the impact on the elective production plan.
- Maximise all current theatre capacity by such initiatives as extending the theatre day and flexible rostering and role definition across all craft groups.

Data quality

Both access to and quality of data is a significant issue, with the directorate reporting timestamping issues in the theatre management information system and difficulties getting good information out from the organisation.

Orthopaedic theatre time highlights the data issues…

A comparison of Orthopaedic theatre time provided to us against theatre time reported by the service gives different figures:

- Full theatre dataset provided to us has 5,043 theatre hours for Orthopaedics in 2014/15
- Data analysed and provided to us by the service has 5420 theatre hours in 2014/15
- A difference of 377 hours (i.e. data from the service is 7.5 percent higher)

Management of acute surgery

Fluctuations in acute demand are not predictable on a day-by-day basis, but are somewhat predictable over longer periods. The directorate wants to focus on acute timeliness to theatre as a clinically agreed, consistent indicator to measure performance.

Smoothing demand that builds up over the weekend is a priority. At present, there is only one acute list each weekend day, meaning there is a backlog of patients that disrupts surgery scheduled for early in the following week. Orthopaedics is the service most impacted by this pattern.

Workforce and rostering

The service accepts that feedback through this process has indicated a more detailed view of SMO availability is required, particularly in specialties with a small number participating in acute and elective work and who are part-time employees.
They are considering the mix of registered and enrolled nurses in theatre; enrolled nurses can be a technical resource. In addition to the nursing mix, there is the opportunity to use anaesthetic technicians more widely than they are currently. The service reported that Invercargill is more team based and they are looking at opportunities to enhance the team approach in Dunedin.

5.3.1 Modified service demand

Given the known data issues and advice from the service, we have modelled the impact of 15 percent reduction in acute theatre time as a holding assumption.

**Scenario**
- 15 percent reduction in forecast acute theatre time over seven to ten years

**Impact**

**Figure 50 Theatre hours - base vs alternate forecast**

Further modelling will be required once the service has more confidence in its theatre data. Addressing unmet need would see a greater number of theatre cases in the future than demographics alone would suggest. The capacity required to meet this demand will depend upon the level of efficiency that can be achieved, which will become clearer as data quality and performance measurement improves.
5.4 Intensive care; wait and see

Intensive Care Unit (ICU) capacity has been sharply constrained and is a major driver of an interim works programme. ICU capacity is needed for increasingly complex patients with increasingly invasive surgery. Lack of ICU capacity hampers the flow of surgical patients through the hospital, with surgical lists being cancelled if there is no access to an ICU bed.

At the end of 2015, a working group undertook a rapid analysis to assess the bed numbers required in a reconfigured critical care unit (ICU and high dependency unit (HDU)). The assessment was limited in its scope due to the very short timeframe available in which to complete it. The working group reported an average occupancy in ICU of 6.8 beds per day, with a range of between 4 and 10 beds per day. Taking unmet need, particularly for HDU beds, into account the group recommended building at least 20 physical bed spaces.

Crude benchmarking of critical care beds per capita across the country suggests that the overall complement of ICU and HDU beds will need to increase to a total level of 20 to 25, with a further increase to reflect ageing.

Unfortunately, data in the national minimum data set (NMDS) does not align with hospital data sources, meaning an event level forecast of demand (linked to inpatient forecasts) is not possible at this point. However, there will be further opportunity to see what happens when the interim build is complete and ICU capacity is expanded.

Length of stay is increasing
The chart below illustrates the increasing length of stay for patients in ICU between July 2014 and October 2016, at approximately 16 percent per year. The department has discharged patients earlier than they perhaps would otherwise, in the face of increasing
pressure from new patients requiring admission to an ICU bed. Increased capacity will allow patients to stay longer in line with clinical best practice, increasing overall average length of ICU stay in the future.

**Figure 53 Average hours in Dunedin ICU**

![Dunedin Hospital: ALOS in ICU](image)

**Source:** Southern DHB

**Rationale**

We consider two scenarios to model where ICU volumes may head in the future. The first considers the impact of a 5 percent increase in ICU admissions, to reflect elective surgical activity that is currently postponed due to lack of ICU beds; combined with a 15 percent increase in length of stay per year between the 2015 and 2018 financial years.

Two additional resourced ICU beds are currently being introduced, taking the number of resourced ICU beds from approximately six to eight. There are also eight high dependency unit beds (two units of four attached to surgical wards) which will be increased to ten as part of the interim works programme. The second scenario assumes the increase from six to eight ICU beds will correspond to an immediate, proportionate increase in ICU hours utilised, which will continue to increase reflecting population ageing.

Population ageing impacts on the demand for ICU support for complex surgery will be substantial, particularly because of increased cardiothoracic cases and complications from obesity in the patient population.

**Scenario one**

- Discharges are 5 percent higher than base forecast from January 2017 onwards, **and**
- 15 percent increase per annum in ALOS from 2015 to 2018

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8 The ICU Basic Healthcare Needs Assessment for Interim ICU Build reported that over a one-year period, an average of 40 patients have their elective surgery postponed owing to a lack of ICU bed.
Scenario two
• 33 percent increase in hours from January 2017 onwards

Impact
Figure 54 ICU hours - base vs alternate forecasts

The initial increase in ICU time in these two scenarios takes the hours to one-third higher in scenario two, or 59 percent higher under scenario one. From that point, we expect volumes to increase with population growth and ageing. As noted previously, there will be an opportunity to review these models with data reflecting the expanded capacity.
6. Other services are more about incremental improvement

There are a number of initiatives assumed for other services but, for most of them, other than women’s health services, it is more of the same.

6.1 Ophthalmology growth is extreme but largely outpatient

The impact of an aging population is going to be very large in ophthalmology, with a high probability of expanding demand for this service in the future, although it is already under considerable pressure. The service notes the importance of Government interventions and plans for elective services, and how this might affect baseline projections for demand. Although inpatient events will increase substantially in percentage terms, the inpatient ophthalmology service is relatively small with a short length of stay. The more material growth driven by ageing will be in outpatient services. The forecast outpatient volumes below suggest a nearly 50 percent increase in outpatient procedures between 2015 and 2038.

The national dataset may underestimate the outpatient volume; depending on internal business rules, activity may be counted against generic nurse-led purchase unit codes or others, which mean it is not easily identifiable. The service reports a higher number of outpatient attendances than is reflected in the national dataset, an average of 29,600 over the last three financial years - 21,700 of which were seen by an ophthalmologist or registrar. The DHB will want to inform further work at the detailed business case stage using internal clinic data.

![Figure 55 Forecast ophthalmology FSAs and follow-ups](image1)

![Figure 56 Forecast ophthalmology outpatient procedures](image2)
6.2 Women’s and children’s services

6.2.1 Maternity services

The main model of care and facility issue raised by the service was the lack of a primary birthing unit in Dunedin. Primary birthing units are considered best practice, and evidence suggests that intervention rates tend to be lower than when delivery occurs in a tertiary facility. This seems to be the generally agreed direction in the directorate.

Other key points for the future are:

• Midwives see a place for telemedicine in some circumstances, which has the potential to improve access for women in more remote parts of the district;
• There is a need for IT system improvement. A good electronic referral management system, supplemented with a virtual conversation with the referrer, would help both administration and clinical management, and
• Technology and multidisciplinary input will also assist in the management of diabetic obstetric patients. Early intervention in these circumstances has the potential to improve outcomes.

A possible reduction in length of stay is possible

The inpatient forecast suggests minimal growth in discharges for mothers; 2193 in 2015 projected to rise to just 2283 by 2033.
6.2.2 Paediatrics will decrease with demographics

The demographic forecast projects a slight decrease in the number of paediatric and neonatal discharges between 2015 and 2033. Ambulatory sensitive hospitalisation rates for Southern are generally lower than average. Dunedin’s paediatric medicine length of stay is close to expected, There is a tendency to keep children from distant areas slightly longer in hospital, before discharging them to more remote areas where follow-up may be more difficult.

Figure 58 Ambulatory sensitive hospitalisations 0-4 years

Source: Ministry of Health
6.2.3  Gynaecology services need to increase, in an ambulatory setting

With a generally low growth and ageing population, there is little expected growth in demand from the current level in gynaecology. The issue is more that the current level of provision appears not to meet the existing level of need.

The Southern DHB standardised discharge ratio for gynaecology specialty discharges is 0.68 compared to the national rate, the lowest for any DHB. Comparing age specific rates of discharge to DHBs of similar size (MidCentral and Hawkes Bay) shows that Southern DHB has lower gynaecology discharge rates, particularly for women aged under the age of 30. The gap between Southern DHB and the other DHBs in case-weights is not as wide as the gap in discharges.

**Figure 60: Gynaecology discharges age specific comparison**

These results are consistent with an interpretation that Southern DHB has a lower rate of intervention for gynaecology with a particularly high threshold for surgery (CPAC) and specifically that acute need for older women is closer to being met, but potentially at the expense of presentations of younger women with abdominal pain requiring laparoscopy. The level of unmet need for this service has not been systematically quantified. Anecdotally, GPs sometimes do not refer, since they are aware that patients will not be seen. Based on existing information, this means that quantifying the level of unmet need is difficult.

While acute discharges for gynaecology have been stable over time, there has been some decrease in elective discharges since July 2014. This may reflect a combination of the following:

- SMO staffing shortages in gynaecology over that period;
- The introduction of HealthPathways and the consequent provision of some care in a general practice setting, and
- Some shift to office gynaecology provided in an outpatient setting rather than as inpatient episodes.
6.3 Blood and cancer unchanged

We have moved blood and cancer sections to this section rather than medical services, as there is less to say about it. The service appears to be managed in a proactive, orderly manner and likely will persist as such.

All cancer and blood services are oriented to outpatient and day patient services with only the most complex being admitted into inpatient beds. Comparing intervention rates across DHBs is inherently difficult as the inpatient model of care for patients with cancer can vary hospitals. Some inpatient stays for symptom management may be provided by general medicine in some hospitals, whereas in others they are admitted under oncology. Dunedin has a high readmission rate from oncology suggesting scope to reduce inpatient volumes; however, any gains may be offset by reportedly increasing incidence of haematological cancers, and a material impact on haematology bed days if transplants are repatriated from Canterbury.

6.4 Mental health services

Mental health services identify a number of key issues:

- Demographic pressure on demand is low, but increasing incidence will create new demand;
- There is a strong move to shift care to community based settings and away from hospital facilities where this is feasible;
- These factors are likely, to some extent, to balance each other in terms of need for physical capacity to provide care within a hospital setting, and
- Psychogeriatric services cross boundaries between older person’s health and mental health services, and these linkages must be respected.

There is a major decision point related to the continued provision of mental health services on a separate site from the main Dunedin Hospital, as opposed to being part of the main hospital rebuild. There are clearly identifiable pros and cons to providing mental health service as part of the main hospital rebuild, ranging from improved mental and physical health integration, to a less therapeutic environment within a busy hospital. This is a distinct strategic decision, which should be considered once a short list of options for a new Dunedin Hospital has been identified and the potential benefits and constraints of those options for mental health services can be more clearly identified.
Appendix 1 Additional forecasts

Methodology

Demographic driven generation of forecasts
The service forecasts have been generated from Statistics New Zealand, DHB, and territorial authority projections. These methods are applied at a high level, across whole services, and do not take into account underlying epidemiological trends.

Base method of demographic driven generation of forecasts
The general method for calculating forecasts by age band involves:

• Calculating an index of increase for each category of age band, sex, and ethnicity (ASE) for each year from DHB/TA projections relative to the base year 2015.
• Calculating the quantum of health service measures (hospital discharges, bed days, ICU hours, etc.) for each ASE category for the base year 2015.
• Multiplying through the base year quantum of health service measures by the index of increase for each year in each ASE category.
• Summing the consequent measure for each ASE category for each year.

Some error arises where, for a particular combination of categories:

• The annual variability of health events means that there are zero or near-zero current in the base year that multiply to zero events in the forecast or

• The Statistics New Zealand rounding to the nearest five means that changes can be discrete (e.g. 5 to 10) rather than smooth.

Local population change and service demand
The forecasts of demand by facility by DHB-wide ASE will not reflect local variations in growth observed in the forecasts for the population. The method for calculating forecasts for Dunedin Hospital is similar to the above but based on Statistics New Zealand TA projections that provide five-yearly projections from 2013 to 2038.

In order to minimise the impact of the errors sources noted above, the service level and projection data has been combined using age-band and domicile territorial authority categories, averaging over sex and ethnicity. We utilise the Statistics New Zealand projections containing only TA and age bands, basing an “other” TA of domicile category on the whole DHB projections and calculating the base year 2015 value by linear interpolation.

Theatre and procedure forecasts
The forecasts of theatre minutes and outpatient procedures are derived from a top down method where:
• The theatre utilisation data has been analysed to derive the rate of theatre utilisation and average time in theatre per admission by health specialty and admission type, hence an average number of theatre minutes per admission, then

• The forecast number of admissions is multiplied by the average number of theatre minutes per admission for each health specialty and admission type.

**Interpretation**

The forecasts presented here answer the question: what would the future population demand be if we continue to provide services in exactly the way we currently provide them?

There are a number of factors, which are likely to affect these forecasts. To the extent that older populations may be healthier in the future than they are now, these forecasts may overestimate demand. Equally, to the extent that more services are required to keep older people healthy, these forecasts may underestimate some aspects of demand. The forecasts presented here do not attempt this sort of detailed epidemiology.

These forecasts are intended to give an idea about which areas of care are likely to face the greatest pressure from the ageing population

**Forecasts for Dunedin Hospital**

**Overall forecasts at directorate level**

The following charts illustrate the forecast changes in services by directorate, including inpatient discharges, bed days and case-weights, and outpatient attendances.

• Discharges: forecasts indicate strong growth in older person’s health (73 percent over 23 years), medicine (29 percent) and surgery (27 percent).

• Bed days: forecasts indicate strong growth in older person’s health (86 percent over 23 years), medicine (56 percent), surgery (38 percent) and paediatrics (21 percent).

• Case-weights: forecasts indicate strong growth in older person’s health (74 percent over 23 years), medicine (42 percent), surgery (33 percent), and paediatrics (26 percent), and moderate growth in maternity (13 percent over 23 years).

• Outpatient attendances: forecasts indicate strong growth in older person’s health (53 percent over 23 years) and surgery (44 percent), and moderate growth in paediatrics (19 percent) and medicine (15 percent).
Figure 61 Forecast discharges at Dunedin Hospital

Figure 62 Forecast bed days at Dunedin Hospital
Discharge forecasts by specialty

Table 10 compares the forecast discharges in 2033 by specialty with the actual volume in 2015, ranked by the proportionate change in descending order. This indicates:

- Strong growth in older persons health, general medicine, ophthalmology, radiation oncology, vascular surgery, cardiothoracic, urology, respiratory medicine, cardiology, and haematology;
- Moderate growth in orthopaedics, general surgery, gastroenterology, plastics, renal medicine, neurosurgery, oncology, emergency and ENT; and
- Low growth or possible decline in demand for other services.
# Table 10 Forecast discharges by health specialty

<table>
<thead>
<tr>
<th>Specialty</th>
<th>2015</th>
<th>2033</th>
<th>Δ(%)</th>
<th>Specialty</th>
<th>2015</th>
<th>2033</th>
<th>Δ(%)</th>
</tr>
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<tbody>
<tr>
<td>Older persons health</td>
<td>1,016</td>
<td>1,700</td>
<td>167</td>
<td>Neurosurgery</td>
<td>464</td>
<td>540</td>
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<td>Internal Medicine</td>
<td>3,262</td>
<td>5,094</td>
<td>156</td>
<td>Oncology</td>
<td>986</td>
<td>1,142</td>
<td>116</td>
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<td>1,142</td>
<td>1,678</td>
<td>147</td>
<td>ED</td>
<td>8,782</td>
<td>10,127</td>
<td>115</td>
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<tr>
<td>Radiation Oncology</td>
<td>252</td>
<td>354</td>
<td>141</td>
<td>ENT</td>
<td>1,616</td>
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<td>Cardiothoracic</td>
<td>383</td>
<td>535</td>
<td>140</td>
<td>Rheumatology</td>
<td>231</td>
<td>249</td>
<td>108</td>
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<td>Urology</td>
<td>1,779</td>
<td>2,424</td>
<td>136</td>
<td>Other allied</td>
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<td>221</td>
<td>106</td>
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<tr>
<td>Respiratory Medicine</td>
<td>763</td>
<td>1,035</td>
<td>136</td>
<td>Endocrinology and diabetes</td>
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<td>Cardiology</td>
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<td>2,887</td>
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<td>Gynaecology</td>
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<td>1,517</td>
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<td>Haematology</td>
<td>606</td>
<td>788</td>
<td>130</td>
<td>Maternity</td>
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<td>3,523</td>
<td>100</td>
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<td>Orthopaedics</td>
<td>3,364</td>
<td>4,086</td>
<td>121</td>
<td>Mental health</td>
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<td>General Surgery</td>
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<td>95</td>
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<td>Gastroenterology</td>
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<td>Dental</td>
<td>80</td>
<td>75</td>
<td>94</td>
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<td>Plastics</td>
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<td>Paediatric Medicine</td>
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<tr>
<td>Renal Medicine</td>
<td>449</td>
<td>536</td>
<td>119</td>
<td>NICU</td>
<td>423</td>
<td>397</td>
<td>94</td>
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</table>
Theatre forecasts

Table 11 compares the forecast theatre in 2033 by specialty with the actual volume in 2015, ranked in descending order of total time in theatre. This indicates:

- Moderate growth (24 percent in 23 years) in orthopaedic and general surgery, which together comprise 44 percent of theatre demand in both 2015 and 2033;
- Variable growth rates across the next nine specialties that together still comprise 53 percent of theatre demand in both 2015 and 2033, and
- All other specialties comprise less than 3 percent of theatre demand

Table 11 Forecast annual theatre hours by health specialty

<table>
<thead>
<tr>
<th>Specialty</th>
<th>2015</th>
<th>2033</th>
<th>Δ(%)</th>
<th>Specialty</th>
<th>2015</th>
<th>2033</th>
<th>Δ(%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Orthopaedics</td>
<td>5043</td>
<td>6242</td>
<td>124</td>
<td>Paediatric surgery</td>
<td>114</td>
<td>116</td>
<td>102</td>
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<tr>
<td>General Surgery</td>
<td>4297</td>
<td>5312</td>
<td>124</td>
<td>Internal Medicine</td>
<td>54</td>
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<td>157</td>
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<tr>
<td>ENT</td>
<td>1886</td>
<td>2191</td>
<td>116</td>
<td>Paediatric Medicine</td>
<td>32</td>
<td>32</td>
<td>100</td>
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<tr>
<td>Plastics</td>
<td>1376</td>
<td>1694</td>
<td>123</td>
<td>Haematology</td>
<td>31</td>
<td>41</td>
<td>131</td>
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<tr>
<td>Cardiothoracic</td>
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<td>1920</td>
<td>142</td>
<td>Oncology</td>
<td>25</td>
<td>30</td>
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<td>Gynaecology</td>
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<tr>
<td>Maternity</td>
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<td>Cardiology</td>
<td>19</td>
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<tr>
<td>Ophthalmology</td>
<td>1192</td>
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<td>148</td>
<td>ED</td>
<td>15</td>
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<tr>
<td>Neurosurgery</td>
<td>1091</td>
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<td>Neurology</td>
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<td>15</td>
<td>112</td>
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<tr>
<td>Vascular Surgery</td>
<td>962</td>
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<td>142</td>
<td>Older persons health</td>
<td>7</td>
<td>11</td>
<td>170</td>
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<td>Urology</td>
<td>880</td>
<td>1213</td>
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<td>Radiation Oncology</td>
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<td>140</td>
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<td>Renal Medicine</td>
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<td>Dental</td>
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<td>Rheumatology</td>
<td>4</td>
<td>4</td>
<td>116</td>
</tr>
<tr>
<td>Paediatric surgery</td>
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<td>116</td>
<td>102</td>
<td>NICU</td>
<td>1</td>
<td>1</td>
<td>101</td>
</tr>
</tbody>
</table>
Outpatient day procedures are likely to be approximately right

Figure 65 illustrates the forecast changes in outpatient day procedures by clinic. This indicates:

- Strong growth in some low volume clinics, 37 percent over 23 years to 2033 in eye minor procedures and 22 percent in see and treat oncology, and
- Moderate growth in high volume clinics, 18 percent in gastro scope and 8 percent in gynaecology colposcopy.

Like most DHBs, however, Southern DHB's outpatient data is idiosyncratic and non-standard across clinicians and services. Two particular services where there appear to be differing views of volumes are ENT regarding skin lesions, and ophthalmology (where there is a difference of several hundreds of procedures. The DHB is instructing a project to standardise business rules and coding, and get a better estimate of outpatient volumes over the next year. We acknowledge the issues in the outpatient forecast, but also feel that those differences are likely to be immaterial at the level of detail we are working with in this clinical services plan. Further, many of those activities such as removal of minor skin lesions do not have to happen on the hospital campus.

**Figure 65 Outpatient procedures by clinic**
Appendix 2 Patient journey mapping

Aim of the patient journey workshops
Patient journey workshops provide an opportunity for health professionals, patients, and other stakeholders to identify areas of improvement in the care chain from a patient perspective rather than an organisational perspective. The patient journeys are hypothetical, but typical, cases. The objectives of the patient journey workshop are:

• To map out the patient journey and identify where processes or activities are considered to be positive or negative to patient care or flows.
• For each participant to have an opportunity to provide input into the patient journey.
• To gain more awareness of how other clinical and non-clinical staff affect the patient journey.
• To make suggestions about a transformational change to service directions.

Approach
Southern DHB and Sapere held six workshops from 26 July to 11 August 2016.

Table 12 Summary of workshops

<table>
<thead>
<tr>
<th>Workshop</th>
<th>Date</th>
<th>Attendance numbers</th>
</tr>
</thead>
<tbody>
<tr>
<td>A: Complex trauma</td>
<td>26 July 2016</td>
<td>54</td>
</tr>
<tr>
<td>B: Acute mental health</td>
<td>28 July 2016</td>
<td>31</td>
</tr>
<tr>
<td>C: Fractured neck of femur</td>
<td>1 August 2016</td>
<td>60</td>
</tr>
<tr>
<td>D: Stroke</td>
<td>3 August 2016</td>
<td>38</td>
</tr>
<tr>
<td>Ea: Colorectal Cancer</td>
<td>11 August 2016</td>
<td>43</td>
</tr>
<tr>
<td>Eb: Cardiothoracic</td>
<td></td>
<td></td>
</tr>
<tr>
<td>F: Respiratory</td>
<td>10 August 2016</td>
<td>26</td>
</tr>
</tbody>
</table>

Methodology
The patient journey workshops were jointly facilitated by staff from Southern DHB and Sapere Research Group. Southern DHB staff led groups of up to ~25 people per table. Small group facilitators were selected from the DHB with a view to ensuring the process was wholly owned and “voiced” by the DHB.
Workshop participants included Southern DHB staff (clinicians and management), as well as representatives from primary care and partner organisations (such as New Zealand Police), and patient representatives and support people. Participants were organised into tables to ensure (as far as possible) a balance of views. The number of participants ranged from 40 to approximately 70.

To ensure optimal participation from participants, an informal and low-tech, but effective, approach was used. A lead facilitator was identified for each table to guide participants through the journey. The workshops were divided into two parts – the current state, and the future desired state.

Part A – the current state
Groups were asked to track in detail the patient journey from the point of entry to the point of exit of the health service. Each group had butcher’s paper drawn as a table with time on the x-axis and the setting and actor on the y-axis (e.g. emergency department, nurse).

Participants were asked to note the activity in the care chain and the setting (and other relevant details) using colour-coded post-it notes (yellow for an activity, green for processes that go well, red for issues and blue for future ideas). The groups worked collaboratively on placing these in order on the templated butcher’s paper.

Groups were asked to report back through a series of ‘rolling presentations’, whereby the second and subsequent groups only raise points that have not been addressed by previous groups.

The resulting representations of the patient journeys in this document are a tidied up copy of what the groups identified on the butcher’s paper. It should be noted that these pathways were relatively complex and most groups did not complete the entire journey.

Part B – the future state
During the second part of the workshop, groups were asked to identify what they thought an ideal state would look like in the future. At the end of this stage, the groups again reported back via rolling presentations. The groups were asked to be transformational in their thinking.