

- Language services.

External:

- GPs and community specialist consultants;
- Residential Aged Care facilities; and
- Ambulance and non-emergency patient transfer services

Ideally, infectious diseases services would be proximal to the winter surge and COVID beds.

12.7. CHALLENGES AND OPPORTUNITIES FOR INFECTIOUS DISEASES

Of course, the COVID pandemic has promoted infectious diseases to the forefront of prevention, treatment, and management across health care more broadly.

It is expected that specific design principles and capacity requirements are built into the infectious disease wards including more isolation rooms, negative pressure and barrier nursing and isolation of areas as required.

13. Rheumatology

13.1. SERVICE DESCRIPTION

Rheumatology at CH is a Level 5 service.⁴¹ Rheumatology is a specialty of medicine for musculoskeletal and systemic autoimmune conditions commonly referred to as rheumatic diseases. Rheumatology services provide treatment to alleviate pain, prevent disease progression and joint damage, maintain, or improve joint mobility and assist with managing other associated existing medical conditions. A significant portion of the service is focused on the management of osteoarthritis, osteoporosis, and spinal pain.

The rheumatology inpatient beds are collocated with endocrine and respiratory inpatient PoC and utilise very few bed-days.

Rheumatologists also provide an inpatient consultative service to other specialities and provide support to lower-level services.

The rheumatology outpatient clinic, which is currently located in Building 7, will become part of the outpatient clinics in the redevelopment.

Rheumatology Outpatient services include assessment, treatment, clinical management, and specialised services for all residents of the ACT community and neighbouring regions of NSW, particularly Queanbeyan and South Eastern NSW, and include:

- Rheumatology Biologic Clinic;
- Outpatient clinic is for patients with inflammatory arthritis undergoing biological Disease-Modifying Anti-Rheumatic Drugs therapy;
- General Rheumatology Clinic;
- Rheumatology related conditions, i.e., suspected inflammatory Arthritis (Rheumatoid Arthritis, Psoriatic Arthritis, Ankylosing Spondylitis, Connective tissue disease);
- Rheumatology Early Arthritis Clinic;
- Clinic aimed at identifying and treating patients with early inflammatory arthritis, i.e., early morning stiffness and swelling, raised inflammatory markers, psoriasis, inflammatory bowel disease or family history of inflammatory arthritis, or positive rheumatoid;
- Outpatient clinic Rheumatology MINERVA Clinic;
- Outpatient clinic for people with likely early inflammatory rheumatic disease who have a willingness to participate in research programs consisting of clinical trials; and
- Paediatric Rheumatology Clinic.

Outpatient clinic aimed at identifying and treating children and adolescents with early inflammatory arthritis and connective tissue disease who are aged less than 18 years of age.

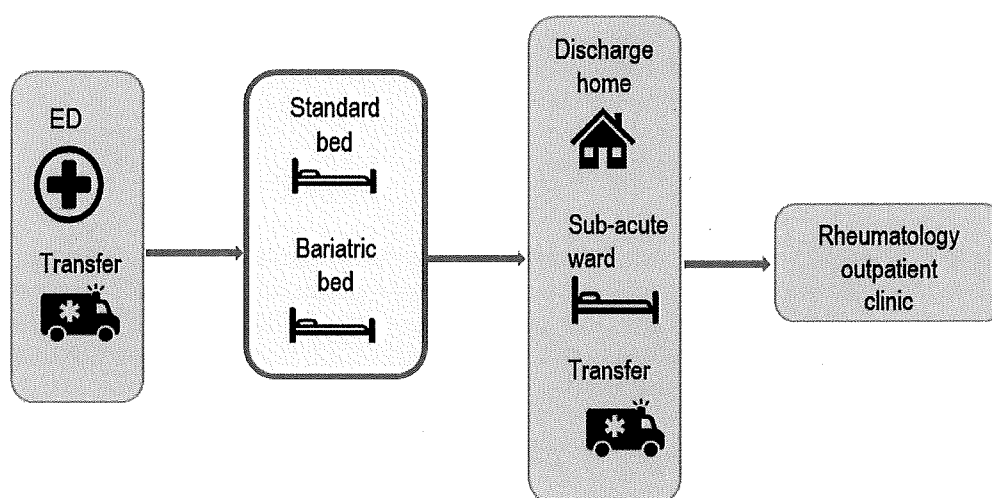
41. NSW Health, *Guide to the Role Delineation of Clinical Services*, 2021. Available: <https://www.health.nsw.gov.au/services/Publications/role-delineation-of-clinical-services.PDF>

13.2. PATIENT PATHWAY

The patient pathway for Rheumatology inpatients is shown in Figure 13-1 below. Patients requiring overnight or ongoing acute care are admitted to a General Medical unit under the care of a Rheumatology physician.

A patient may step down from ICU and be admitted to the General Medical unit, or a patient may have escalating care requirements and be transferred from the ward to the ICU. Follow-up care and monitoring is through the Rheumatology outpatient clinic.

Figure 13-1: Rheumatology patient pathway



13.3. WORK PROCESSES

13.3.1. Hours of operation

Rheumatology admits and cares for patients 24 hours a day, 7 days a week. Rheumatology medicine outpatient clinics provide ongoing monitoring and treatment.

13.3.2. Care planning

The treating team will establish a care plan for each patient admitted to the unit. The care plan will outline the care pathway, the team members to be involved in patient care (including multidisciplinary staff), special considerations relating to individual patient (or family/carer) needs, and the expected discharge date, destination and supports to be provided (by whom) following return to the community. Any deviation from the initial patient pathway will be documented, noting additional services required.

13.3.3. Conditioning

Allied health bed-based therapy will be provided to inpatients as soon as possible after admission to support early rehabilitation and patient mobility. A multi-purpose gymnasium will also be available for therapy with Allied Health practitioners, focusing on mobility, strength, and activities of daily living.

13.3.4. Patient transfer and discharge

Patients may require transfer to other clinical services within CHS. Transfers may be temporary, such as to medical imaging. Some patients may also be transferred to the ICU for more intensive monitoring or management. Patients may also be transferred to the North Canberra Hospital for subacute care.

If a bed or chair in the Discharge lounge is available, the patient will be transferred into the lounge to await discharge summary, medications, and transport to their end destination point. This can be by private transfer, taxi or ambulance dependent on discharge destination.

A Rheumatology Advanced Practice Nurse provides clinical care and education as well as coordinating investigations and appointments for patients with inflammatory arthritis undergoing biological Disease-Modifying Anti-Rheumatic Drugs therapy. Follow up care may be provided through a GP, Dermatologist, or a Community Service.

13.4. WORKFORCE

The workforce to support a Level 5 service includes a Rheumatologist as well as a medical officer with at least 3 years of post-graduate experience, which may be with the RACP. On-site coverage for 24 hours per day is required, however, this could be a medical officer covering multiple sub-specialities overnight. Allied Health professionals with specific skills in musculoskeletal conditions should also be available to patients on the ward.

The Rheumatology nursing workforce is shared with Respiratory and Endocrinology and is provided in sections 6.4 and 7.4.

13.5. CLINICAL AND NON-CLINICAL SERVICE SUPPORT FUNCTIONS

Refer to section 19 for clinical and non-clinical supports and separately provided Clinical Support Services Service Model.

13.6. FUNCTIONAL RELATIONSHIPS AND ADJACENCIES

Internal:

- ED;
- Dermatology;
- Medical Imaging;
- Pharmacy;
- HITH;
- Pathology;
- Outpatients;
- ICU;
- Allied health;
- Language services.

External:

- GPs and community specialist consultants;
- Residential Aged Care facilities
- Ambulance and non-emergency patient transfer services

13.7. CHALLENGES AND OPPORTUNITIES FOR RHEUMATOLOGY

The Territory Government has committed to the develop rheumatology services and to realign the expected clinical capability levels. On this basis, it will be important that the service is able to clearly articulate the future scope and inter-relationships between rheumatology at the clinical level determined.

14. Palliative Care / Comfort Interventional Care

Palliative care is 'practiced' in many inpatient settings at CH. To date, there has been no dedicated palliative care inpatient service. The Territory Government has committed to the development of an inpatient palliative care service at CH.

"Introduce more end-of-life treatment and care options, including a palliative care ward at the Canberra Hospital, enhanced after hours palliative care, palliative care respite facility for carers and a scoping study for a secular hospice".⁴²

Provision has been made in this Service Model for a new dedicated palliative care service in the redevelopment. The number of inpatient POC would be determined following a demand analysis that differentiates service volumes for community-based care and a secular hospice as noted above. For the purposes of this Service Model, a 12-bed unit has been planned.

The Service Model for palliative care will be quite different from other inpatient medical services.

14.1. SERVICE DESCRIPTION

Palliative care provides treatment, care, support, and symptom management of conditions that are life-limiting, with no realistic prospect of cure.

Palliative care is principally client-driven, respecting the rights and wishes of individuals in relation to care and treatment, regardless of their setting. Palliative care has been described as caring for the patient's clinical, emotional, social, and spiritual needs⁴³.

There are two main types of patients that are admitted to a palliative care ward:

- Patients who are in their end stage of their clinical condition and choose not to die at home; and
- Patients admitted for symptom management and stabilisation of condition, who are then suitable for discharge.

Contemporary practice is that care and treatment occur principally in a home/community setting, not in a hospital.

14.2. PATIENT PATHWAY

Patients are admitted to the ward from:

- Emergency Department;
- From other acute and subacute wards; and
- Directly from the community settings

The Service Model should include direct admission from the community for known/existing patients without first having to present to ED. This requires protocols that are supported by the palliative care physicians, and a clinical capability on the ward to admit 24/7. Such models enable earlier provision

⁴² Parliamentary and Governing Agreement, Item 12.3, p23.

⁴³ Palliative Care Australia

of treatment and stabilisation of conditions than would result from the usual process of admission through ED.

Palliative care can be a subspecialty that is introduced late in the patient's progression of their illness, especially for cancers. Introducing the palliative care team early in the process can be beneficial in developing rapport with the team, improving the quality of the patient's life and support for families. Therefore, the preferred Service Model is for a 'pull model' where the palliative care team participates in patient meetings, identifies patients that are likely to be requiring palliative care and works with the currently treating team to 'pull' patients to palliative care. It is often not in the experience of many physicians to provide timely introduction to palliative care in the absence of a 'pull' model.

Discharge should be under the clinical care of the community palliative care program or a hospice, or to home.

14.3. WORK PROCESSES

14.3.1. Hours of operation

Palliative Care admits and cares for patients 24 hours a day, 7 days a week.

14.3.2. Care planning

The treating team establishes a care plan for each patient that incorporates the necessary elements of the community palliative care plan. The care plan outlines the care pathway for their inpatient stay, (including multidisciplinary staff), special considerations relating to individual patient (or family/carer) needs, and the expected discharge date, destination and supports to be provided (by whom) following return to the community. Any deviation from the initial patient pathway is documented, noting additional services required.

There is a particular focus on the drug therapy and other 'conditioning requirements' delivered by allied health and nursing team.

It would be rare for internal patient transfers to other areas of CH, even ICU.

14.4. WORKFORCE

The nature and level of workforce required for the inpatient is expected to be fully integrated with the community palliative care services (and the secular hospice). Contemporary practice suggests that both medical, nursing, and allied health staff may be inter-changeable across service settings. This facilitates improved patient integration and timely care as noted above.

As this is a new service, there is no current staffing profile. The workforce profile would typically include:

- Palliative care physicians (and possibly general physicians);
- Specialised palliative care nurses;
- Nurse Practitioners;
- Various allied health disciplines as needed, which could include practitioners specialising in palliative care; and
- Administrative staff.

14.5. CLINICAL AND NON-CLINICAL SUPPORT FUNCTIONS

Inpatient (or any) palliative care service is expected to have strong relationships with a very broad range of services.

The service model for palliative care needs to be structured so that it enables flexibility.

Palliative care will require ready access to traditional support services, particularly pharmacy and pathology, but also medical imaging. If possible, processes/protocols be established that provide for early/priority access to these services as required. There are also strong connections with other clinical services including social work, psychology, and counselling.

There are connections in contemporary models with:

- Spiritual Support;
- Volunteer groups that specialise in patient and family support.

Refer to section 19 for clinical and non-clinical supports and separately provided Clinical Support Services Service Model.

14.6. FUNCTIONAL RELATIONSHIPS

As an inpatient service, the strongest relationship is with oncology but also with other chronic and degenerative conditions.

Within the CH, the palliative care team can also:

- Contribute to patient meetings and instigate a pull system;
- Lead 'advance care planning' of patients more broadly; and
- Interface with community palliative care, HITH and with outpatient clinics of other specialties where specialist palliative care expertise can contribute to a patient's treatment plan.

The adjacencies of palliative care with other clinical inpatient services are not as important as a setting that can provide an inviting, quiet, home-like, and pleasing aesthetics. Functionally, the palliative care ward can be relatively isolated from other units and should not have passing traffic. Ideally, the palliative care ward should be able to be accessed after-hours without traversing hospital corridors.

The design of the facility will provide for individual rooms that are sufficiently large for family to sleep over, and facilities that operate as close to a home circumstance as possible.

The palliative care ward has no principal adjacency requirements, however, will be frequently serviced by the clinical ward pharmacist.

15. Hospital in the Home

15.1. SERVICE DESCRIPTION

Hospital in the Home (HITH) is a clinical service that substitutes traditional inpatient care in a hospital ward setting with the provision of individualised acute treatments by health care professionals in the patient's home or hospital care setting. HITH is available to adults and delivered 24 hours, seven days per week with on-call provisions after business hours. The Women's and Children's Service are planning a paediatric HITH service in the future.

Patients admitted to the HITH service are classified as inpatients and are considered acute care admissions, but medically stable enough to be treated at home. Patients admitted under HITH require medical and nursing care that is more intensive and / or specialised than could be supported by community-based nursing services, an Outpatient Clinic, community nursing or General Practitioner (GP).

HITH services are provided in patient's home, but can also take place in settings such as clinics, schools, workplaces and / or the HITH unit located at CH. The setting depends on the initial clinical and risk assessment, the HITH Model of Care, patient preference, and available resources. HITH services also occur via telehealth and / or telemonitoring where the risk assessment and patient preference allows.

Attendance to the HITH unit may also be advised for medical review and treatment episodes / procedures that cannot be completed safely outside the hospital setting (i.e., first dose of a parental medication) and patient utilisation of pharmacy, medical imaging, physiotherapy, occupational therapy, social work, psychology, podiatry, and dietician, if required.

As the HITH service sits within the CHS General Medicine governance structure, HITH unit location within the CH is optimal for close collaboration and integrated care with other services and specialities. Access to after-hours on-call medical workforce and opportunities to take part in an established teaching, training, and quality review programs.

Common conditions managed through HITH include:

- Cellulitis;
- Pneumonia, COVID and other respiratory conditions;
- Deep vein thrombosis;
- Chronic obstructive pulmonary disease (COPD);
- Complex wounds;
- Perioperative anticoagulant management; and
- Urinary tract infections.

A future range of services could become much broader.

Atypically, CH also makes extensive provision of day hospital facilities to deliver HITH, that is 11 inpatient PoC located on Level 2 in Building 1, which is set to expand to 31 PoC in the new building to incorporate 18 day infusion chairs and 2 intravenous access chairs. This could be seen as anomalous for a HITH program. In any HITH program there will be cause to 'call in' patients to review

their condition, particularly if there are signs of deterioration and/or a requirement to provide diagnostic test, specimen collection or pharmacy review.

The HITH may benefit from a re-evaluation that would aim to prevent a significant volume of patients coming to hospital to service 11 beds/chairs. This may require strategic and substantial strengthen of the clinical capability of HITH staff, supported by ICT that can deliver real-time and broad ranging clinical information of the patient at home.

15.2. PATIENT PATHWAY

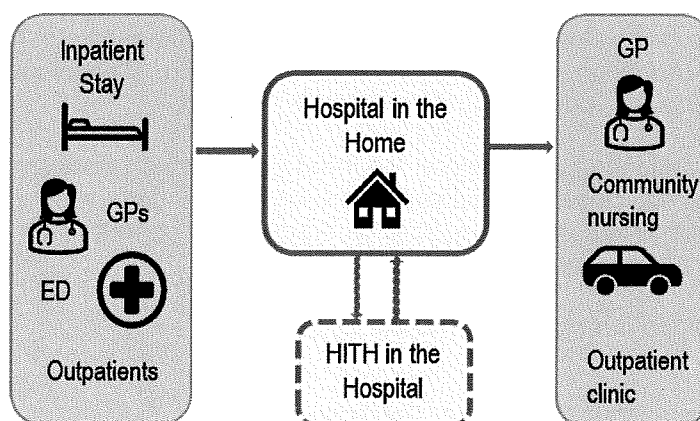
Patients enter HITH as a diversion/substitution service where clinical outcomes can be achieved without having to admit the patient, or without the need to continue to have the patient in an inpatient bed. Referrals to HITH should be able to be generated from:

- ED;
- Outpatients;
- After becoming stable whilst an inpatient stay and meet the criteria of the service.

A well-developed model with clear admission criteria will also take referrals from GPs.

Discharge from HITH occurs once the patient's care needs can be met through GPs, community-based nursing, or outpatient clinics.

Figure 15-1: HITH patient pathway



15.3. WORK PROCESSES

15.3.1. Hours of operation

HITH operates 24 hours a day, 7 days a week. Nursing care is currently provided during business hours only, but patients can access after-hours on-call medical staff.

A future HITH model could be available with active intake and care for expanded business hours.

15.3.2. Care planning

The HITH team will establish a care plan for each patient admitted to the HITH. The care plan will outline the care pathway, the team members to be involved in patient care (including multidisciplinary staff), special considerations relating to individual patient (or family/carer) needs, and the expected discharge date, destination and supports to be provided (by whom) following return to the community. Any deviation from the initial patient pathway will be documented, noting additional services required.

15.3.3. Conditioning

Allied health appointments may form part of the HITH service to provide patients with mobility and strengthening exercises. These appointments are available through HITH in the Hospital.

15.3.4. Patient transfer and discharge

Patients discharged from HITH may require follow-up care through their GP or Community Nursing. Patients may also be monitored through specialist outpatient clinics.

15.4. WORKFORCE

HITH is predominantly staffed by nurses who visit patients in their home (or in other community settings). However, medical staff from General Medicine and allied health professionals support patients in the service.

The number of staff in HITH is a function of volume and the technology available at the time. Hence, the FTE for HITH will vary. It will nevertheless be important for the service to be able to maintain its core capability.

15.5. CLINICAL AND NON-CLINICAL SERVICE SUPPORT FUNCTIONS

Refer to section 19 for clinical and non-clinical supports and separately provided Clinical Support Services Service Model.

15.6. FUNCTIONAL ADJACENCIES

HITH has a broad range of inter-relationships within CH. Indeed, almost all clinical units should have a liaison and referral with HITH. Currently, integrated care occurs with:

- ED;
- Pathology;
- Medical Imaging;
- Oncology inpatients;
- Specialist outpatient clinics;
- Geriatric Rapid Acute Care Evaluation;
- Rapid Assessment of the Deteriorating Aged at Risk;
- CHS Community Nursing;
- CHS Community Allied Health;

- CHS Chemo at Home and Paediatrics at Home;
- Residential Aged Care Facilities; and
- GPs.

15.7. CHALLENGES AND OPPORTUNITIES FOR HITH

All HITH programs suffer from two perennial issues:

- Enhancing the scope of services that can be delivered safely in the home with efficiency; and
- The experience and clinical capability of the HITH staff to function at higher levels (and preferably much higher levels) than the traditional 'district or community' nursing.

The opportunity is to break the mould and to strategically reposition HITH. HITH will be a critically important service of CHS in managing future demand and enabling care closer to home; key planks of government policy. This will require HITH to significantly broaden its range and acuity of services including conditions that today may be 'unthinkable'. These may include, for example:

- Acute cardiology patients;
- Acute stroke patients;
- Medical imaging at home;
- Almost all chronic conditions including respiratory, rheumatology; and
- Same day discharge post-surgery for conditions that would currently require several days stay, amongst others.

Newly designed HTH programs have several key features that transcend the fragility (and medical suspicion) of former models. The key features of a successful HITH service model would appear to include:

- A 'pull system' that actively 'recruits' patients from ED and wards in particular;
- An outcomes assessment process that demonstrates value to more reluctant medical consultants;
- Admission to HITH that can occur after-hours. This makes the service valuable to the traditional hospital departments, particularly the ED and wards with bed pressures;
- Staffed by senior/experienced clinicians that have credibility within the organisation;
- Have targets for volume and % of total acute admissions, as well as quality of care measures; and
- A senior medical resource that can be relied upon to respond to clinical situations that might be out of the purview of nursing or allied health staff.

A second, more short-term, challenge is the perception that HITH is another ward at CH, and the uncoupling of the current 11 Day Medical Beds on Level 2 Building 1 from the HITH program.

16. Dermatology

16.1. SERVICE DESCRIPTION

The Dermatology service at CH is a Level 5 service.⁴⁴

Dermatology involves the treatment of people with problems relating to skin, hair, and nails. The Dermatology unit cares for both inpatients and outpatients, with the following clinics:

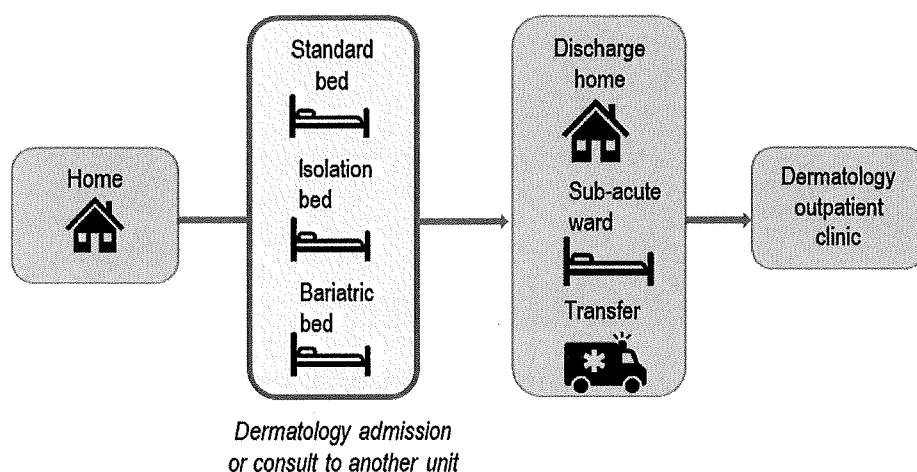
- Adult Dermatology Clinic;
- Paediatric Dermatology Clinic;
- Renal Transplant Dermatology Clinic; and
- Oncology Dermatology Clinic.

Dermatology may also be involved in clinical trials.

16.2. PATIENT PATHWAY

Patients may be admitted to dermatology beds, and Dermatologists also consult patients admitted to other units.

Figure 16-1: Dermatology patient pathway



16.3. WORK PROCESSES

16.3.1. Hours of operation

Dermatology cares for patients 24 hours a day, 7 days a week.

44. NSW Health, *Guide to the Role Delineation of Clinical Services*, 2021. Available: <https://www.health.nsw.gov.au/services/Publications/role-delineation-of-clinical-services.PDF>

Dermatology outpatient clinics provide ongoing monitoring and treatment. Access to outpatients is by appointment, with initial appointment triaged based on the most urgent condition.

16.3.2. Care planning

The treating team will establish a care plan for each patient admitted to the units. The care plan will outline the care pathway, the team members to be involved in patient care (including multidisciplinary staff), special considerations relating to individual patient (or family/carer) needs, and the expected discharge date, destination and supports to be provided (by whom) following return to the community. Any deviation from the initial patient pathway will be documented, noting additional services required.

16.3.3. Conditioning

Allied health bed-based therapy will be provided to inpatients as soon as possible after admission to support early rehabilitation and patient mobility. A multi-purpose gymnasium will also be available for therapy with Allied Health practitioners, focusing on mobility, strength, and activities of daily living.

16.3.4. Patient transfer and discharge

Patients may require transfer to other clinical services within CHS. Patients may also be transferred to the North Canberra Hospital for subacute care. If a bed or chair in the Discharge lounge is available, the patient will be transferred into the lounge to await discharge summary, medications, and transport to their end destination point. This can be by private transfer, taxi or ambulance dependent on discharge destination.

16.4. WORKFORCE

The workforce requirements for a Level 5 service include a consultant dermatologist, as well as a medical officer with three or more postgraduate years of experience; may be in training with the Australasian College of Dermatologists.

16.5. CLINICAL AND NON-CLINICAL SUPPORT FUNCTIONS

Refer to section 19 for clinical and non-clinical supports and separately provided Clinical Support Services Service Model.

16.6. FUNCTIONAL ADJACENCIES

- | | |
|---------------------|----------------------|
| ■ Rheumatology; | ■ Pathology; |
| ■ General Medicine; | ■ Outpatients; |
| ■ Medical Imaging; | ■ ICU; |
| ■ Pharmacy; | ■ Allied health; |
| ■ HITH; | ■ Language services. |

External:

- GPs and community specialist consultants;
- Residential Aged Care facilities.

16.7. CHALLENGES AND OPPORTUNITIES

Both Dermatologists and Rheumatologists are involved in the management of psoriatic arthritis (PsA). Multidisciplinary Dermatology and Rheumatology outpatient clinics (face-to-face and virtual) for PsA are considered to be optimal care.⁴⁵

Benefits of the multidisciplinary model include earlier identification of arthritis, more frequent monitoring of the patient's condition (e.g., of skin and joint manifestations, medications, and disease flares), improved recruitment for clinical trials, and multidisciplinary professional development.⁴⁶

The most frequently reported challenges included scheduling the right mix of patients for a clinic to maximise the time and productivity of both clinicians and demonstrating the value of the clinic to support ongoing operation.⁴⁷

45. Okhovat, J.P., Ogdie, A., et. al, *Psoriasis and Psoriatic Arthritis Clinics Multicenter Advancement Network Consortium (PPACMAN) Survey: Benefits and Challenges of Combined Rheumatology-dermatology Clinics*, The Journal of Rheumatology May 2017, 44 (5) 693-694; DOI: <https://doi.org/10.3899/jrheum.170148>

46. Okhovat, J.P., Ogdie, A., et. al, *Psoriasis and Psoriatic Arthritis Clinics Multicenter Advancement Network Consortium (PPACMAN) Survey: Benefits and Challenges of Combined Rheumatology-dermatology Clinics*, The Journal of Rheumatology May 2017, 44 (5) 693-694; DOI: <https://doi.org/10.3899/jrheum.170148>

47. Okhovat, J.P., Ogdie, A., et. al, *Psoriasis and Psoriatic Arthritis Clinics Multicenter Advancement Network Consortium (PPACMAN) Survey: Benefits and Challenges of Combined Rheumatology-dermatology Clinics*, The Journal of Rheumatology May 2017, 44 (5) 693-694; DOI: <https://doi.org/10.3899/jrheum.170148>

17. Mental Health Short Stay Unit

17.1. SERVICE DESCRIPTION

CH Mental Health Short Stay Unit (MHSSU) is a standalone mental health inpatient unit designed to facilitate short admissions of up to 48 hours. All clients must be assessed in a face-to-face assessment by a Psychiatry Registrar for an admission to MHSSU. Admissions from other sources are also considered pending assessment of suitability by MHSSU consultants.

The MHSSU provides:

- Psychosocial assessment, short term stabilisation, brief therapeutic intervention, and organisation of follow up care for primary mental health issues, provided by the multidisciplinary team (medical, nursing, allied health clinicians);
- Medical assessment and support for concurrent physical health issues;
- Assessment and treatment for concurrent AOD issues;
- Other supports as required, e.g., Aboriginal Liaison Officers, peer workers; and
- Close liaison with community health providers (e.g., Community MH Teams, General Practitioner (GPs), family and carers, as well as Non-Government Organisation supports.

Clients are deemed ineligible for MHSSU admission if they are:

- Likely to require a mental health admission extending beyond 48 hours;
- Under the age of 18 years;
- Not assessed as medically stable by a member of the ED medical staff;
- Exhibiting aggressive behaviours;
- Exhibiting signs of delirium, overt confusion, or decreased level of consciousness;
- Have a primary diagnosis of dementia, developmental disability, or traumatic brain injury (unless they are experiencing a significant psychiatric disorder);
- Frail elderly; or
- Intoxicated from alcohol or other drugs; or
- Experiencing a primary diagnosis of drug or alcohol related conditions without significant mental health co-morbidities.

Clients who are referred from the ED (or other sources) and accepted as eligible and appropriate for care are formally admitted to the unit for observation and management.

The MHSSU, as part of the CH, is an approved and gazetted facility, and is able to accommodate clients under specific legislative arrangements, including under the Mental Health Act 2015 (Section 80) and the Crimes Act 1900 (Section 309).

The future location of the MHSSU is currently being determined, weighing the models of care and the available spaces. Ideally, the MHSSU should have close proximity to ED (as the major source of first contact and the need for a joint mental health and emergency medicine response).

17.2. CLIENT PATHWAY

Many of the admissions to MHSSU will likely come via the CH ED, however a smaller number of direct admissions from community teams as well as admissions from other hospitals e.g., Northside, are expected.

Most clients will initially present to the ED, where they will be:

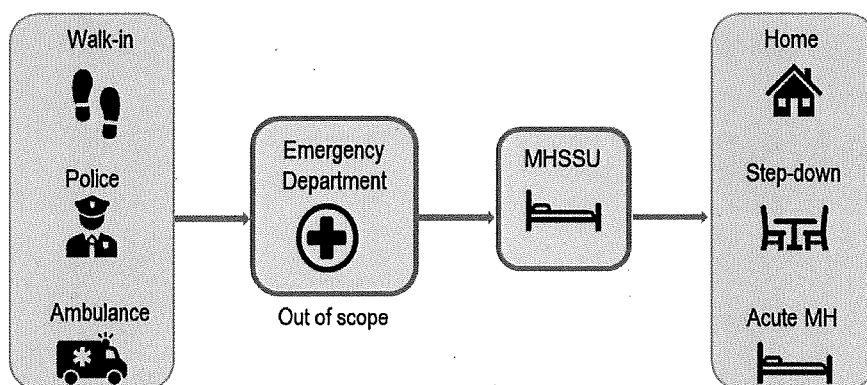
- Registered and triaged at the main ED reception;
- Assessed by a medical officer to determine any issues requiring medical treatment;
- Provided with a mental health screening by ED staff;
- Referred for assessment by an ED MH clinical liaison clinician, Psychiatric Registrar or Consultant;
- Assessed to determine the appropriateness of a short stay admission; and
- Approved for admission by a Consultant Psychiatrist.

Following transfer to the MHSSU (refer to Section 17.7), clients will be admitted as an inpatient to the unit.

Clients will typically depart the MHSSU to one of three major destinations.

- Most clients return to their usual accommodation within the community after receiving treatment in the MHSSU.
- Some clients may be referred to adult step-down mental health services in their local area if active monitoring and support is required.
- A small percentage of clients may be transferred to a longer stay acute mental health service for ongoing treatment and care.

Figure 17-1: MHSSU client pathway



17.3. WORK PROCESSES

17.3.1. Hours of Operation

The MHSSU will operate 24 hours per day, seven days per week.

17.3.2. Care Planning

All mental health clients admitted to the MHSSU receive timely and accessible care that is safe, person centred, recovery focused, harm minimising, trauma informed, sensitive and responsive to cultural and individual diversity, and optimised to an individual's lifestyle and living environment. Specific interventions provided by the unit include the establishment of pharmacological treatments, recovery focussed interventions (e.g., brief therapy), psychoeducation, and ongoing care planning.

17.4. WORKFORCE

The staff profile in the MHSSU requires a skilled workforce adept at assessing and treating people presenting in mental health crisis.

Accordingly, the unit is comprised of a specialist medical, nursing, and allied health team with access to additional support from the extended Adult Acute Mental Health unit. In-reach specialist consultation services will also be provided (e.g., Alcohol and Drug Service, Mental Health Service for People with and Intellectual Disability, Older Persons Mental Health Service, Aboriginal Liaison Service).

It is anticipated that the MHSSU will require a range of different staff comprising:

- Medical staff, including a Staff Specialist, Psychiatry Registrar, and Junior Medical Officer.
- Nursing staff, including Nurse Unit Manager, Clinical Nurse Consultant, Registered Nurses, Enrolled Nurses, and Assistants in Nursing.
- Allied health staff, including Social Workers, Psychologists and Occupational Therapists.
- Clerical staff, including an Administrative Officer.

17.5. CLINICAL AND NON-CLINICAL SUPPORT FUNCTIONS

Refer to section 19 for clinical and non-clinical supports and separately provided Clinical Support Services Service Model.

17.6. FUNCTIONAL ADJACENCIES

Internal:

- ED;
- Pharmacy;
- Pathology;
- Allied health;
- Medical specialties.

External:

- Ambulance and non-emergency patient transfer services;
- PACER (Police, Ambulance and Clinician Early Response); and
- Community Mental Health programs.

The ED is a critical adjacency, whilst the Adult MH unit is also an important adjacency.

17.7. CHALLENGES AND OPPORTUNITIES

The proximity of MHSSU to the ED in the Critical Services Building will determine access and model of care for presenting mental health patients who are suitable for the SSU. If the location of the MHSSU is adjacent to ED, the ED physicians will provide any emergency medical treatment required to the mental health clients in collaboration with specialist mental health staff, including psychiatrists.

If the location of the MHSSU is not adjacent to the ED, the medical care of mental health clients and a safe mode of transport will need to be determined.

18. Discharge / Transit Lounge

18.1. SERVICE DESCRIPTION

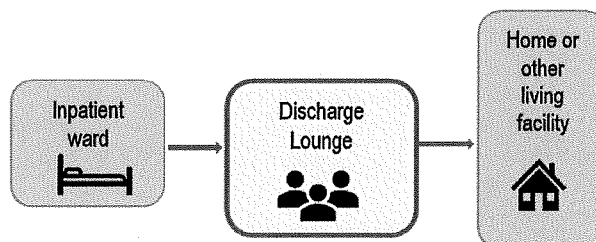
The **Discharge / Transit Lounge** will consist of 10 chairs, 1 isolation room and 8 beds. The discharge lounge is a transition area for patients prior to going home, or prior to being transferred to another facility.

The Discharge / Transit Lounge supports effective patient flow, by increasing discharge rates in inpatient beds prior to noon, which increases the turnover of inpatient beds and supports flow through the ED and operating theatres.

18.2. PATIENT PATHWAY

Ambulatory patients awaiting discharge may be from any inpatient unit in the hospital, or from ED. They may be awaiting discharge home, transfer to other regional or local hospitals and transfer to nursing home/ care facilities.

Figure 18-1: Discharge Lounge patient pathway



18.3. WORK PROCESSES

The operating hours of the Discharge / Transit Lounge are Monday to Friday 0700 hours until 2130 Hours.

18.4. WORKFORCE

The workforce will be sufficient to enable some level of monitoring but not direct patient care. It is most likely that the area is staffed by an EN.

18.5. CLINICAL AND NON-CLINICAL SUPPORT FUNCTIONS

Refer to section 19 for clinical and non-clinical supports and separately provided Clinical Support Services Service Model.

18.6. FUNCTIONAL ADJACENCIES

The Discharge / Transit Lounge must be located with the inpatient wards. It should also be easily accessible for family/carers who are going to transport the patient home. Other important adjacencies for the Discharge / Transit Lounge are Pharmacy for discharge medication, and the Equipment Service for the provision of home aids.

18.7. CHALLENGES AND OPPORTUNITIES

A common challenge with Discharge / Transit Lounges is a lack of buy-in, ownership and trust from ward clinicians that the Discharge / Transit Lounge is the right place for their patients to go prior to discharge, leading to the Discharge / Transit Lounge being underutilised. Similarly, ward clinicians may not have the time required to assess the appropriateness of a patient to go to Discharge / Transit Lounge.

Another challenge with Discharge / Transit Lounges is being able to measure the effectiveness of the service in terms of patient flow (inpatients and ED), patient quality of care and patient satisfaction.

19. Support Services

19.1. CLINICAL SUPPORT SERVICES

A separate Clinical Support Services Service Model has been developed. Below is a short summary of the services.

Descriptions of the key clinical support services for in-scope medicine are:

- **Medical Imaging**, which is described in the Clinical Support Services Service Model (separately provided);
- **Pathology services**, which is described in the Pathology Service Model (separately provided);
- **Pharmacy services**, which is described in the Clinical Support Services Service Model (separately provided); and
- **Infection Control and Prevention.**

Each of these will be described more fully in the Functional Design Brief as it relates to the new Buildings to be developed.

19.2. NON-CLINICAL SUPPORT SERVICES

These include:

- Bio-Medical Engineering;
- Communications and Information Technology;
- Courier and Transport;
- Engineering and Maintenance;
- Fleet Management;
- Food Services;
- Linen Services;
- Patient/Visitor Access/Wayfinding;
- Portering;
- Quality and Risk;
- Security Services;
- Supply and Waste Management; and
- Volunteers.

All of the support functions need to ensure that they seamlessly interface with the clinical and patient services as needed.

The basis for the interface will be different for each non-clinical support service based on the buildings within which they operate or provide services. These issues are incorporated in the Functional Design Briefs to the extent that they are germane to the design and function of the new facilities.

A1. Canberra Hospital Role Delineation

The Role Delineation for clinical services provided by Canberra Hospital were obtained from the ACT Health Services Plan, 2022 - 2030⁴⁸

Service	2021		
	Canberra Hospital	UCH	CPHB
Core services			
Anaesthesia and recovery	6	NPS	4
Operating Suite	6	NPS	4
Intensive Care Service	6	NPS	4
Nuclear Medicine	6	NPS	4
Radiology and Interventional Radiology	6	2	5
Pathology	6	2	5
Pharmacy	6	2	5
Emergency medicine			
Emergency Medicine	6	NPS	4
Medicine			
Acute Stroke Services	5	NPS	4
Cardiology and Interventional Cardiology	6	NPS	4
Chronic Pain Management Services	4	3	NPS
Clinical Genetics	4	NPS	NPS
Dermatology	5	NPS	3
Drug and Alcohol Services	5	NPS	1
Endocrinology	6	NPS	3
Gastroenterology	6	NPS	4
General and Acute Medicine	6	NPS	4
Geriatric Medicine	6	5	4
Haematology	6	NPS	3
Immunology	6	NPS	4
Infectious Diseases	6	2	5
Neurology	5	NPS	4

48. ACT Government, Health, *ACT Health Services Plan 2022-2030*, available <https://www.health.act.gov.au/about-our-health-system/planning-future/act-health-services-plan-2022-2030#:~:text=The%20ACT's%20population%20is%20growing,and%20effective%20care%20for%20everyone.>

Oncology — medical	6	NPS	2
Oncology — radiation	6	NPS	NPS
Palliative Care	4	NPS	2, CHH 6
Rehabilitation Medicine	2	6	2
Renal Medicine	6	NPS	2
Respiratory and Sleep Medicine	6	NPS	3
Rheumatology	5	NPS	2
Sexual Assault Services	4	NPS	1
Sexual Health	5	NPS	NPS

Surgery

Burns	4	NPS	2
Cardiothoracic Surgery	5	NPS	NPS
ENT Surgery	6	NPS	4
General Surgery	6	NPS	4
Gynaecology	6	NPS	4
Neurosurgery	6	NPS	NPS
Ophthalmology	5	NPS	3
Oral Health	6	NPS	NPS
Orthopaedic Surgery	6	NPS	4
Plastic Surgery	5	NPS	4
Urology	6	NPS	4
Vascular Surgery	6	NPS	4

Child and family health services

Maternity	6	NPS	5
Neonatal	5	NPS	3
Paediatric Medicine	5	NPS	2
Surgery for Children	4	NPS	2
Youth Health	4	NPS	NPS

Mental Health

Adult Mental Health	5	2	4
Child and Youth Mental Health	4	NPS	NPS
Older Persons Mental Health	4	NPS	4



ACT
Government

**Canberra Health
Services**

aspex consulting

Canberra Hospital Capital Redevelopment

SERVICE MODEL - SURGICAL AND
PROCEDURAL SERVICES

Final

25 Jan 2024



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LIST OF ABBREVIATIONS

ACE	Acute Care for the Elderly	HDU	High Dependency Unit
ACT HSP	ACT Health Services Plan	HITH	Hospital in the Home
ADLs	Activities of Daily living	HWA	Health Workforce Australia
AI	Artificial Intelligence	ICU	Intensive Care Unit
CSB	Critical Services Building	IPU	Inpatient Unit
CH	The Canberra Hospital	MI	Medical Imaging
CHS	Canberra Health Services	NSW	New South Wales
COTU	Care, Optimisation and Transition Unit	NUM	Nurse Unit Manager
COVID	Corona Virus Infectious Disease	PACU	Peri-Operative Care Unit
DOS	The Division of Surgery	POC	Points of Care
DOSA	Day of Surgery Admission	RMD	Reusable Medical Devices
ED	Emergency Department	SSD	Sterilising Services Department
FDB	Functional Design Brief	UCH	University of Canberra Hospital
GP	General Practitioner		

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VERSION CONTROL

VERSION	DESCRIPTION	ISSUED TO	ISSUED BY	DATE OF ISSUE
1.0	Surgical inpatient and outpatient Service Model	CHS	Aspex Consulting	3 July 2023
2.0	Inclusion of comments from CHS Clinical Liaison and Health Facility Planning team	CHS	Aspex Consulting	16 July 2023
3.0	Inclusion of comments from CHS Clinical Liaison and Health Facility Planning team	CHS	Aspex Consulting	19 July 2023
4.0	Clarification of WYC theatre use and location	CHS	Aspex Consulting	19 July 2023
5.0	Revised patient pathway emergency WYC surgery	CHS	Aspex Consulting	24 July 2023
6.0	Clinical Lead comments	CHS	Aspex Consulting	7 August 2023
FINAL	Incorporation of all ACTHD comments	CHS	Aspex Consulting	25 Jan 2024

1. Introduction

1.1. PURPOSE

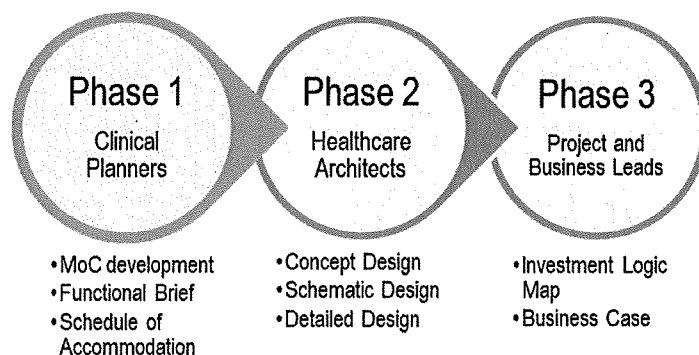
This Service Model focuses on surgical and procedural inpatient and outpatient clinical services that are in scope for the Phase 2 redevelopment at the Canberra Hospital (CH) and outlines *how* services are planned to be delivered in the future.

Phase 2 of the redevelopment plans will replace *like-with-like* capacity in the new facilities, not necessarily *like-with-like* space. This is to be based on translating the existing points of care (POC)¹ in the new facilities. New evidence, new technologies, changes in clinical practice, or more efficient or innovative ways of working may result in the *like-with-like* capacity replacement contributing to meeting future demand.

This Service Model incorporates the scope and clinical level of service, the care setting, patient pathway, coordination and integration between services, workflow, and work processes, and the indicative POC.

The information in this Service Model will input into the Functional Design Brief (FDB) and the Schedule of Accommodation SoA), which will be used to inform the new building concept designs. The steps are outlined in Figure 1-1.

Figure 1-1: Canberra Hospital Capital Redevelopment planning phases



1.2. APPROACH

This draft Service Model has been developed in partnership with the Canberra Health Services (CHS) Clinical Liaison and Health Facility Planning team in the Capital Project Delivery and Infrastructure and Health Support Services Division.

¹ A Point of Care is defined as a place where a patient receives definitive care. This would typically include beds, ED cubicles, operating theatres, labour wards, outpatient clinics, chairs for chemotherapy/dialysis amongst others. It would not normally include recovery spaces from theatre, discharge lounges, other general patient spaces that does not deliver definitive care

2. Service Model Context

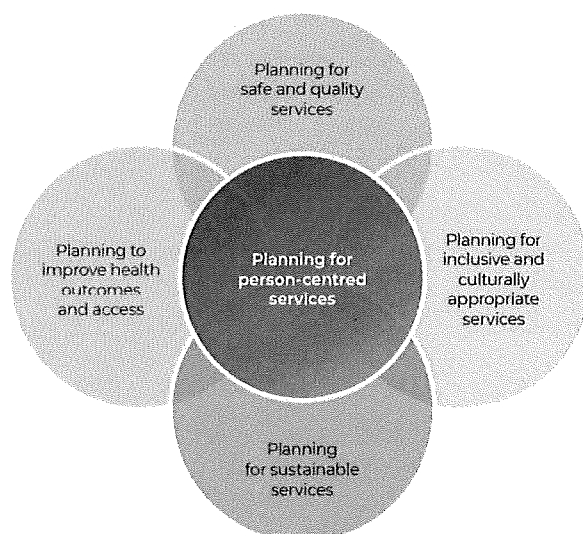
This section provides context within which the Service Model has been developed. It specifically includes:

- ACT Health's planning principles;
- CHS' future directions;
- Overarching key drivers of change;
- System-wide service innovations; and
- Service model options.

2.1. ACT PLANNING PRINCIPLES

The following principles underpin the *ACT Health Services Plan* (ACT HSP) 2022-2030². These principles also accord with the development of this Service Model.

Figure 2-1: ACT Health Service Planning Principles



Person-centred services - The ACT Government consults with consumer and carers so that services are planned to treat consumers with dignity and respect; the ACT Government makes it easier for people to access services equitably, to move between services across the health system, and to partner with health professionals to participate in decisions about the services provided to them.

Inclusive and culturally appropriate services - The ACT Government consults with groups underrepresented in the healthcare system so that services are planned to be inclusive and culturally appropriate and targeted to specific health needs where necessary.

2. ACT Government, Health, *ACT Health Services Plan 2022-2030*, available <https://www.health.act.gov.au/about-our-health-system/planning-future/act-health-services-plan-2022-2030#:~:text=The%20ACT's%20population%20is%20growing,and%20effective%20care%20for%20everyone.>

Safe and quality services - Planning is guided by evidence-informed policy directions, and the ACT Government continually strives to plan for services that improve health outcomes, experiences of receiving care, experiences of providing care, and effectiveness and efficiency of care.

Health outcomes and access - Planning is guided by evidence-informed policy directions, with specific focus on at-risk and priority population groups; planning the right service, at the right time, in the right place, by the right team, every time.

Sustainable services - The ACT Government maximises the use and efficient allocation of limited resources by taking a Territory-wide approach to planning services across the ACT public health system, guided by clear role delineations, service levels, and evidence informed policy directions: service planning activities are prioritised based on need.

2.2. CANBERRA HEALTH SERVICE VISION AND SERVICE DIRECTION

CHS' vision is to '**Create exceptional health care together**'³. Improving the quality of healthcare across the ACT is a key priority for CHS as it aims to be the safest healthcare system in Australia, delivering high-quality, person-centred care that is effective and efficient.

Specifically, CHS will provide health care that is:

- Person-centred: providing care that is respectful, responsive, and focused on the patient's needs;
- Safe: avoiding harm to patients from care that is intended to help them;
- Effective: providing services based on scientific knowledge and which produce a clear benefit;
- Timely: reducing waits and sometimes harmful delays;
- Efficient: avoiding waste and reducing unit costs; and
- Equitable: providing care based on clinical need, and that does not vary in quality because of a person's personal circumstances.

Consumer Principles

A fundamental component of patient-centred care is recognising and understanding the consumer perspective of the service. Central to patient-centred care are the themes of Participation, Communication, Experience and Support. These themes form the basis for Consumer Care Principles, the guiding principles for the Service Model. The Consumer Care Principles are:

- Participation: consumers (and where appropriate their family members and carers) will be equal partners within the multidisciplinary care team, enabling them to be actively involved in their own care;
- Communication: embedding frequent and meaningful communication with consumers, their family members, and carers, about their care for their entire hospital journey, including discharge;
- Experience: care is delivered in a way that supports the consumers' experience of safety and fosters trust; and
- Support: recognising the importance of involving family and carers in the consumer's care and recovery throughout their health journey.

³ https://www.canberrahealthservices.act.gov.au/_data/assets/file/0005/1933187/CHS-Exceptional-Healthcare-Framework_V7_DigitalFA.pdf. July 2023

2.2.1. CHS Future Directions

Canberra Health Services' future service directions are set out in the *ACT Health Services Plan, 2022–2030*.⁴ The desired outcomes from each of the directions are also articulated. These are outlined below.

Addressing key areas of service demand and reform

- Improve health outcomes and access to care, with a particular focus on priority population groups.
- Support access to the services experiencing most significant demand pressures.
- Ensure our services are flexible and inclusive to respond to individual needs and circumstances.

Transitions of care

- Improve health outcomes and access to care.
- Make it easier for patients, families/carers, and service providers to navigate the service system.
- Address issues of patients 'falling through the gaps' as they move between services and care settings such as between hospital and the community.
- Break down the barriers and silos between services.

The ACT's role as a local, Territory and regional service provider

- Improve access to care closer to home in a safe and sustainable way.
- Reduce unwarranted variation between services.
- Maximise the efficient use of health resources to meet the needs of the community.

Strengthening core ACT Government funded clinical support services

- Improve patient outcomes and reduce length of stay in hospital.
- Ensure that our clinical support services have the appropriate capacity and capability to support new and expanded clinical services.
- Optimise clinical decision making in determining the most appropriate treatment and care for patients.

Specific Surgery Initiatives

The ACT HSP⁵ also outlines specific areas of focus with actions for surgical services. These are:

Develop a Territory-wide **public surgery plan** that:

- Ensures long-term sustainability for public emergency and elective surgery delivery;
- Identifies future workforce requirements;
- Identifies infrastructure requirements;
- Maps the current and predicted future service case-mix;
- Identifies opportunities for service innovation;
- Identifies strategies to manage patient comfort while waiting for surgery; and
- Considers cross-border arrangements.

4. ACT Government, Health, *ACT Health Services Plan 2022-2030*, available <https://www.health.act.gov.au/about-our-health-system/planning-future/act-health-services-plan-2022-2030#:~:text=The%20ACT's%20population%20is%20growing,and%20effective%20care%20for%20everyone.>

5. ACT Government, Health, *ACT Health Services Plan 2022-2030*, available <https://www.health.act.gov.au/about-our-health-system/planning-future/act-health-services-plan-2022-2030#:~:text=The%20ACT's%20population%20is%20growing,and%20effective%20care%20for%20everyone.>

Increase capacity for emergency and elective surgery services across the ACT, including:

- Identify opportunities for further emergency surgery delivery to respond to increasing demand;
- Redistribution of elective surgery to maximise Territory-wide capacity;
- Improve management of wait lists by surgical specialty;
- Expand capacity of specialty surgery including plastic and reconstructive surgery, ENT surgery, orthopaedic surgery, vascular surgery, urology, paediatric surgery, and general surgery; and
- Establish a territory-wide public endoscopy waiting list and review opportunities to establish Territory-wide public waiting lists for procedures.

Improved application of ***care plans as part of pre-admission planning***, which covers a comprehensive list of areas including:

- Identification and culture;
- Clinical assessment;
- Falls, cognition, and pressure injury;
- Goals of care;
- Activities of Daily living (ADLs);
- Planned interventions;
- Monitoring requirements,
- Care team supports pre- and post-surgery (e.g., family, clinical, allied health and key discharge planning etc); and
- Post-surgical home supports including weight, nutrition, and oral health.

Establish a profile of ***procedures that can be undertaken in ambulatory or procedural settings*** to reduce demand on hospital-based theatres and consider the development of infrastructure to enable the delivery of day surgery away from hospitals.

Undertake a ***cost benefit analysis/feasibility study for the development and sustainability of robotic surgery in the ACT***, with a particular focus on:

- Urology, gynaecology, and cardiothoracic surgery;
- Patient outcomes benefits;
- Workforce issues;
- Cost of equipment and infrastructure modifications required;
- Equipment maintenance and end of life replacement;
- Training, set up time; and
- Volumes of procedures.

2.2.2. Learning, Teaching and Research

CHS' *Clinical Learning and Teaching Strategy 2023 – 2027*⁶ provides the overarching vision, goals and strategic commitments to clinical learning and teaching. The six Strategic Commitments are:

- Strengthen governance and processes to prioritise and enable learning and teaching.
- Prepare and support the clinical workforce to work safely and effectively at the leading edge of their practice.

6. ACT Government, *Clinical Learning and Teaching Strategy 2023 – 2027*. Available: https://www.canberrahealthservices.act.gov.au/__data/assets/pdf_file/0012/2222040/69e04bc4df49dfd4a9ff49375fe0a3bcfd9dd628.pdf

- Develop and support the clinical workforce to deliver effective, innovative, evidence-based teaching and point of care clinical supervision.
- Establish collaborative environments that maximise and enable effective, innovative, and efficient learning and teaching.
- Foster and strengthen strategic partnerships for learning and teaching with clinicians, consumers and carers, communities, and academia.
- Promote, share, and celebrate learning and teaching.

To achieve these strategic commitments, and to develop a contemporary health precinct, a holistic approach to integrated education, training and research activities into the clinical areas will be key. For clinicians, access to teaching and learning will be built into the flow of their day. This means rooms available on each unit or a shared area readily accessible to clinical (patient) areas. To complement the integrated clinical spaces, a teaching and learning hub would provide greater opportunities for education.

The development of teaching and research are embodied in the design of the new facilities through a **tiered approach**, where:

- Tier 1 is teaching/learning as part of the spaces designed where patients are treated/managed including outpatient rooms, ward areas and clinical examination spaces. The key concept here is embedding. These developments would bring CH up to contemporary standards and practices common in newly developed tertiary hospitals;
- Tier 2 is teaching/learning spaces on wards and proximal to patient treatment areas that enable review, collegiate discussions, and virtual learning experiences through meeting/ consultation rooms. This would also provide suitable teaching space associated with formal training for accreditation in clinical specialties; and
- Tier 3 is teaching/learning spaces that are for more formal education away from patient areas that, for an academic tertiary hospital, could be expected to have larger auditorium spaces, academic administration space, teaching demonstration spaces (such as the gross anatomy museum), hi-fidelity simulation spaces for different clinical settings, and consumer experience spaces used for teaching and learning. This could also enable national and international research and large conferences to be held at Canberra Hospital, potentially creating new revenue streams.

The tier 3 type services may be well suited in a separate teaching, learning and conference hub on campus that remains clinically connected. This would be undertaken in collaboration with academic institutions.

Refer to the Clinical Support Service Model for more information on Learning, Teaching and Research.

2.3. OVERARCHING DRIVERS FOR CHANGE

The above strategic and policy positions articulated by ACT Health and CHS are underpinned by a range of drivers for change. The Territory, like other jurisdictions, are facing increasing challenges that are forcing changes in the way people seek and access services. Some of these challenges which are driving change are described below.

Ageing population – the demand for health services is increasing as people live longer with more chronic and multi-morbid conditions. The aged population are high users of health services;

Access for vulnerable population groups – some population groups in Australia experience health inequalities. Aboriginal and Torres Strait Islanders and people from low socioeconomic areas are likely to have poorer health compared to the general population;

Increasing service demand – for elective and emergency surgery, chronic disease, cancer services, and mental health. These have been exacerbated due to the COVID-19 pandemic;

Climate change – has been causing more extreme weather events, such as bushfires and floods. Instances of heat stress, smoke inhalation, food insecurity, and mental health and wellbeing issues are increased for people experiencing extreme weather events; and

COVID-19 – the delivery of healthcare has rapidly changed since the beginning of the COVID-19 pandemic, especially in terms of how and where care is delivered, with a virtual and care closer to home becoming the norm. COVID-19 patients have caused greater pressure on health system capacity, especially in intensive care units and for multidisciplinary teams treating people experiencing the effects of 'long COVID'. Additionally, workforce availability has been significantly impacted, with burnt out staff choosing to leave their professions and with the usual immigrant workforces being unavailable.

2.4. SYSTEMWIDE SERVICE INNOVATION

The drivers of change result in different responses and innovations. These are particularly relevant to this Service Model.

The Territory's health services are exposed to continual external and internal influences which drive innovation in healthcare. The onset of the COVID-19 pandemic accelerated innovation in practice, workforce, technology, and infrastructure. Some of the key innovations that influence this Service Model include:

Care closer to people's homes is now the preferred model of service for any chronic, non-urgent care. This has been made possible via the wide spread adoption of telehealth and telemonitoring, particularly for diabetes, chronic obstructive pulmonary disease, and renal medicine.

For CHS the concept of the services closer to home can be much more than telemedicine, it can push the boundaries of the level of acuity of care that can be delivered at home and in the community with higher clinical capability 'on the ground' and investment in real-time patient technologies. The results would achieve a significantly higher proportion of acute admissions as hospital in the home (HITH).

Increased utilisation of available and emerging technologies. This applies to the current virtual service provision but will also apply to emerging remote clinical treatment and the broader use of artificial intelligence (AI) for diagnosis and patient pathways. AI analyses big data, which are extremely large data sets, to reveal patterns, trends, and associations to predict a diagnosis. From big data a common patient pathway for someone with the same diagnosis can also be obtained. AI in healthcare is currently infantile in Australia.

Patient engagement in healthcare has been increasing to the point where a patient is now at the centre of their care. Patients provide input into their care planning, treatments and care locations and patients are encouraged to discuss any concerns they may have with their treating team. The other aspect of patient centred care is self-management of their risks and lifestyle whilst they are not in hospital, such as tracking their exercise or diet, alcohol consumption or their use of medications. This further encourages patients to become central to their care.

Social prescribing is treating a person holistically and linking a person undergoing healthcare to social supports as required, to relieve social isolation or other factors that may be impacting on that person's mental health and wellbeing. These supports may range from walking groups to book clubs, to financial aid or housing services. Social prescribing models are well established in the United Kingdom and Canada, and they are becoming more prevalent in Australia.

Value-Based Health Care is a contemporary service model designed to develop patient-focused care in a meaningful (structured) way to create enhanced outcomes (value) to the patient and value to the funder. This is a potentially important, albeit radical model to consider in the development of (a selected number of) clinical services that can be 'clustered to deliver end to end' outcomes for patients. The model transcends current hospital structures that are not designed to deliver value to the patient and where there are only very blunt outcome indicators. Value-based Health care models go to the issues of clinical practice controlled by the clinicians and make decisions based on improved outcomes, not traditional patient flow through operational silos.

This is an important consideration as it impacts on the organisation and flow of patients that is not only efficient but improves patient outcomes (value). It is potentially a game-changer.

Nurse Endoscopy models of care. Health Workforce Australia (HWA) launched the Expanded Scopes of Practice Program in February 2012, which has evolved over the last 10 years to a functioning program of training of nurse endoscopists. The program has been successful in innovatively increasing medical specialist workforce productivity, recruitment, and retention. The 'Expanded Scope of Practice – Advanced Practice in Nurse Endoscopy' was also developed to address increasing demand for endoscopic procedures, in particular colonoscopy, after the implementation of the National Bowel Cancer Screening Program. This would appear to be a suitable contemporary model for CHS.

2.5. SERVICE MODEL OPTIONS

At this early stage of the planning for the new surgical services, there are some over-arching options for surgical services.

2.5.1. Location

The diagnostic endoscopy services and the Women, Youth and Children (WYC) theatres need to complement the surgical services in B5 and the Women's, Youth and Children's services in B11. In general terms, the Service Model options for in-scope surgical accommodation are to:

1. Collocate surgery inpatient and outpatients in the same building.
2. Collocate all inpatients – medical and surgical in the same building, with medical and surgical outpatients in a separate building; or
3. Collocate all medical and surgical inpatients and outpatients in the same building.

Each of these broad options will be examined. The final determination will be an 'on balance' determination that considered capital funding, ideal service adjacencies, and the 'yield capacity' of the various (potential) buildings.

2.5.2. Models of Care

More specific models that are important to consider this the Phase 2 Redevelopment are:

A 'pull model' from the Emergency Department (ED) for multi-day stay surgical patients ensures that there is direct surgeon/registrar availability in ED, and protocols that will enable transfer of likely surgical patients to the wards to reduce demand pressures in ED. 'Pull models' are currently in operation in hospitals of similar size and clinical capability as CH. The 'pull model' not only assists with patient flow at the front door, but it also facilitates patient flow through to discharge.

A focus on complex discharge and models that support acute care for the elderly (ACE). This is a key complementary strategy for all surgical wards. It has a focus on patient flow and minimise 'bed blocking'. It is designed to address those aspects of post-surgery care that a more holistic, reduce post-anaesthetic anxiety/delirium, and has a specific attention to factors that inhibit elderly surgical patients from being discharged.

The perioperative medicine model of service emphasises the importance of an integrated, planned, and personalised approach to patient care, before during and after any surgical procedure involving anaesthesia.⁷ This approach requires close, continuous communication, collaboration, and co-ordination between healthcare practitioners at every stage of a patient's surgical journey, from their pre-procedure preparation to their post-operative rehabilitation. The perioperative care team includes everyone involved in a patient's perioperative journey. The perioperative medicine team is led by a medical specialist who will work collaboratively with the surgical team to support safe, effective, and efficient care.⁸

7. <https://www.anzca.edu.au/education-training/perioperative-medicine-qualification/what-is-perioperative-medicine#:~:text=Perioperative%20medicine%20emphasises%20the%20importance,any%20surgical%20procedure%20involving%20anaesthesia.>

8. <https://www.anzca.edu.au/education-training/perioperative-medicine-qualification/what-is-perioperative-medicine#:~:text=Perioperative%20medicine%20emphasises%20the%20importance,any%20surgical%20procedure%20involving%20anaesthesia.>

3. In-scope services

3.1. SURGICAL SPECIALTIES

This surgical Service Model includes the inpatient and outpatient services as outlined in **Error! Reference source not found.** below.

The ACT HSP uses the NSW Role Delineation Framework⁹ to classify the level of clinical capability for each clinical service, as well as for the required supporting services. Role delineation defines the level of clinical complexity for each specialty service provided at a particular facility or setting which will enable the workflow to be directed to the most appropriate facility. Role delineations describe the minimum service requirements, staffing, core support services and other elements necessary for the clinical service to be delivered safely. Levels range from Level 1 (least complex) to Level 6 (most complex). Clear role delineation helps to ensure that planned services can be delivered safely. The Clinical capability and Role Delineation for CH is provided in Appendix 1.

Table 3-1: Canberra in-scope surgical services

Inpatient Specialty Service	Inpatient (Clinical Level)	Outpatients	Anaesthetics	Operating Suite	Close Observation	ICU	Nuclear Med	Medical Imaging	Pathology	Pharmacy
General Surgery	6	x	6	6	-	6	6	6	6	6
Endoscopy	-	-	2	4	-	-	-	3	3	3
Orthopaedics	6	x	6	6	-	6	5	6	6	6
Ophthalmology	5	x	5	5	-	5	5	5	5	5
Otolaryngology / Head and Neck	6	x	6	6	-	6	5	6	6	6
Maxillofacial surgery	5	x	5	5	6	6	-	6	5	5
Plastic Surgery	5	x	5	5	-	5	4	5	5	5
Trauma	-	-	6	6	6	6	-	6	6	-
Pre-Admission Clinic		x								

NSW Health, *Guide to the Role Delineation of Clinical Services*, 2021. Available: <https://www.health.nsw.gov.au/services/Publications/role-delineation-of-clinical-services.PDF>

This Service Model focuses on the inpatient surgical wards and the surgical outpatient clinics for the surgical specialities outlined above. It does not include surgery planned to occur in Building 5 (B5), which is out of scope.

There are two exceptions:

- It is proposed to develop *two standard operating theatres and a shell space for a third* for (urgent and elective) WYC service requirements. The operating theatres will be located in B10 with a link through to B11 WYC services.
- *A new endoscopy suite*. This will increase the number of procedure rooms from three to eight (including five endoscopy rooms, a fluoroscopy room and two bronchoscopy rooms). The endoscopy suite will be located close to the operating theatres in the B5, with a link between the two areas for emergency transport of patients.

3.2. DESCRIPTION AND SCALE OF SERVICES

The Division of Surgery (DOS) caters to adults >16yrs with a surgical condition.

General Surgery at CH provides emergency or elective surgery for a range of surgical conditions. Common conditions include hepatobiliary / pancreatic surgery, upper gastrointestinal surgery, hernia repairs (with or without mesh) and colorectal bowel disease.¹⁰ Surgical patients may also be admitted with complex general surgical injuries under the ACT Trauma Service delineation.

Endoscopy is a procedure that uses an endoscope (a long flexible tube with a light and camera) to observe the inside of the body without performing surgery.¹¹ Endoscopy is used for screening and treating disease. Common types of endoscopies include arthroscopy (joints), bronchoscopy (trachea to lungs), colonoscopy (colon and large intestine), gastroscopy (stomach) and laparoscopy (abdominal organs and female reproductive organs), among others.¹² All of these procedures can usually be done as day procedures.

The gastroenterology outpatient clinics will be co-located with the Endoscopy Suite.

Orthopaedic surgery involves broad range of procedures of the musculoskeletal system, including bones, joints, ligaments, tendons, muscles, and nerves. Common procedures can be urgent or elective total hip, knee and shoulder replacements, and upper and lower limb fractures.

Due to the ageing population, the number of fractured necks of femur admissions are increasing. This cohort of patients are often vulnerable and more complex as they have multiple comorbidities and can live with a diagnosed/undiagnosed cognitive impairment.

There are often a range of associated clinical support functions associated with orthopaedic surgery including:

- Pre-habilitation;
- Trauma stabilisation prior to surgery;
- Due to the duration of procedures, patients can often have delirium/cognitive impairment and require additional nursing support post-surgery;

10. Act Government, Canberra Health Services, *General Surgery*. Available: <https://www.canberrahealthservices.act.gov.au/services-and-clinics/services/general-surgery>

11. Victoria State Government Department of Health and General Surgeons Australia, Better Health Channel, *Endoscopy*, updated 2014. Available: <https://www.betterhealth.vic.gov.au/health/conditionsandtreatments/endoscopy>

12. Victoria State Government Department of Health and General Surgeons Australia, Better Health Channel, *Endoscopy*, updated 2014. Available: <https://www.betterhealth.vic.gov.au/health/conditionsandtreatments/endoscopy>

- Rehabilitation and 'gym' facilities; and
- Occupational therapy and home assessments

Orthopaedics have at least 28 inpatient beds.

Ophthalmology is the diagnosis, management, and surgery of eye/vision disorders. It includes surgical procedures of the eye and other ocular adnexa including eyelids, conjunctival sac, lacrimal drainage system and gland, and orbital contents except for eye and optic nerve. A *like-with-like* capacity would suggest fewer than 1 inpatient POC. CH operates a busy ophthalmology outpatient department that is located in Building 3, and therefore, not in scope.

Otolaryngology / Head and Neck surgeons manage a wide range of conditions including the investigation and treatment of conditions of the ear, nose, throat, and head and neck. This may include nasal and sinus conditions, snoring and breathing problems, tonsillitis, cancer of the throat, voice problems, plastic surgery of the nose and face, hearing difficulties and deafness, and tumours of the head, neck, and ears¹³.

Maxillofacial surgery involves management of the mouth, jaws, face, and neck. Maxillofacial surgeons work with ENT / Head and Neck surgeons. Types of surgery include impacted teeth, dental implant surgery, bone grafting, facial trauma surgery, facial reconstructive surgery and cleft lip and palate surgery.¹⁴

Plastic surgery involves both cosmetic and reconstructive surgery. Breast reconstruction, hand surgery, skin cancer surgery, medicinal leech therapy and skin flap management are all examples of reconstructive surgery.

ACT Trauma Service is ward-based care for people experiencing shock resulting from trauma, blood loss, an allergic reaction or heat stroke. The like-for-like capacity for trauma is included in the general surgery POC estimates.

Pre-Admission Clinic is an ambulatory space for the assessment of patient for suitability of surgery, and the key risks that CH would anticipate for particular patients. The Service Model at CH is that all planned surgical admissions will attend a preadmission appointment prior to the surgery date. The like-with-like Pre-Admission Clinic is eight POC.

Surgical bookings will be colocated with the preadmission clinics. Surgical bookings manage all planned surgery bookings and is the best point of contact if a patient's condition has changed or if they are no longer ready for surgery. Surgical bookings are an administrative service.

Sterilising Services. A separate *Sterilising Services Department (SSD)* is being considered for colocation with the WYC theatres in B10. This will provide a comprehensive specialised sterilising service for reusable medical devices (RMDs) at the level of the Australian Standards (AS 4187:2014).

The requirements include:

- Reprocessing Reusable Medical Devices (RMDs):
 - ▶ Disassembling, cleaning, and disinfecting instruments, trays, and other items requiring reprocessing;

¹³ Australian Society of Otolaryngology Head and Neck Surgeons

¹⁴ Royal Australasian College of Dental Surgeons, *Oral and Maxillofacial Surgery*, updated 2023. Available: <https://racds.org/education/oral-and-maxillofacial-surgery-oms/>

- ▶ Preparing, assembling, and inspecting package instrument trays and packs, including device functionality and safety checks; and
- ▶ Sterilising completed trays and packs and provide disinfected items acceptable for patient use.
- Ensure that all processes meet quality assurance practices;
- Store raw materials/components before they are assembled into instrument trays/packs;
- Distribute sterile items and stock to theatres; and
- Manage RMD purchases, repairs, and maintenance.

Scope Reprocessing. It is expected that the endoscopy suite may have its own SSD for reprocessing scopes. Given the endoscopy suites will be proximal to the Building 5 theatres, then staffing or sterilising efficiencies may ensue.

The cleaning, decontamination and reprocessing of flexible scopes will be in a dedicated area of the Endoscopy unit. The unit will be AS/NZS 4187:2014 compliant. There will also need to be a HEPA-filtered storage cupboard for the reprocessed scopes to hang.

3.3. SURGERY CLASSIFICATION

Although surgery is a relatively small component of the relocating services, the classification of the surgery influences the patient pathway, and therefore capacity and supporting allied health functions.

Surgery may be classified as elective, emergency, or other surgery. Elective surgery is planned surgery that can be booked in advance. A general practitioner (GP) will refer a patient to a surgeon who will determine whether a patient requires planned surgery, and then place the patient on the Elective Surgery Waiting List.

People on the Elective Surgery Waiting List will be assigned an urgency category (1, 2 or 3) depending on the seriousness of their condition. These are defined as:¹⁵

- Category 1: Procedures that are clinically indicated within 30 days.
- Category 2: Procedures that are clinically indicated within 90 days.
- Category 3: Procedures that are clinically indicated within 365 days.

Emergency surgery is required to treat trauma or acute illness after a presentation at the ED or by helicopter transfer. Surgery may be required immediately, or at a later time. Emergency surgery also includes unplanned surgery if someone on the Elective Surgery Waiting List has deteriorated in condition.¹⁶

Day surgery is when a patient can be safely discharged from hospital on the same day they are admitted. They may be a booked admission or come via ED.

15. ACT Government, Health, *Waiting Time, and Elective Surgery Access Policy: Managing Elective Surgery patients in ACT public Hospitals*, July 2016. Available: <https://health.act.gov.au/sites/default/files/2019-02/Waiting%20Time%20and%20Elective%20Surgery%20Access%20Policy.docx>

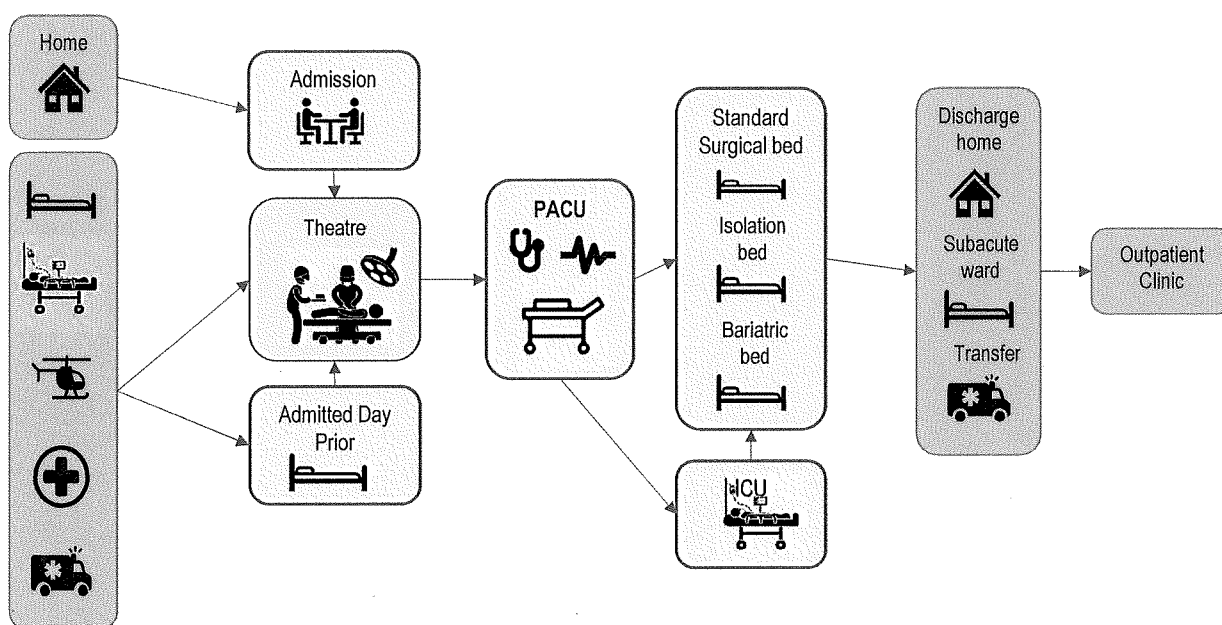
16. ACT Government, Health, *Waiting Time and Elective Surgery Access Policy: Managing Elective Surgery patients in ACT public Hospitals*, July 2016. Available: <https://health.act.gov.au/sites/default/files/2019-02/Waiting%20Time%20and%20Elective%20Surgery%20Access%20Policy.docx>

4. Patient Pathways

This section focuses on a patient's pathway through a surgical inpatient unit (IPU) and outpatient clinic.

As an admitted patient there are three main pathways; an elective/emergency pathway, an endoscopy pathway, and an emergency WYC pathway.

Figure 4-1: Elective and Emergency surgery patient pathways



Patients having **elective or planned surgery** may arrive the morning of their surgery (DOSA¹⁷), or they may arrive the day before, in which case they will stay on the surgical ward on the night prior to surgery. After surgery and after the patient has recovered from anaesthesia, the patient will be transferred to the surgical ward, (or to high dependency unit/intensive care unit) if required before being transferred back to the ward). Upon discharge from the ward a patient would typically be discharged home but may also be discharged to:

- HITH;
- A subacute hospital for rehabilitation;
- Home.

Following a surgical discharge, the patient would be routinely booked into an outpatient clinic approximately six weeks post-surgery. Further follow up outpatient attendances may then be necessary.

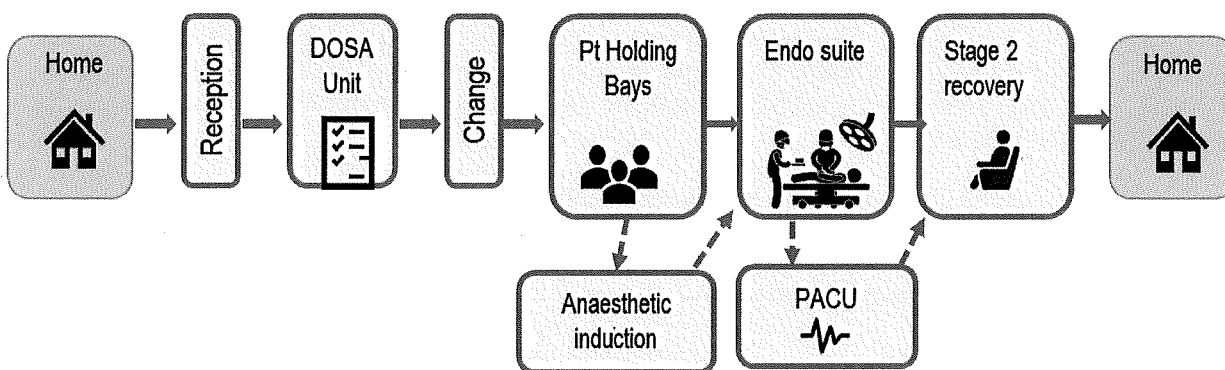
Emergency surgery patients presenting through the ED will either have surgery soon after arrival or will be booked for surgery within the coming days. The patient may go home whilst waiting for surgery if they are stable, or they may require an inpatient stay in a surgical ward whilst waiting for surgery.

¹⁷ Day of Surgery Admission

The **endoscopy** patient pathway is shown in Figure 4-2 below. Endoscopy patients are largely same day stay patients, who arrive on the morning of their procedure, attend the DOSA reception, get changed and then wait in the patient hold area. Not all patients will require anaesthesia.

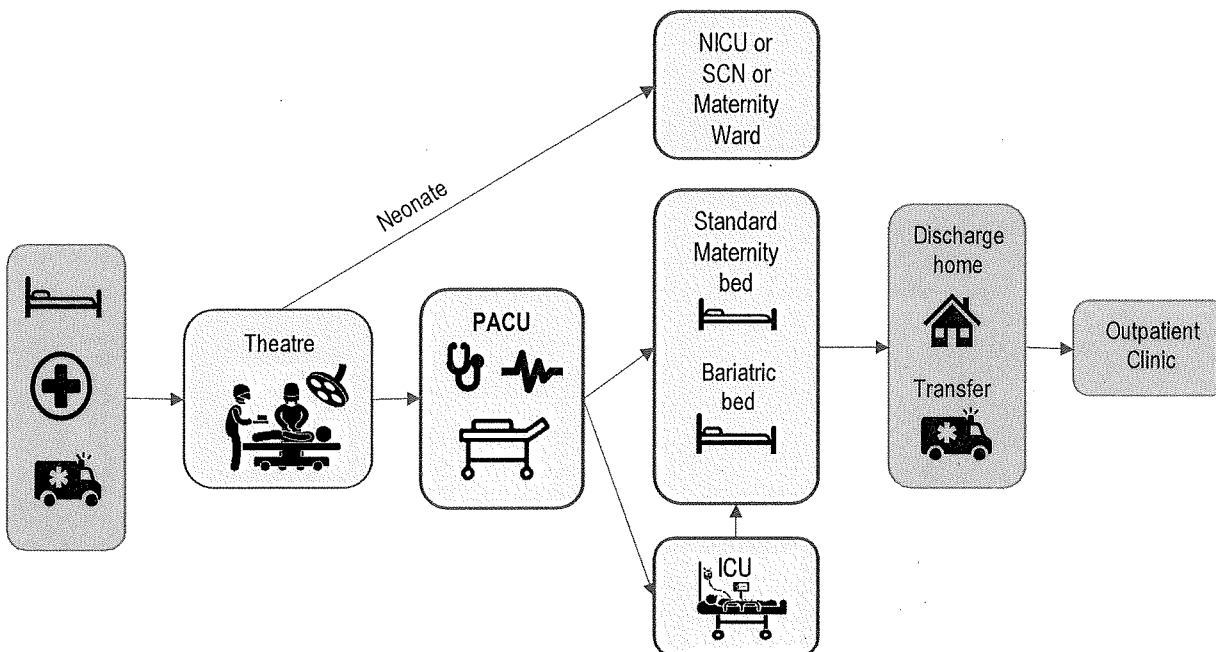
Following the procedure, patients with anaesthesia will recover in the post-anaesthetic care unit (PACU), whilst patients without anaesthesia will go straight to Stage 2 recovery and then be discharged home. There will be a link from the endoscopy suite to the general theatres in B5 to support emergency transfer of the patients to the theatres, or ICU.

Figure 4-2: Endoscopy Patient Pathway



It is recognised that there will be a small cohort of CH inpatients who will require endoscopy procedures. They will return to their ward once stable.

Figure 4-3: Unplanned and Elective WYC surgery pathway



WYC patients will be managed through pathways determined by the service, and generally include a labour or birthing suite.

The model of care for unplanned (that is, emergency surgery including caesarean deliveries) and elective obstetric surgery would require the use of a fully equipped operating suite to be available on an unpredictable basis.

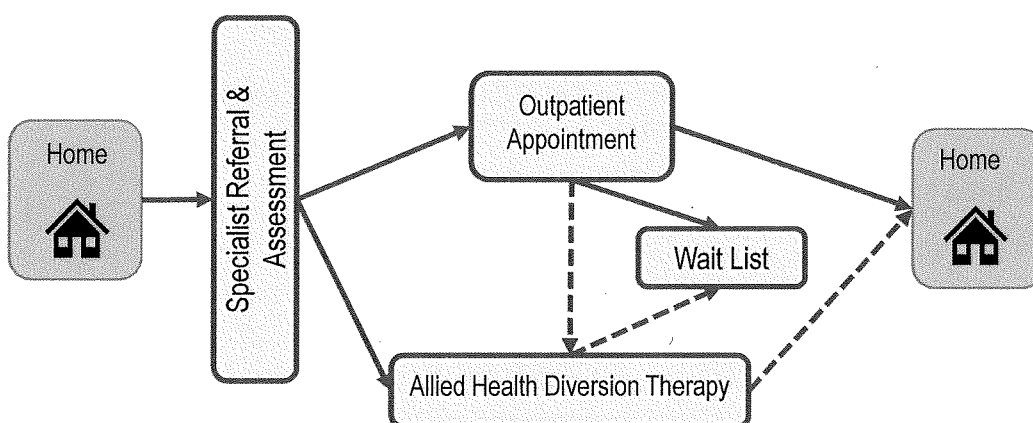
The Phase 2 Redevelopment Project will develop two operating theatres and one shell space in the new Building 10, proximal to the current labour wards in Building 11 Centenary Hospital for WYC surgical services.

Surgery-related outpatients. Many patients referred to surgery outpatients from GPs and other medical specialists will not proceed to surgery.

Some patients will be assessed at the referral stage and diverted to alternative/substitution therapies. Other patients who do require surgery will be placed on a surgical waiting list before a surgical time is booked. The wait is likely to be within a month for the most urgent patients but may be several years for non-urgent cases.

As noted above, outpatient attendances post-surgery will generally be around six weeks for surgery with follow up appointments as needed and referred back to the primary health provider.

Figure 4-4: Surgical Outpatient Pathway



5. Functional relationships

The key internal functional relationships for surgical inpatient wards are broadly represented in Figure 5-1 below.

Figure 5-1: Matrix of Adjacencies for In-Scope Surgical Services and Clinical Support

Relationship Matrix	Medical Imaging - CSB	Pharmacy	Pathology	Health Information Services	General Surgery	Endoscopy	Orthopaedics	Ophthalmology	ENT / Head and Neck	Maxillofacial surgery	Plastic Surgery	Learning & Teaching	Peri-Operative Suite CSB
Medical Imaging - New Core In-Scope MI	3	-	-	-	3	3	3	3	3	3	3	2	3
Pharmacy		x	-	-	3	3	3	3	3	3	3	2	3
Pathology			x	-	3	3	3	3	3	3	3	2	3
Health Information Services				x	-	-	-	-	-	-	-	-	-
General Surgery					x	-	-	-	-	-	-	2	3
Endoscopy						x	-	-	-	-	-	2	2
Orthopaedics							x	-	-	-	-	2	3
Ophthalmology								x	-	-	-	2	3
ENT / Head and Neck									x	1	2	2	3
Maxillofacial surgery										x	1	2	2
Plastic Surgery											x	2	2
Learning & Teaching												x	-
Peri-Operative Suite CSB													x
Legend													
	1	directly adjacent (Horizontal / Vertical)											
	2	easily accessible (less than 3 minutes)											
	3	accessible (3 - 5 minutes)											

In context, there are many other relationships between in-scope surgical units and:

- Care, Optimisation and Transition Unit (COTU);¹⁸
- ED;
- ICU;
- Surgical Services in the Critical Services Building (CSB);
- Medical Imaging;
- Pathology;
- Outpatient clinics;
- Allied Health;
- Discharge Lounge;

18. Currently proposed as of July 2023 - The COTU at Canberra Hospital provides a 20-bed inpatient service. The unit will be governed by the Division of Rehabilitation, Aged, Community and Allied Health Services. The unit will work closely with Division of Medicine and Division of Surgery. The COTU Model of Care facilitates Allied Health and nursing led therapies to defined non-acute patients in one geographical location; Improved access to acute hospital beds in specialty care areas; and Reduction in hospital length of stay through patient centred and targeted maintenance therapy and complex discharge planning.

- Pharmacy;
- Security;
- Environmental Services (food, waste, linen, etc.); and
- Mortuary.

Other units within CHS that the surgical inpatient units will have working relationships with include HITH, outpatient clinics, subacute/rehabilitation services (Northside) and biomedical engineering.

The key external relationships for the Surgical Inpatient Units will be:

- GPs;
- Lower-level health services;
- Residential Aged Care facilities;
- Subacute services (The University of Canberra Hospital); and
- Ambulance and non-emergency patient transfer services.

6. Work processes

The work processes for the surgical inpatient and outpatients will continually be refined over the course of planning and design.

6.1. ACCESS

6.1.1. Hours of operation

The surgical inpatient units will operate 24/7 every day of the year. Importantly, the inpatient units need to safely accept admissions from ED at any hour.

6.1.2. Admission to Ward

Allocation of a surgical IPU bed is determined through a collaborative approach of the Patient Flow Unit, the nurse unit manager (NUM), the surgical subspecialty consultant or registrar, and the patient source, such as ED, intensive care unit (ICU) or other hospital transfer.

Admissions to a ward are consistent with CHS Admission to Discharge Procedure (adults and children).¹⁹ This admission process supports the collaborative development of an individualised care plan and guides the expected date of discharge and discharge planning requirements'.

6.2. CARE PLANNING

The treating team will establish a care plan for each patient admitted to wards. The care plan will outline the care pathway, the team members to be involved in patient care (including multidisciplinary staff), special considerations relating to individual patient (or family/carer) needs, and the expected discharge date, destination and supports to be provided (by whom) following return to the community. Any deviation from the initial patient pathway will be documented, noting additional services required.

Acute Care of the Elderly

A large proportion of our patient cohort consist of adults > 80 years of age who also have pre-existing behavioral and psychological conditions such as delirium and dementia. Many of these patients are admitted under surgical teams following elective or emergency surgery or in some instances, patients are admitted under the aged care team to the ward when aged care beds are unavailable. Inpatient services provide strategies to minimise the risk of further functional decline underpinned by the principles of person-centred practice.

19. Canberra Health Services, October 2021, Procedure – Admission to Discharge Procedure (adults and children), available at [bing.com/ck/a?!&p=eb98407187cec0b8JmItldHM9MTY4ODg2MDgwMCZpZ3VpZD0wYmRjZWE0Y1kZGYxLT4NzMTM2QyZS1mYjQ0ZGM2MTY5ZWMMaW5zaWQ9NTI0MA&ptn=3&hsh=3&fclid=0bdcea4b-ddf1-6873-3d2e-fb44dc6169ec&psq=chs+admission+policy&u=a1aHR0cHM6Ly93d3cuY2FuYmVycmFoZWZsdGhzZXJ2aWNlcy5hY3QuZ292LmF1L19fZGF0YS9hc3NldHMvd29yZF9kb2MvMDAwMy8xOTgxMDkyL0FkbWlzc2lubi10by1EaXNjaGFyZ2UuUHJvY2VkdXJlLWFKdWx0cy1hbmQtY2hpbGRyZW4uZG9jeA&ntb=1](https://www.canberrahealthservices.com.au/ck/a?!&p=eb98407187cec0b8JmItldHM9MTY4ODg2MDgwMCZpZ3VpZD0wYmRjZWE0Y1kZGYxLT4NzMTM2QyZS1mYjQ0ZGM2MTY5ZWMMaW5zaWQ9NTI0MA&ptn=3&hsh=3&fclid=0bdcea4b-ddf1-6873-3d2e-fb44dc6169ec&psq=chs+admission+policy&u=a1aHR0cHM6Ly93d3cuY2FuYmVycmFoZWZsdGhzZXJ2aWNlcy5hY3QuZ292LmF1L19fZGF0YS9hc3NldHMvd29yZF9kb2MvMDAwMy8xOTgxMDkyL0FkbWlzc2lubi10by1EaXNjaGFyZ2UuUHJvY2VkdXJlLWFKdWx0cy1hbmQtY2hpbGRyZW4uZG9jeA&ntb=1)

6.3. CONDITIONING

Allied health bed-based therapy can often provide inpatients with some pre-habilitation as well as post-surgical rehabilitation and conditioning to speed up a full recovery.

It is expected that surgical areas will have access to a multi-purpose therapy space focusing on mobility, strength, and activities of daily living. The most appropriate place is on the orthopaedic ward(s) if possible. Other wards that require types of rehabilitation would benefit from being in close proximity of the orthopaedic physical therapies area.

6.4. PATIENT ADMINISTRATION

The staff stations will provide space for clerking duties. A ward clerk will operate from the main staff station, and as necessary staff stations in the wards.

The reception which will be staffed by administrative staff during normal business hours will have line of sight to the public entry from the public, and the patient lifts.

6.5. AMENITIES FOR PATIENTS, CARERS AND STAFF

Patients will have access to a patient lounge/dining room – an area where the patient can gather with family/visitors. Patients may be ambulant or in a wheelchair. The lounge/dining room should have a variety of seating options available including occasional chairs. The lounge/dining room is to:

- Be arranged so several families and individuals can gather at the same time; and
- Include a beverage bay with microwave, tea and coffee making facilities.

The ward area will ensure provision of sufficient storage space for equipment (such as lifters, wheelchairs, shower chairs, tilt tables and battery charging stations etc).

Staff will have access to end of trip facilities including but not limited to change rooms, lockers, showers, toilets, and drying facilities.

6.6. PATIENT TRANSFER AND DISCHARGE

Patients may require transfer to other clinical services within CHS. Transfers may be temporary and relate to medical imaging or interventional cardiology or radiology labs, for example. Some patients may also be transferred to theatre for planned or unplanned secondary surgical procedures, or to the ICU for more intensive monitoring or management.

Patients will also be discharged home or to alternative living facilities from the ward or via a Discharge Lounge.

7. Workforce

The specific configuration of staff and skills mix for the surgical inpatient units and the outpatient clinics will be determined closer to the commencement of the service. At this stage, there are general workforce requirements, as discussed below.

7.1. MEDICAL STAFF

As the surgical services at CH extend up to Level 6 services²⁰, with the exception of cardiothoracic, plastics and ophthalmology which are Level 5, there are specific requirements for medical staffing, including:

- A Surgical Head of Unit;
- Staff specialists or Visiting Medical Officers;
- Fellow/Registrars; and
- Residents/Interns.

24 hour on-call/on-site coverage is required of specialist staff as well as registrars.

7.2. NURSING STAFF

As per a Level 6 and Level 5 clinical service²¹, there are specific requirements for the nursing workforce in relation to clinical supervision, clinical education, and clinical expertise, including:

- | | |
|--|-------------------------------|
| ■ Assistant Director of Nursing; | ■ Clinical Care Coordinators; |
| ■ Nurse Managers; | ■ Registered Nurses; |
| ■ Clinical Nurse Consultants/Midwives; | ■ Enrolled Nurses; and |
| ■ Nurse Practitioner; | ■ Assistants in Nursing. |
| ■ Clinical Development Nurse/s; | |

The number and skill level of the nurses required to provide the day-to-day care should be based on the number and acuity of the patients within each unit and adhere to the minimum Nursing Hours per Patient Day set out in the ACT Public Sector Nursing and Midwifery Enterprise Agreement, 2020 – 2022.²²

7.3. ALLIED HEALTH STAFF

A range of allied health staff will also be required to complete the mix of multidisciplinary skills required for patient management, including (but not necessarily limited to):

- Pharmacists;

20. NSW Ministry of Health, NSW Health Guide to the Role Delineation of Clinical Services, Third Edition, June 2018, available: <https://www.health.nsw.gov.au/services/Publications/role-delineation-of-clinical-services.PDF>

21. NSW Ministry of Health, NSW Health Guide to the Role Delineation of Clinical Services, Third Edition, June 2018, available: <https://www.health.nsw.gov.au/services/Publications/role-delineation-of-clinical-services.PDF>

22. Fair Work Act 2009, s.185—Enterprise agreement Australian Capital Territory T/A Justice and Community Safety Directorate, (AG2021/8828), ACT Public Sector Nursing and Midwifery Enterprise Agreement, 2020 – 2022, State and Territory government administration, COMMISSIONER P RYAN SYDNEY, 17 JANUARY 2022. Available: https://www.cmtedd.act.gov.au/_data/assets/pdf_file/0007/1891447/ACTPS-Nursing-and-Midwifery-Enterprise-Agreement-2020-2022-FINAL.pdf

- Physiotherapists;
- Occupational Therapists;
- Nutritionists;
- Speech Therapists;
- Psychologists;
- Medical Imaging Technologists;
- Social Workers; and
- Exercise physiologists.

The level of engagement/involvement of individual allied health practitioners should be based on clinical needs of individual patients.

7.4. TRAINING, EDUCATION & RESEARCH ACTIVITIES

Teaching and education include activities undertaken through the Medical Colleges, the Universities and higher education institutions, the staff development unit, and on the ward. Teaching, training, and development opportunities are a vital part of the surgery inpatient models of care.

Multidisciplinary learning and development opportunities are promoted and encouraged. Medical teaching rounds will occur during ward rounds. Staff will also be encouraged to take up and complete professional development packages.

Nurse education will be facilitated by the Nurse Educators. Nursing in-service education will be routinely conducted on the unit. Clinical placement for students from TAFE Colleges and Universities will also be provided for nursing, allied health, and medical students.

It is an expectation that all staff remain current in their essential training and maintain annual training currency as identified by the organisation. In addition to CHS mandatory training it is a requirement for all permanent staff to undertake specific education and training to their speciality as competencies. This may require both e-learning and practical assessments.

8. Discharge / Transit Lounge

8.1. SERVICE DESCRIPTION

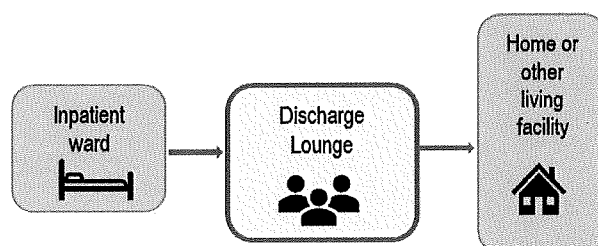
The **Discharge / Transit Lounge** will comprise 10 chairs, 1 isolation room and 8 beds. The discharge lounge is a transition area for inpatients prior to going home, or prior to being transferred to another facility.

The Discharge / Transit Lounge supports effective patient flow, by increasing discharge rates in inpatient beds prior to noon, which increases the turnover of inpatient beds and supports flow through the ED and operating theatres.

8.2. PATIENT PATHWAY

Ambulatory patients awaiting discharge may be from any inpatient unit in the hospital, or from ED. They may be awaiting discharge home, transfer to other regional or local hospitals and transfer to nursing home/ care facilities.

Figure 8-1: Discharge Lounge patient pathway



8.3. WORK PROCESSES

The operating hours of the Discharge / Transit Lounge are Monday to Friday 0700 hours until 2130 Hours.

8.4. WORKFORCE

The workforce will be sufficient to enable some level of monitoring but not direct patient care. It is most likely that the area is staffed by an EN.

8.5. CLINICAL AND NON-CLINICAL SUPPORT FUNCTIONS

Refer to section 9 for clinical and non-clinical supports and separately provided Clinical Support Services Service Model.

8.6. FUNCTIONAL ADJACENCIES

The Discharge / Transit Lounge must be located with the inpatient wards. It should also be easily accessible for family/carers who are going to transport the patient home. Other important adjacencies for the Discharge / Transit Lounge are Pharmacy for discharge medication, and the Equipment Service for the provision of home aids.

8.7. CHALLENGES AND OPPORTUNITIES

A common challenge with Discharge / Transit Lounges is a lack of buy-in, ownership and trust from ward clinicians that the Discharge / Transit Lounge is the right place for their patients to go prior to discharge, leading to the Discharge / Transit Lounge being underutilised. Similarly, ward clinicians may not have the time required to assess the appropriateness of a patient to go to Discharge / Transit Lounge.

Another challenge with Discharge / Transit Lounges is being able to measure the effectiveness of the service in terms of patient flow (inpatients and ED), patient quality of care and patient satisfaction.

9. Support Services

9.1. CLINICAL SUPPORT SERVICES

Descriptions of the key clinical support services for in-scope surgery are:

- **Medical Imaging**, which is described in the Clinical Support Services, Service Model (separately provided);
- **Pathology Services**, which is described in the Pathology Service Model (separately provided);
- **Pharmacy Services** which is described in the Clinical Support Services Service Model (separately provided); and
- **Infection Control and Prevention.**

9.2. NON-CLINICAL SUPPORT SERVICES

These include:

- Health Technology Management;
- Communications and Information Technology;
- Courier and Transport;
- Engineering and Maintenance;
- Fleet Management;
- Food Services;
- Linen Services;
- Patient/Visitor Access/Wayfinding;
- Personal Services Assistants;
- Quality and Risk;
- Security Services;
- Supply and Waste Management; and
- Volunteers.

All of the support functions need to ensure that they seamlessly interface with the clinical and patient services as needed. The basis for the interface will be different for each non-clinical support service based on the buildings within which they operate or provide services. These issues are incorporated in the Functional Design Briefs to the extent that they are germane to the design and function of the new facilities.

A1. Surgical Clinical Capability Levels

The Role Delineation for clinical services provided by Canberra Hospital were obtained from the ACT Health Services Plan, 2022 - 2030²³

Service	2021		
	Canberra Hospital	UCH	CPHB
Core services			
Anaesthesia and recovery	6	NPS	4
Operating Suite	6	NPS	4
Intensive Care Service	6	NPS	4
Nuclear Medicine	6	NPS	4
Radiology and Interventional Radiology	6	2	5
Pathology	6	2	5
Pharmacy	6	2	5
Emergency medicine			
Emergency Medicine	6	NPS	4
Medicine			
Acute Stroke Services	5	NPS	4
Cardiology and Interventional Cardiology	6	NPS	4
Chronic Pain Management Services	4	3	NPS
Clinical Genetics	4	NPS	NPS
Dermatology	5	NPS	3
Drug and Alcohol Services	5	NPS	1
Endocrinology	6	NPS	3
Gastroenterology	6	NPS	4
General and Acute Medicine	6	NPS	4
Geriatric Medicine	6	5	4
Haematology	6	NPS	3
Immunology	6	NPS	4
Infectious Diseases	6	2	5
Neurology	5	NPS	4

23. ACT Government, Health, *ACT Health Services Plan 2022-2030*, available <https://www.health.act.gov.au/about-our-health-system/planning-future/act-health-services-plan-2022-2030#:~:text=The%20ACT's%20population%20is%20growing,and%20effective%20care%20for%20everyone.>

Oncology — medical	6	NPS	2
Oncology — radiation	6	NPS	NPS
Palliative Care	4	NPS	2, CHH 6
Rehabilitation Medicine	2	6	2
Renal Medicine	6	NPS	2
Respiratory and Sleep Medicine	6	NPS	3
Rheumatology	5	NPS	2
Sexual Assault Services	4	NPS	1
Sexual Health	5	NPS	NPS
Surgery			
Burns	4	NPS	2
Cardiothoracic Surgery	5	NPS	NPS
ENT Surgery	6	NPS	4
General Surgery	6	NPS	4
Gynaecology	6	NPS	4
Neurosurgery	6	NPS	NPS
Ophthalmology	5	NPS	3
Oral Health	6	NPS	NPS
Orthopaedic Surgery	6	NPS	4
Plastic Surgery	5	NPS	4
Urology	6	NPS	4
Vascular Surgery	6	NPS	4
Child and family health services			
Maternity	6	NPS	5
Neonatal	5	NPS	3
Paediatric Medicine	5	NPS	2
Surgery for Children	4	NPS	2
Youth Health	4	NPS	NPS
Mental Health			
Adult Mental Health	5	2	4
Child and Youth Mental Health	4	NPS	NPS
Older Persons Mental Health	4	NPS	4



aspex consulting

Canberra Hospital Capital Redevelopment

PROPOSED PATHOLOGY SERVICE MODEL

Version 5.0

25 January 2024

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List of Abbreviations

ACT	Australian Capital Territory	FTE	Full-Time Equivalent
ACT HSP	ACT Health Services Plan	GBA	Gross Building Area
AusHFG	Australasian Health Facility Guidelines	GDA	Gross Departmental Area
AI	Artificial Intelligence	HCV	Hepatitis C
AIDS Syndrome	Acquired Immune Deficiency	HIV	Human Immunodeficiency Virus
ANU	Australian National University	HLA	Human Leukocyte Antigen
AP	Anatomical Pathology	ICT	Information Communication Technology
ARCBS	Australian Red Cross Blood Service	IHC	Immunohistochemistry
B	Building	IVF	In Vitro Fertilization
BMT	Bone Marrow Transplant	LIS	Laboratory Information System
CH	Canberra Hospital	MoC	Model of Care
CHS	Canberra Health Service	NATA	National Association of Testing Authorities
CJD	Creutzfeldt-Jakob Disease	NDA	Net Department Area
COVID	Corona Virus Disease	NGS	New Generation Sequencing
CRI	Colour Rendering Index	NPAAC	National Pathology Accreditation Advisory Committee
CTC	Circulating Tumour Cells	PCR	Polymerase Chain Reaction
DG	Diagnostic Genomics	POCT	Point of Care Testing
DHR	Digital Health Record	PPMS	Perinatal Post-Mortem Service
DNA	Deoxyribonucleic Acid	RCPA	Royal College of Pathologists of Australasia
ED	Emergency Department	RSI	Repetitive Strain Injury
FBC	Full Blood Count	SNP	Special Nucleotide Polymorphism
FDB	Functional Design Brief	SoA	Schedule of Accommodation
FFP	Fresh Frozen Plasma	SOP	Standard Operating Procedures
FFPE	formalin fixed paraffin embedded	RNA	Ribonucleic acid
FISH	Fluorescence In-Situ Hybridisation	WSI	Whole Slide Imaging
FNA	Fine Needle Aspirate		

DISCLAIMER

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Version 3 of the Service Model incorporates material from ACT Pathology as expressed through a Vision Statement and a high level Functional Design Brief prepared by L2D Architects. The materials incorporated from L2D Architects are referenced as such. Issues not addressed in this document by Aspx or L2D Architects could be addressed through a consultation process managed by Canberra Health Services.

VERSION CONTROL

VERSION	DESCRIPTION OF CHANGE	ISSUED TO	ISSUED BY	DATE OF ISSUE
1.0	Preliminary (Part) Service Model	CHS	Aspex	6 June 2023
2.0	Full Draft Service Model	CHS	Aspex	14 June 2023
2.1	Proposed Service Model	CHS	Aspex	30 June 2023
3.0	Third Revision Service Model Incorporating L2D Draft FDB and ACT Pathology Vision	CHS	Aspex	23 July 2023
4.0	Incorporating ACT Pathology changes	CHS	Aspex	1 August 2023
5.0	Incorporating ACT Pathology changes (from FDB)	CHS	Aspex	25 January 2024

1. Introduction

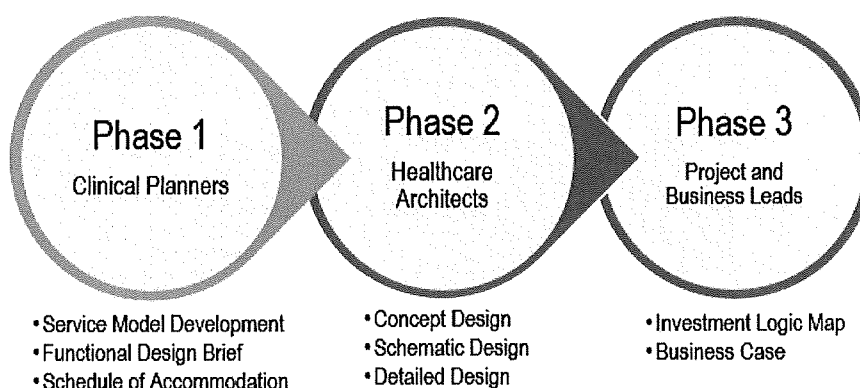
1.1. PURPOSE

This Service Model focuses on pathology services at the Canberra Hospital (CH) and outlines *how* services are planned to be delivered in the future.

The Phase 2 Redevelopment project involves developing *like-with-like* services into new facilities. However, this will not necessarily be *like-with-like space*, as new evidence, new technologies, changes in clinical practice, or more efficient or innovative ways of working may result in contemporary *like-with-like services*.

The information in this Service Model will input into the Functional Design Brief (FDB) and the Schedule of Accommodation (SoA), which will be used to inform the new building concept designs. The steps are outlined in Figure 1-1.

Figure 1-1: Canberra Hospital Capital Redevelopment planning phases



1.2. APPROACH

This draft Service Model has been developed in partnership with the Canberra Health Services (CHS) Clinical Liaison and Health Facility Planning team in the Capital Project Delivery and Infrastructure and Health Support Services Division.

This draft also includes input from ACT Pathology in the form of a Vision statement and incorporates relevant elements of a high-level FDB prepared for ACT Pathology by L2D Architects.

This Service Model outlines the vision, principles, and objectives of service delivery for the operation of Pathology Services. *It describes the potential impact of the changes to pathology services that can be expected in the future. This is a critically important consideration for the Service Model as it will underpin ACT Pathology's strategic direction and its propensity to thrive.*

The Service Model also describes each of the main pathology sub-specialties (Section 4). In doing so, it incorporates the scope and clinical level of service, specimen pathway, functional relationships and adjacencies, integration and work processes.

2. Service Model Context

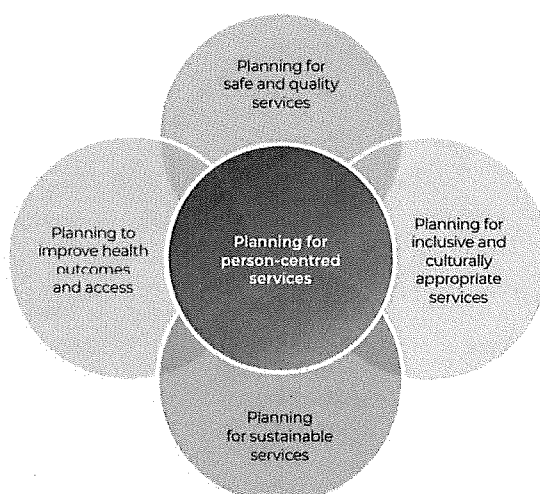
This section provides context within which the Service Model has been developed. It specifically includes:

- ACT Health's planning principles;
- CHS' future directions; and
- ACT Pathology's vision and alignment with system-wide drivers for change and service innovations.

2.1. ACT PLANNING PRINCIPLES

The following principles underpin the *ACT Health Services Plan* (ACT HSP) 2022-2030¹. The Service Model is developed consistent with these principles.

Figure 2-1: ACT Health Service Planning Principles



Person-centred services - The ACT Government consults with consumer and carers so that services are planned to treat consumers with dignity and respect; the ACT Government makes it easier for people to access services equitably, to move between services across the health system, and to partner with health professionals to participate in decisions about the services provided to them.

Inclusive and culturally appropriate services - The ACT Government consults with groups underrepresented in the healthcare system so that services are planned to be inclusive and culturally appropriate and targeted to specific health needs where necessary.

Safe and quality services - Planning is guided by evidence-informed policy directions, and the ACT Government continually strives to plan for services that improve health outcomes, experiences of receiving care, experiences of providing care, and effectiveness and efficiency of care.

1. ACT Government, Health, *ACT Health Services Plan 2022-2030*, available <https://www.health.act.gov.au/about-our-health-system/planning-future/act-health-services-plan-2022-2030#:~:text=The%20ACT's%20population%20is%20growing,and%20effective%20care%20for%20everyone.>

Health outcomes and access - Planning is guided by evidence-informed policy directions, with specific focus on at-risk and priority population groups; planning the right service, at the right time, in the right place, by the right team, every time.

Sustainable services - The ACT Government maximises the use and efficient allocation of limited resources by taking a Territory-wide approach to planning services across the ACT public health system, guided by clear role delineations, service levels, and evidence informed policy directions: service planning activities are prioritised based on need.

2.2. CANBERRA HEALTH SERVICE VISION AND SERVICE DIRECTION

CHS' vision is to **'Create exceptional health care together'**. Improving the quality of healthcare across the ACT is a key priority for CHS as it aims to be the safest healthcare system in Australia, delivering high-quality, person-centred care that is effective and efficient.

Specifically, CHS will provide health care that is:

- Person-centred: providing care that is respectful, responsive, and focused on the patient's needs;
- Safe: avoiding harm to patients from care that is intended to help them;
- Effective: providing services based on scientific knowledge and which produce a clear benefit;
- Timely: reducing waits and sometimes harmful delays;
- Efficient: avoiding waste and reducing unit costs; and
- Equitable: providing care based on clinical need, and that does not vary in quality because of a person's personal circumstances.

2.2.1. Consumer Principles

A fundamental component of patient-centred care is recognising and understanding the consumer perspective of the service. Central to patient-centred care are the themes of Participation, Communication, Experience and Support. These themes form the basis for Consumer Care Principles, the guiding principles for the Service Model. The Consumer Care Principles are:

- Participation: consumers (and where appropriate their family members and carers) will be equal partners within the multidisciplinary care team, enabling them to be actively involved in their own care;
- Communication: embedding frequent and meaningful communication with consumers, their family members, and carers, about their care for their entire hospital journey, including discharge;
- Experience: care is delivered in a way that supports the consumers' experience of safety and fosters trust; and
- Support: recognising the importance of involving family and carers in the consumer's care and recovery throughout their health journey.

2.2.2. CHS Future Directions

CHS' future service directions are set out in the *ACT Health Services Plan, 2022–2030*.² The desired outcomes from each of the directions are also articulated. These are outlined below.

2. ACT Government, Health, *ACT Health Services Plan 2022-2030*, available <https://www.health.act.gov.au/about-our-health-system/planning-future/act-health-services-plan-2022-2030#:~:text=The%20ACT's%20population%20is%20growing,and%20effective%20care%20for%20everyone.>

Addressing key areas of service demand and reform

- Improve health outcomes and access to care, with a particular focus on priority population groups.
- Support access to the services experiencing most significant demand pressures.
- Ensure our services are flexible and inclusive to respond to individual needs and circumstances.

Transitions of care

- Improve health outcomes and access to care.
- Make it easier for patients, families, and service providers to navigate the service system.
- Address issues of patients 'falling through the gaps' as they move between services and care settings such as between hospital and the community.
- Break down the barriers and silos between services.

The ACT's role as a local, Territory and regional service provider

- Improve access to care closer to home in a safe and sustainable way.
- Reduce unwarranted variation between services.
- Maximise the efficient use of health resources to meet the needs of the community.

Strengthening core ACT Government funded clinical support services

- Improve patient outcomes and reduce length of stay in hospital.
- Ensure that our clinical support services have the appropriate capacity and capability to support new and expanded clinical services.
- Optimise clinical decision making in determining the most appropriate treatment and care for patients.

2.2.3. Learning, Teaching and Research

CHS' *Clinical Learning and Teaching Strategy 2023 – 2027*³ provides the overarching vision, goals and strategic commitments to clinical learning and teaching. The six Strategic Commitments are:

- Strengthen governance and processes to prioritise and enable learning and teaching.
- Prepare and support the clinical workforce to work safely and effectively at the leading edge of their practice.
- Develop and support the clinical workforce to deliver effective, innovative, evidence-based teaching and point of care clinical supervision.
- Establish collaborative environments that maximise and enable effective, innovative, and efficient learning and teaching.
- Foster and strengthen strategic partnerships for learning and teaching with clinicians, consumers and carers, communities, and academia.
- Promote, share, and celebrate learning and teaching.

3. ACT Government, *Clinical Learning and Teaching Strategy 2023 – 2027*. Available: https://www.canberrahealthservices.act.gov.au/__data/assets/pdf_file/0012/2222040/69e04bc4df49dfd4a9ff49375fe0a3bcfd9dd628.pdf

To achieve these strategic commitments, and to develop a contemporary health precinct, a holistic approach to integrated education, training and research activities into the clinical areas will be key. For clinicians, access to teaching and learning will be built into the flow of their day. This means rooms available on each unit or a shared area readily accessible to clinical (patient) areas. To complement the integrated clinical spaces, a teaching and learning hub would provide greater opportunities for education.

Refer to the Clinical Support Service Model for more information on Learning, Teaching and Research.

2.3. OVERARCHING DRIVERS FOR CHANGE

The above strategic and policy positions articulated by ACT Health and CHS are underpinned by a range of drivers for change. The Territory, like other jurisdictions, are facing increasing challenges that are forcing changes in the way people seek and access services. Some of these challenges which are driving change are described below.

The ACT Health Services Plan (2022 to 2030) provides context within which the Service Model needs to be considered. The *ACT Health Services Plan* indicates that the Territory's population increased by 14% between 2016-2021 and is projected to increase by 9.7% over the decade to 2030. It is also ageing with those in the 70+ age category increased 34% between 2016-21 and is forecast to rise a further 22.7% by 2030, more than doubling the growth rate for the total population. In addition to population growth and ageing, there are particular factors that drive change for the Territory:

Ageing population and increasing chronic disease – the demand for health services is increasing as people live longer with more chronic and multi-morbid conditions. The aged population are high users of health services;

Access for vulnerable population groups – some population groups in Australia experience health inequalities. Aboriginal and Torres Strait Islanders and people from low socioeconomic areas are likely to have poorer health compared to the general population;

Increasing service demand – for elective and emergency surgery, chronic disease, cancer services, and mental health. These have been exacerbated due to the COVID-19 pandemic;

Climate change – has been causing more extreme weather events, such as bushfires and floods. Instances of heat stress, smoke inhalation, food insecurity, and mental health and wellbeing issues are increased for people experiencing extreme weather events; and

COVID-19 – the delivery of healthcare has rapidly changed since the beginning of the COVID-19 pandemic, especially in terms of how and where care is delivered, with a virtual and care closer to home becoming the norm. COVID-19 patients have caused greater pressure on health system capacity, especially in intensive care units and for multidisciplinary teams treating people experiencing the effects of 'long COVID'. Additionally, workforce availability has been significantly impacted, with burnt out staff choosing to leave their professions and with the usual immigrant workforces being unavailable.

3. Pathology

3.1. ACT PATHOLOGY

ACT Pathology currently operates as a tertiary (Level 6) pathology laboratory, and includes the (specialist) departments of:

1. Pre-Analytics (collection services, and specimen reception);
2. Anatomical Pathology (including Histology, Immunohistochemistry and Cytology);
3. Chemical Pathology (Routine Chemistry, Endocrinology, Special Chemistry and POCT);
4. Diagnostic Genomics;
5. Haematology (including General Haematology, Haemostasis, Blood Product Transfusion Service, Immunophenotyping, and Bone Marrow Transplantation);
6. Immunopathology and Infectious Immunoassay;
7. Microbiology (including Bacteriology, Mycobacteriology, Mycology, Parasitology and Virology);
8. Molecular Pathology; and
9. Mortuary Services.

Support departments include Pathology Administration, Information & Communication Technology (ICT), Quality, Pathology Museum (gross anatomical teaching), and Pathology Research. ACT Pathology employs more than three hundred personnel.

The role of ACT Pathology is to deliver routine and specialist pathology service to all CHS services, private hospitals, and community GPs and medical specialists with accurate, reliable and timely information obtained from scientific tests, investigations and examinations.

As is usual with tertiary-level pathology services that it also provides consultative services regarding the correct interpretation of test reports, and actively participates (or can lead) multi-disciplinary care team patient reviews.

ACT Pathology also provides important teaching functions for medical undergraduate and postgraduate degrees at the Australian National University (ANU). ACT Pathology is a leading provider of candidates seeking Registrar places in Pathology, and also provides training to registrars in other disciplines to assist them with the pathology components of their studies.

ACT Pathology prides itself on attracting pathology registrars in significant numbers each year.

It is expected that teaching and training will continue to be integral to the service model for pathology. This translates to dedicated teaching and research spaces, and spaces within the clinical specialties for pathology related activities

3.2. CONTEXT

ACT Pathology is expected to continue to operate at the highest clinical level (Level 6) and will also need to operate in a particularly dynamic environment, with important considerations in relation to:

- The inadequacies of the current facility to meet acceptable, contemporary standards;
- Operational efficiency and design considerations to deliver on its core functions; and

- The rapid pace of the convergence and emergence of technologies that will need to be embedded into a future pathology service. Future capacity and capability will be driven by technology developments.

3.3. TEST VOLUMES

ACT Pathology perform approximately 2.5 to 2.6 million testing panels annually⁴ based on testing panel volumes since FY19-20, which demonstrates that the overall testing volume has been steady with a tendency toward a modest upward trend, as detailed in Table 3-1 below.

The pathology subspecialties with the highest percentage of testing volumes (excluding COVID Polymerase Chain Reaction [PCR]) are Chemical Pathology, Immunopathology & Infectious Immunoassay (55% in FY21-22), Haematology & Transfusion (19%), and Microbiology (4%), with all remaining subspecialties each contributing to approximately 1% or less of total testing volumes (noting that the number of tests does not correlate with test complexity).

It is difficult to assess ACT Pathology's trends relative to maintaining market share due to COVID "Refer Out" services, that is, potential activity foregone, has increased by 5% over the period. It may nevertheless reflect ACT Pathology's current services are not keeping pace with referrer demand at the high end of the testing spectrum, particularly diagnostic genomics.

Table 3-1: Pathology Testing Panel Volumes By Subspecialty, By Year⁵

Pathology Subspecialty	2019-20	2020-21	2021-22	Raw Change 19-20 to 2021-22	% Change 19-20 to 2021-22	% of total 21-22 Excl. COVID
Chemical Pathology, Immunopathology & Infectious Immunoassay	1,661,806	1,756,151	1,748,351	86,545	5%	67.8%
Haematology	523,564	537,756	531,487	7923	2%	20.6%
Microbiology	127,840	124,093	121,327	-6513	-5%	4.7%
Transfusion	53,448	56,472	56,021	2573	5%	2.2%
Molecular Pathology (excl. COVID PCR)	39,980	40,304	34,491	-5,489	-14%	1.3%
Research	34,650	34,094	32,427	-2,223	-6%	1.3%
Anatomical Pathology	34,265	33,157	30,221	-4,044	-12%	1.2%
Diagnostic Genomics	2,131	2,4526	1,9787	-153	-7%	0.1%
Refer out	19,766	20,312	20,695	929	5%	0.8%
Total Excluding COVID PCR	2,497,450	2,604,791	2,576,998	79,548	3%	100.0%
<i>Coronavirus PCR</i>	<i>31,821</i>	<i>201,101</i>	<i>579,791</i>	<i>547,970</i>	<i>1722%</i>	<i>N/A</i>
Grand Total	2,529,271	2,805,892	3,156,789	627,518	25%	N/A

4. Excluding COVID effect. If we include COVID effect the numbers would be 2.5 – 3.2 million tests annually between FY19-22.

5. Note testing numbers are significantly underestimated due to data reporting panels, not individual tests. For example, a Liver Function test is counted as 1, but may be made up of 6 individual tests.

6. Plus 2,145 send outs.

7. Plus 2,603 send outs.

3.4. FUTURE DEMAND

Forecasting the future volume of pathology specimens is fraught with complexities, not least of which is changing practice and development of new services.

Outlined below are estimates of future demand:

- For Anatomical Pathology, demand growth is based on the current ratio of specimens to total operating theatre procedures, including endoscopes. By 2035/36, there is expected to be an additional 33.7% surgical/procedural separations, resulting in an additional 7,973 AP examinations.
- For pathology tests other than for Anatomical Pathology:
 - ▶ Applying current rates of tests for hospital services only and extrapolate for the growth in hospital activity, excluding operating theatres, is expected to result in 37.7% growth in demand, or 631,990 additional testing panels; and
 - ▶ For other more routine tests, the expected demand is based on the relative utilisation of medical services of an ageing population, applied against expected community referral rates, would see demand growth of 28.3%, or 259,665 tests.
- An important part of the ACT Pathology work is also new types of tests, such as Genomics. The test volumes have been increasing steadily, and substantial growth is expected in the emerging area of diagnostics; and
- The provision of novel cell therapy products would increase the service demand on ACT Pathology's BMT/cell processing facility in the coming years. The manufacturing and storage of specialised therapies such as CAR-T cells will increase the regulatory, facility and operational demands of Haematology's BMT Laboratory. Although numbers are expected to be small initially (~10% growth), the complexity of processing would increase over time.

3.5. REFERRAL SERVICES

ACT Pathology is able to deliver all testing expected of a tertiary pathology laboratory or is able to refer out. For those tests that are not actually performed by ACT Pathology, the tests are referred to specialist referral interstate laboratories. ACT Pathology endeavours to use referral laboratories that provide the best quality testing for the respective test in an efficient manner and that have NATA accreditation to perform the respective test. Over time, ACT Pathology is looking to be able to undertake all tests in house.

3.6. PATHOLOGY SERVICES VISION AND DRIVERS FOR CHANGE

ACT Pathology aspires to be a leading tertiary pathology service with a national reputation for excellence.

The environment within which pathology services operate, offer both significant opportunities and challenges in achieving this vision. This is summarised below.

“The next decade will see a profound transformation in Pathology. Several major drivers of change, including total automation, genomics, precision medicine, informatics and digital pathology – as well as a consumer-led revolution in healthcare leadership – are converging to reshape the way that Pathology services are designed, delivered and governed.

This has major implications for ACT Pathology, for Canberra Health Services, and for the community. In particular, the Pathology service model will see a significant shift towards convergent diagnostic technologies, genomics and personalised medicine, digital enablers, a focus on the value of data and shared clinical decision making, collaboration, and consumer-led co-design.

A key challenge is to embrace these new service models, whilst ensuring that we retain our leadership role – our trusted voice - in diagnostic excellence. This is especially true for our leadership and expertise with emerging diseases such as COVID-19, in which the ACT community has placed its trust"⁸.

In turn, designs for a new Pathology building at Canberra Hospital must be sufficiently flexible to cater for this future. Agility to provide workspaces that support new diagnostic technology and automation, new digital systems and infrastructure, and new ways of working with others – while at the same time supporting modern practices in infectious disease diagnosis and pandemic management to keep the ACT community safe into the future.

Pathology services will operate at the highest level of clinical capability⁹ for pathology (Level 6) and service the ACT and south-eastern NSW catchment. ACT Pathology *will continue to offer an extensive range of pathology services, be agile and adjust to new areas of pathology testing regimes, embrace current and emerging opportunities to innovate, and deliver the highest quality across all service types*. As noted, this will include embracing:

- Converging and Emerging Technologies;
- Workforce Co-Design, Flexibility and Planning for Uncertainty;
- Teaching and Research; and
- Consumer and Community Engagement.

3.6.1. Converging Technologies

Laboratory workflows, human tasks and governance are being fundamentally reshaped and standardised, driven by converging technologies. This is the clear trend in the pathology sector and endorsed by ACT Pathology staff¹⁰.

Manual diagnostic methods are replaced with automation, which improves reliability, reduces and standardises turnaround time, and reduces error. More recently, more radical automation of workflows (such as sample "track" systems) and standardisation of instrumentation and IT connectivity are breaking down traditional laboratory structures and transforming the way that laboratories function.

This trend is well established in core laboratories such as Chemistry and Haematology. However more and more diagnostic equipment systems in these departments will be connected to automated track systems. This underscores the need for a strict approach to "open plan", since the expansion plans of many laboratories have been thwarted by under-estimating this requirement, with office and load -bearing structures limited the opportunity for extension of automated tracks. With increased automation comes more sophisticated integrated IT solutions which allows for increased workplace flexibility i.e., scientists can perform extensive work remotely.

8. Glenn Edwards, 'Future State Issues Impacting Building Design for Pathology', July 2023, unpublished.

9. NSW Role Delineation of Clinical Services,(2021). The NSW Role Delineation of Clinical Service is used as the default clinical capability framework for NSW, Victoria and ACT, unless there is a specific jurisdictional capability framework

10. Gen Edwards, op.cit.

Microbiology and Molecular Pathology are also being transformed by automation, which is in part enabled by digital technology (e.g. plate reading via digital images). This trend will continue across all diagnostic areas, and laboratory design must allow for flexibility and expansion within a relatively short period of time.

Thus, laboratory workflows, human tasks and governance are being fundamentally reshaped and standardised. The design of new laboratory spaces is evolving to exploit this convergence of technology and workflow and ensure that the consequent value of these new models can be fully enabled.

3.6.2. Emerging Technologies

Increased application of emerging technologies is particularly relevant to the rapidly developing fields of **genomics** and the broader use of **artificial intelligence** (AI) and digital pathology for diagnosis, and patient treatment/management.

Genomic technologies are evolving to bring new insights into disease and diagnosis – and enabling a new era of personalised medicine. This revolution is still relatively new, and yet laboratories are already evolving the way we work. This includes a much deeper collaboration with clinicians, with consumers and with technology partners. Genomic technologies are also breaking down traditional boundaries within Pathology laboratories, with new collaborations between genomic experts and haematologists, anatomical pathologists, microbiologists, and infectious disease experts – and this collaborative approach is growing, as it makes traditional boundaries within laboratory workplaces increasingly redundant¹¹.

Digital technologies, using AI, are driving transformation within pathology laboratories, most notably for Whole Slide Imaging (WSI) in Anatomical Pathology, Haematology, Immunology and Diagnostic Genomics, which enables workforce flexibility and greater collaboration with interstate clinical experts. There is now a National Pathology Accreditation Advisory Committee (NPAAC) standard for validating WSI use by Pathologists, and many Australian laboratories are rapidly gearing up for this.

WSI is shaping as a game changer for the workforce shortage in healthcare and pathology, and potentially allowing CHS to provide more effective diagnosis and timely care for people in the ACT and neighbouring regions during workforce shortages. “second opinion” reviews are able to be referred simply including to overseas expert services.

WSI also enables a new generation of AI tools as aids for the pathologists in their diagnostic task, with likely benefits for both task efficiency and diagnostic accuracy.

WSI has significant implications for digital technology infrastructure, including extensive image storage and transmission. Digital infrastructure is therefore a key design element for a new Pathology laboratory build.

AI and data analytics are also enabling a new approach to delivering clinical value across all of Pathology. In addition to internal real-time monitoring of laboratory processes, enhanced analytics and AI-driven decision making will enable a new generation of clinical diagnostics informaticians. These roles will work collaboratively together, across CHS and beyond, to drive new models of clinical decision making, audit and evidence-based policy. This approach will allow greater transparency, greater collaboration, and greater value – and also provide a powerful platform for CHS researchers, including a growing research opportunity in clinical decision science.

11. Ibid

Thus, with the recent implementation of the Epic digital health record (DHR), and a suite of other analytical and AI tools, CHS Pathology is well-placed to drive this new approach to clinical decision support. IT infrastructure and spaces for collaboration (physical and virtual) will be critical enablers of success.

A summary of the above technologies as well as other potential innovative service developments are described below in Table 3-2. Many of the innovations are inter-related and capable of being developed independently, or inter-dependently in driving innovation.

Table 3-2: Innovations Identified from Specialty Sections

FUTURE TREND/ INNOVATION	DESCRIPTION
Next Generation (Genome) Sequencing (NGS)	- NGS is a parallel or deep (DNA) sequencing technology which has revolutionised disease diagnostics and screening over the recent years. Using this technology, NGS has become a part of routine clinical practice, as it helps to detect oncogenic and disease-causing genetic variants and enables a deeper understanding of complex diseases. This translates into diagnosis with genetic changes incorporated into essential criteria for classification of disease, prognosis, identification of targetable chemotherapies, disease monitoring, and screening. This revolution will reduce morbidity and will prolong survival in the population of the ACT and surrounds. - Expansion of NGS into multiple areas of healthcare is an immediate next step in the future direction, especially to support CH oncologists and haematologists who are actively seeking for ACT Pathology to develop this technology.
Omics Technologies and Integration	Similar to the way that multidisciplinary teams approach works in healthcare, the multi-omics approach (including technologies such as genomics, transcriptomics, epigenomics, proteomics, and metabolomics) will provide a much more holistic view of disease mechanisms, which not only works to enhance the accuracy of diagnosis, but also enables personalised treatment strategies based on individual patient profiles. The drive towards individually targeted therapies is compelling, it is expected to continue to increase the level of testing, workforce expertise and need for individualised reports, particularly in cancer treatments. <i>It is likely that in the not-so-distant future, the 'omics revolution' for personalised diagnoses and treatments could become core business for ACT Pathology¹²</i>
Biomarkers and Predictive Models	Support that predicts disease progression, treatment response, and patient outcomes. It is an important area of research in haematology and has the potential to make a massive difference to patient outcomes alongside other technologies such as the omics revolution.
Immuno and Targeted Therapies	CAR T-cell therapy and immune checkpoint inhibitors are new treatment options for patients with haematological disorders (including malignancies). ACT residents who are currently candidates for CAR-T cell therapies currently have to travel interstate to undergo a cell collection procedure and return 2-3 weeks later for infusion and post-therapy care. Patients must live within 30 minutes of the hospital for 4-5 weeks. Availability of this service in ACT will support patient-centred and value-based care models and improve timely access to novel treatments.
Artificial Intelligence (AI) [and Whole Slide Imaging]	In all facets of pathology, it is expected that AI will mark its presence. AI and machine learning will help automate processes (analysing big data sets), provide decision support information and security checks that are not systematically built into day-to-day processes. These developments are not expected to reduce staff or the footprint of the Pathology facility but instead give ACT Pathology more capacity to increase the range and level of services offered. "WSI is shaping as a game changer for the workforce shortage in healthcare and pathology, and potentially allowing CHS to provide more effective diagnosis and timely care for people in the ACT and neighbouring regions. AI and data analytics are also enabling a new approach to

12. Noting ACT Pathology already does gene assessment, epigenetics and protein expression as part of standard cancer reporting at the time this report was prepared.

FUTURE TREND/ INNOVATION	DESCRIPTION
	delivering clinical value across all of Pathology. In addition to internal real-time monitoring of laboratory processes, enhanced analytics and AI-driven decision making will enable a new generation of clinical diagnostics informaticians ¹³ .
Automation of Current Manual Steps in Processes	These innovations are to incrementally acquire technology that automates some steps in the process as part of a longer-term plan to automate all steps. This will progressively occupy existing workstations. The Pathology facility will need to design flexible core spaces for automated equipment and sensitively design workstations adjacent to automated equipment in the same specialty. In some instances, there will be cross over periods where both new automated technologies and existing manual processes are retained before phasing out.
Development of a Core Laboratory	Urgent testing on existing instruments is likely to shift to a Core Laboratory operating 24/7 and operated by multi-disciplinary pathology staff. Robotics will be extended to accommodate more of the high-volume testing of a Core Laboratory. Further details are provided in section 4.1.1.
Robotic Extensions taking on more Volume	As more technology moves into the Core Laboratory, so too will be the opportunity to extend the robotics to fully automate the routine testing.
Urgent Testing on Instruments Moved to the Core Laboratory.	The Core Laboratory concept will focus on 24/7 service delivery centralised to an area of the laboratory adjacent to specimen reception. Technologies and tests will move into the Core Lab (as per GeneXpert COVID and Flu A/B urgent testing) from various disciplines.
Recycling and Sustainability	Each Department will have equipment and technology designed to help recycle, particularly plastics and reagents/solvents. It will be a necessary development for Pathology services to demonstrate their 'green credentials'. Manufacturers will focus on reducing heat output and power consumption (e.g. Abbott Alinity i), which will help laboratories manage excess heat in the laboratory and the architectural designs for air conditioning/flow in the location of the equipment.
Point of Care Testing (POCT) Innovation	Enabling increasingly more rapid and accurate testing at the patient's bedside or in remote settings.
Liquid Biopsies	Liquid Biopsies have emerged as a non-invasive cancer diagnostic tool, which may assist in the early detection, residual disease monitoring, and treatment response.
Screening Opportunities	There will be opportunities to support community screening programs and personalised wellness testing expanding the range of services from predominantly diagnostic (i.e. HbA1C testing on microsamples self-collected from the community and microbiome analysis).
Quality Assurance and Standardised Practices/Processes	A growing focus to ensure high-quality laboratory testing and harmonisation across different laboratories, including the standardisation of reference intervals, establishment of proficiency testing programs, and implementation of quality management systems to enhance the accuracy and reliability of laboratory results.

3.6.3. Workforce Co-Design, Flexibility and Planning for Uncertainty

The convergence of technologies and the consequential convergence of workforce collaboration, means that the design of facilities will change to reflect this convergence.

The design of facilities will necessarily have two major elements:

- Integrated design that requires a higher level of functional adjacencies than was previously the case in laboratories; and
- Flexible design of space, which translates to more open spaces.

13. Ibid.

3.6.4. Teaching and Research

As noted above, CHS has articulated 'CHS' *Clinical Learning and Teaching Strategy 2023 – 2027*, and a *Research Strategy 2021-2025*. Both learning & Teaching, and research are outlined more fully in the *Service Model on Core Clinical Support Services*. These strategies underpin the approach for pathology and align in important respects including:

- Embedding a research ethos is facilitated by the use of multi-purpose spaces including flexible laboratories and real and virtual research; and
- Research will increasingly be informed and facilitated by digital technologies. Indeed, it is likely that several informatics-based activities will form the core of research in Pathology, including Artificial Intelligence and clinical decision support science (whilst supported and/or confirmed by manual testing).

3.6.5. Consumer and Community Engagement

Consistent with the broader service delivery principles consumers and the community will become more active participants in their health care. This will be manifest in:

- Individually tailored treatments. New technology and tools that enable pathology the opportunity to develop a genuine consumer-led co-design model, that will be in the vanguard of its kind in Australia.
- Care closer to home is now the preferred model of care (MoC) for any chronic, non-urgent care. This has been made possible via the widespread adoption of telehealth and telemonitoring, particularly for diabetes, chronic obstructive pulmonary disease, and renal medicine. Telemonitoring is performed using sensors, other wearable devices, or apps to record data which is relayed to the healthcare team. Changes in condition outside set parameters will also alert healthcare providers in real time. Pathology too will need to adapt to remote patient pathology testing.
- Consumer empowerment is transforming service models for Pathology. In the ACT there is already an overwhelmingly positive response to the direct-to-consumer test result reporting via MyDHR. Consumers are also actively driving discussions on genomics, cancer testing, pre-natal diagnosis, and other service areas. This trend is expected to continue. ACT Health Services will require real and virtual spaces with public access to facilitate this engagement;
- Social prescribing is treating a person holistically and linking a person undergoing healthcare to social supports as required, to relieve social isolation or other factors that may be impacting on that person's mental health and wellbeing. These supports may range from walking groups to book clubs, to financial aid or housing services. Social prescribing models are well established in the United Kingdom and Canada, and they are becoming more prevalent in Australia;
- Services developed and delivered will need to be increasingly designed around the principles of Value-Based Healthcare (Better Value Care); and

Value Based Healthcare is a contemporary service model designed to develop patient-focused care in a meaningful (structured) way to create enhanced outcomes (value) to the patient and value to the funder. This is a potentially important, albeit radical model to consider in the development of (a selected number of) clinical services that can be 'clustered to deliver end to end' outcomes for patients. The model transcends current structures that are not designed to deliver value to the patient and where there are only very blunt outcome indicators.

All of these trends are inter-related and can have a major impact on the organisation and service options available.

3.7. PATHOLOGY SERVICES AND DESIGN PRINCIPLES

The proposed Pathology facility is seen to be a critical enabler for pathology services to achieve the vision. Therefore, it will be important that the Service Model is able to set some core principles for the future design.

3.7.1. Service Principles

As a clinical support service, operating at the highest clinical capability, ACT Pathology can be expected to:

- Be accessible and responsive to all clinical areas requiring the reporting of pathology results;
- Deliver specialised pathology services across the full spectrum of pathology types, including new and emerging pathology specialties/branches;
- Ensure contemporary practices and the application of leading-edge technologies that materially improves patient diagnosis, treatment and outcomes;
- Operate efficiently and sustainably;
- Actively participate in multi-disciplinary care models to deliver holistic patient treatment regimes;
- Develop a clinically capable workforce across the specialty areas, including through teaching and training as a core part of the role of pathology; and
- Actively participate in learning, teaching and research.

3.7.2. Design Principles

Almost all of the following design principles will be included in the FDB documents and are included here to ***provide a strong sense of the how the service model can be translated into the new facility***. Core design principles include:

- **Collocated and contiguous specialist pathology functions.**

The facility is to provide as much generic open plan laboratory space as possible that maximises flexibility, expansion and alternative uses and for *connectivity between subspecialties*.

This accords with contemporary practice for pathology (as noted above). Be highly interactive and adaptable, reflecting strong interconnection, visibility and flows between all Pathology services, between admin and laboratory, and between pathologists/registrars, scientists and technical staff. In practice it means:

- ▶ Designing a Core Lab concept at the 'heart' of the operation;
- ▶ Shared spaces for automation (robotics) creates a unique place to work. The robotic lines require structured and ordered space that is expandable and interchangeable. The "track" configuration is critical to the interconnectivities of the robotic stations that connect to the track. It is essential to design the space with direct and clear access in order to gain the most benefit from the expensive robotic lines; and

- ▶ Maximise the connectivity between functional clinical units, meaning as many clinical services (that require testing and assessments) being contiguous with each other as possible, ideally over a minimum number of floors without compromising functional capability. This will improve coordination and collaboration between specialties, including the Core Lab, enable the greater use and flexibility of equipment, reduce unnecessary movement of specimens and reduce the need for multiple support facilities.

The extent that ACT Pathology is accommodated over multiple levels, is to perpetuate fragmentation and inefficient practices that currently exist. Maximising the area of the 'floor plates' of the new facility footprint will be important to the new site.

- Within the context of open plan laboratory space there will be a continuing need for **specialised rooms and equipment**.
- Consider **future proofing as part of its design**: future proofing would mean that:
 - ▶ The core facilities are built to AS2243.3, 2022 (Microbiological) standards for PC2 certification for the handling of Risk Group II Organisms even though the space is to be certified PC1 for most of the activities. In this context, a fully PC2 compliant core facility would be possible even though most spaces will not need to operate under PC2 controls. Designing to PC2 does not come at a financial impost, and is appropriate for health, safety and cleanability considerations.
 - ▶ The FRDs in Appendix A3 indicate which functions are to be in PC2 containment, and the Briefing Record outlines this in more detail. The key areas of PC2 containment are Microbiology and parts of Molecular Pathology Biology; and
 - ▶ The PC3 facility is a high containment facility and is subject to decay testing to enable the required annual decontamination via fumigation.
- Consider **future proofing with respect to growth and space**. This would mean enhanced service capacity (that is not like-for-like) with respect to:
 - ▶ Digital support, data centre and digital storage, high resolution and high reliability digital capability;
 - ▶ Prototype laboratory, which is increasingly being adopted by modern pathology services – it will allow space to prototype new equipment, or showcase and trial a supplier's technology, including trialling of robotics before the expense of acquisition, conduct early trials pre-commissioning to speed up the compliance period, and for future expansion subject to priorities;
 - ▶ Diagnostic Genomics; and
 - ▶ Workforce connection spaces.
- Provide a workplace that is planned to enable a combination of quiet spaces for focused work as well as rooms for group activities in order to **promote peak performance and outputs**. The design will *minimise the number of office spaces to maximise break out spaces and meeting rooms for private and collaborative discussions*.
- **Patient-centred care specimen collection**. Depending on the location of pathology facility relative to outpatients, there may be a need to have a second collection centre to enable easy access for patients.
- Design for grieving families and for **cultural sensitivity and safety** in relation to mortuary services.

- From a service model perspective, decoupling mortuary and autopsy services from diagnostic pathology may be considered in the interests of **patient-centred care and operational efficiency** by locating the mortuary closer to where its services are likely to be of greater use, namely the medical inpatient building, in preference to long transport times of deceased persons, as well as creating discreet routes of travel for the deceased for privacy and dignity preservation. This includes National Capital Private Hospital patients.

In addition to the above design principles, the L2D high level FDB has also identified:

- **Lighting** is critical in all areas but more so in the open plan generic spaces with the robotic lines and technology.
 - ▶ Illumination Levels: the recommended illumination levels vary depending on the specific tasks performed in different areas of the laboratory. General working areas may require around 300-500 lux, while microscopy areas may need higher levels of illumination, typically between 1000 and 1500 lux;
 - ▶ Natural lighting is important for staff when reading culture and conversely Ultraviolet (UV) exposure on reagents/analysis can be detrimental;
 - ▶ Uniformity of Lighting: lighting should be uniform across the laboratory to minimise shadows and variations in visibility. Uneven lighting can lead to difficulties in accurately interpreting microscopic specimens or distinguishing subtle colour changes, potentially affecting the accuracy of results;
 - ▶ Colour Rendering Index (CRI) measures how accurately a light source represents colours compared to natural light. A higher CRI (ideally above 90) is desirable to ensure accurate identification and interpretation of colour changes in stained specimens or indicators;
 - ▶ Control of Glare and Reflections: the design should minimise glare and reflections on surfaces, such as microscope lenses, slides, and computer screens, to avoid visual discomfort and potential errors. Non-reflective surfaces, matte finishes, and proper positioning of lighting fixtures help control glare and reflections;
 - ▶ Task Lighting: task lighting is essential in areas where specific visual tasks, such as microscopy or reading culture plates, are performed. Adjustable task lighting, such as adjustable arm lamps or gooseneck lamps, can be utilised to provide targeted illumination and enhance visual clarity for detailed work; and
 - ▶ Emergency Lighting: emergency lighting systems should be in place to provide visibility and safety during power outages or other emergencies. Backup power sources, such as battery-powered lighting fixtures or emergency generators, should be installed to ensure adequate illumination for safe evacuation or continuation of critical task.
- **Temperature**

This applies to all departments with a large number of equipment:

- ▶ HVAC systems play a crucial role in regulating temperature in laboratories and may include air conditioning units, heat exchangers, fans, and ductwork to distribute conditioned air effectively;
- ▶ It is recommended that heat load calculations are conducted for the department to determine the amount of heat generated by equipment and the required cooling capacity to ensure that HVAC systems are appropriately sized to handle the heat load and maintain optimal temperature conditions;

- ▶ The design might also consider dividing into zones to optimise temperature control and to place equipment generating significant heat in strategically placed locations to avoid localised heat buildup. Proper airflow management, such as supply and return air vents, can help direct cool air towards heat-generating equipment and remove hot air efficiently. The design could include ventilation strategies to remove heat from the space by increasing the air exchange rate or adjusting ventilation settings;
 - ▶ Proper insulation of laboratory walls, ceilings, and equipment could also be included in the design to prevent heat transfer to the surrounding environment. Insulating materials with high thermal resistance reduce heat loss or gain, minimizing the impact on overall temperature control;
 - ▶ Careful placement and spacing of equipment will be essential for effective heat management. Overcrowding or improper placement impeding airflow, leading to heat buildup should be avoided in the design; and
 - ▶ The design could also include automated systems (with alarms and alerts) that can adjust HVAC settings based on preset parameters to maintain a comfortable temperature.
- **Acoustic control**
 - ▶ The design should consider noise control measures to allow scientists to concentrate, particularly during analytical processes including blood film reviews;
 - ▶ Consideration to be given to ceiling acoustic and wall treatment where applicable and appropriate. In particular ceilings and this has the added opportunity of enabling a design that adds colour and form to the ceilings – noting that they will be expansive over the large generic laboratories.
- **Laboratory space.** Laboratories are serviced by power/data and gases and shelving suspended from the ceiling above the bench tops to free up space on the floor and to facilitate changeable and modular systems. laboratory benches are to be loose and removable.
- **Offices**
 - ▶ Pathologist and scientific leadership offices/workspaces are to be located on the same level as the corresponding laboratory space in an administration area of the floor, to ensure the laboratory space is open plan and not disrupted by office spaces.
 - ▶ Allocation of offices is to accord with the *CHS Accommodation Guidelines*.
 - ▶ Workspaces for all scientists and some registrars (including supervisory positions) will be in the form of open-plan desks based within laboratory spaces; quiet office/workspace will be provided for scientific leadership roles (in close proximity to the laboratory if possible) as per CHS accommodation policy; and
 - ▶ Anatomical Pathologists are an exception for office requirements where their microscopes are located inside their work point, which for many is in an office with natural light (direct or indirect) and long sightlines beyond the building. While this is not a regulatory requirement, it is highly relevant and practical for the type of work conducted. AP registrars also need a dedicated space.
- **Staff Spaces**
 - ▶ Creating a welcoming and comfortable work environment for staff can be challenging;
 - ▶ Team members need ready access to break-out spaces for local meetings with minimal disruption to work. Each core team requires access to small, functional meeting spaces with glass windows and AV facilities, located near laboratory spaces;

- ▶ Common meeting areas should be spacious, comfortable and well-equipped. Where feasible these should be multi-purpose e.g. for teaching and “town hall” meeting purposes; and
 - ▶ Staff spaces should acknowledge the demands placed on overnight staff – including safety, rest areas and lighted access to vehicles and transport.
- **Centralised support facilities.** Laboratory level storage is via the Centralised Consumables Store (one per level if more than one level) to maximise usable laboratory space and operational efficiency. Same concept goes with the Centralised Waste Store, Centralised Chemical Store, Centralised Equipment Storage, Centralised Record Storage¹⁴, Central Lab Services (e.g., Uninterrupted Power Source room, Compressed air, RO water system), Freezer Farm Biobank, and Centralised cryogenic processing and storage facility.
 - **Health and safety** as being at the forefront of all considerations – and during the further design stages it will become critical to the planning outcomes:
 - ▶ A logical layout that is ordered but yet expandable;
 - ▶ The workflow has key access points that need adequate space to allow operators to do their work unencumbered and not crowded by other activities or instruments;
 - ▶ Clearly articulated travel paths that are wide enough for ease of movement;
 - ▶ Sightlines and visual control will enhance safety;
 - ▶ Allows trolley based movements;
 - ▶ On floor hazard and spill mitigation; and
 - ▶ Appropriate allocation of hygiene and safety stations clearly demarcated.
 - **Building services reticulation and backbone to be flexible and adjustable**, and ordered to avoid “mess” but be serviceable and able to be upgraded and interchanged with new technologies and equipment.
 - **Floor Loading.** All departments will likely have an increased number of analysers and equipment that is heavy and becoming heavier. The design should ensure that the floor load capacity and point loads are designed for current and future equipment.
 - Consider the increasingly popular “**science on display**” concept that can greatly enhance the awareness and importance of a hospital pathology department and engage with the hospital staff and also the public where applicable. These could include visible interior laboratory spaces for the public with extensive use of glazing, and use of graphics on glass
 - **Sustainability.** It is likely that equipment to help recycle plastics, chemicals and other recyclables will be added to the future laboratory state and will require additional space and workstations.

14. BMT cell processing records storage/retention requirements and secure access to BMT staff only (this could be a lockable cabinet in common space).

4. Functional Relationships

4.1. FUNCTIONAL RELATIONSHIPS

This section provides information on the functional relationships between the different pathology departments and support services. These relationships are becoming increasingly complex due to converging and emerging technologies and the need for enhanced operational efficiencies.

Most of this information is relevant to the FDB. It is included here to assist with clarification of scope and scale of the new facility.

Figure 4-1 diagrammatically shows the functional relationships and associated complexities for a contemporary pathology lab. This has been developed by L2D following consultation with ACT Pathology staff. The diagram provides an overview. Other diagrams provide a more detailed set of relationships for each of the main department components, which are included in Appendix A3.

Key relationships include:

- A Core Lab (red border);
- The further development of highly automated processes for core subspecialties (purple);
- Administrative support functions (pink);
- Laboratory support functions (green); and
- Centralised supplies, waste and refrigeration spaces (grey).

The functional relationships diagram as provided by L2D includes new (expanded) functions, comprising:

- A prototype laboratory;
- Digital Pathology Research;
- DNA Extraction and Amplification, and enhanced cryogenic services; and
- 'Interaction space'.

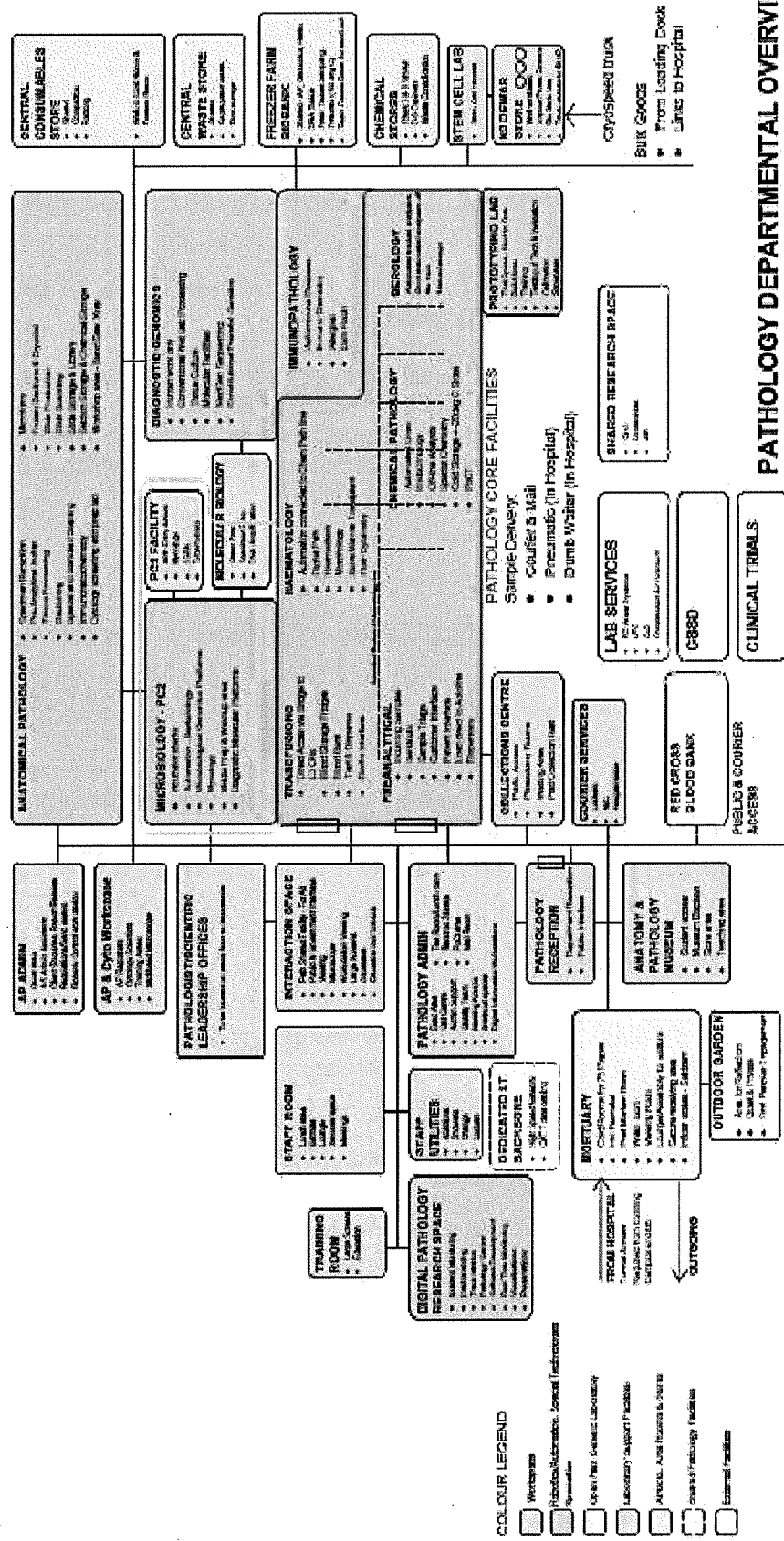
Historically, the above disciplines have functioned as independent silos, with minimal cross collaboration. It is clear, that the future of Pathology requires significant integration, convergence and cross collaboration of departments.

As a first step departments are more consolidated, forming larger integrated 'Groups', including:

- Collection Services and Specimen Reception (Pre-Analytics);
- Core Laboratory departments (Haematology¹⁵, Chemical Pathology, Immunopathology & Infectious Immunoassay and Specimen Reception), and noting that these department functions may also have components that are not necessarily part of the Core Lab;
- Microbiology and Molecular Pathology;
- Anatomical Pathology and Diagnostic Genomics; and
- Mortuary and Autopsies.

¹⁵. Including BMT/Cell Processing Laboratory.

Figure 4-1: Pathology Functional Relationships (Department Overview) – by L2D Architects



Notwithstanding, the above, there are some (non-testing) functions that are potentially able to be separated. Essentially, these are the non-clinical testing area, such as Pathology Administration, Pathology Reception, Mortuary, Pathology Museum, Collection Services, Central Storage spaces, Freezer Farm Biobank, Cryogenic Processing and Storage Facility; and Courier Services.

Figure 4-2 below shows functional adjacencies for pathology services. These are similar to the relationships described above, except expressed in terms of the relative importance of proximity.

There are critically important adjacencies relating to the Core Lab and, very close proximity for the other diagnostic pathology services, with easy access to clinical support functions.

Figure 4-2: Functional Adjacencies Matrix

Relationship Matrix		Pathology Core																					
		Specimen Reception (Preenalytics)	Haematology and Transfusions	Chemical Pathology	Immunopathology - Serology, Infectious Immunocassay (automated)	Immunopathology - Other	Haematology - Bone Marrow Transplant	Chemical Pathology - Special Chem, POCT	Anatomical Pathology	Diagnostic Genomics	Microbiology and Molecular Pathology	Pathology administration	Collections Centre	Mortuary services	Prototyping Lab	Digital Informatics	Centralised Storage and Waste	Liquid Nitrogen Dewar	Freezer Farm and Biobank	ACT Pathology Research	Mortuary and Loading Dock Access	Courier Services	Slides and blocks storage
Pathology Core	Specimen Reception (Preenalytics)	x	1	1	1	1	1	2	1	1	3	2	-	1	3	3	3	2	-	-	1	-	
	Haematology and Transfusions (automated)		x	1	1	1	1	2	1	1	3	2	-	1	3	3	3	1	-	-	-	-	
	Chemical Pathology (automated)			x	1	1	1	2	1	1	3	2	-	1	3	3	3	2	-	-	-	-	
	Immunopathology - Serology, Infectious Immunocassay (automated)				x	1	1	2	1	1	3	2	-	1	3	3	3	2	-	-	-	-	
	Immunopathology - Other					x	1	2	2	2	3	2	-	2	3	3	3	2	-	-	-	-	
	Haematology - Bone Marrow Transplant						x	1	2	2	3	2	-	2	3	3	3	2	-	-	-	-	
	Chemical Pathology - Special Chem, POCT							x	2	2	3	2	-	2	3	3	3	2	-	-	-	-	
	Anatomical Pathology								x	1	3	2	-	2	3	3	3	1	-	-	-	-	
	Diagnostic Genomics									x	3	2	-	2	3	3	3	1	-	-	-	-	
	Microbiology and Molecular Pathology										x	3	2	-	2	3	3	-	1	-	-	-	
	Pathology administration											x	-	-	-	-	-	-	-	-	-	-	
	Collections Centre												x	-	-	-	-	-	-	-	-	-	
	Mortuary services													x	-	-	-	-	-	1	-	-	
	Prototyping Lab														x	-	-	-	-	-	-	-	
	Digital Informatics															x	-	-	-	-	-	-	
	Centralised Storage and Waste																x	-	-	-	-	-	
	Liquid Nitrogen Dewar																	x	-	2	-	-	
	Freezer Farm and Biobank																		x	-	-	-	
	ACT Pathology Research																			x	-	-	
	Mortuary and Loading Dock Access																				x	1	
	Courier Services																					x	
	Slides and blocks storage																						x

Legend
 1 directly adjacent (Horizontal / Vertical)
 2 easily accessible (less than 3 minutes)
 3 accessible (3 - 5 minutes)

4.1.1. The Core Laboratory

The concept of a centralised laboratory has been progressively evolving since the late 19th Century. Contemporary laboratories have the Core Lab at the 'heart' of its operations as automation and quality control become more important.

The future Pathology facility will employ the Core Lab concept with a 24/7 service delivery. The Core Lab includes Specimen Reception, Haematology & Transfusion, Chemical Pathology, Immunopathology & Infectious Immunoassay. It is critical for these departments to be collocated for:

- Efficient triage of patient samples;
- Connection of analysers to core laboratory track system;
- Growth space to allow for the track to expand with additional instrumentation connected;
- Sharing of like technology;
- Sharing of generic workspaces e.g. centrifuges, storage spaces;
- Cross training of technical staff in the use of similar technology; and
- Centralise 24/7 critical services.

Technologies and tests will move into this space from various disciplines, as well as extended robotics to accommodate more of the high-volume testing of a Core Laboratory. Analysers which can be connected to an automated track system, will be connected to it as much as possible.

The Core Lab comprises four main departments:

- Specimen Reception;
- Haematology & Transfusion;
- Chemical Pathology; and
- Immunopathology & Infectious Immunoassay.

It is critical that the Core Lab departments are adjacent to each other in the Core Lab area.

The Core Lab has several critical design features, including:

- A large open space that can:
 - ▶ Accommodate an automated track system. With this comes the connection of the analysers to the Core Lab track system.
 - ▶ Accommodate infrastructure to allow a single sample transport system ('Tempus') to connect from critical locations e.g. Emergency Department (ED), directly into the automated track system to allow for minimal touch points and optimal turnaround time of urgent samples, facilitating triage of patients.
 - ▶ Enable reasonable expected growth in robotics and other automated instrumentation.

Shared spaces for automation (robotics) creates a unique place to design. The robotic lines require structured and ordered space that is expandable and interchangeable. The "track" configuration (typically along a central spine with 'arms') is critical to the interconnectivities of the robotic stations that connect to the track. It is essential to design the space with direct and clear access in order to gain the most benefit from the expensive robotic lines.

- A reception space that receives and efficiently triages patient samples/ specimens (from multiple collection sources);
- Sharing of like technology, and generic workspaces (such as biosafety cabinets, centrifuges, storage);
- Cross training of technical staff in the use of similar technology; and
- Centralise core 24/7 critical services;
- Scientific staff will remain specialised within a particular department, instead of being cross trained.

4.1.2. Prototyping Laboratory

The concept of a Prototyping Laboratory would be implemented in the new Pathology facility. It is an important aspect of futureproofing. This is an initiative that expands on the current functional capacity. It is a practice that is increasingly being adopted by pathology services, which will allow space to:

- Prototype new equipment, or showcase and trial a supplier's technology;
- Be able to trial robotics before the expense of acquiring them, which is invaluable;
- Conduct early trials and testing/commissioning of new technology to speed up the compliance period; and
- Ultimately being able to be used as future expansion subject to priorities.

It is a single open plan area contiguous with the Core Lab.

4.1.3. Digital Pathology

The concept of Digital Pathology will also be fully embedded into the new Pathology facility, including:

- A modular functional space;
- Management of current interfacing and IT connections with dashboards to manage offline problems;
- Data Centre (off site, could be digital reference library/storage); and
- Digital admin (to be with all other admin staff).

The L2D high level Functional Design Brief report¹⁶ also indicates that if not all functions can be located on the same level, then the following services can be on another level, including:

- | | |
|------------------------------------|-------------------------------|
| ■ Pathology Central Administration | ■ Central Waste Store; |
| ■ Collections Centre | ■ Freezer Farm and Biobank |
| ■ Mortuary | ■ Chemical Stores |
| ■ Outdoor reflection garden space | ■ IT Backbone/Data Centre |
| ■ Vehicle access | ■ Stem Cell Lab |
| ■ Anatomy and Pathology Museum | ■ Liquid Nitrogen Dewar Store |
| ■ Central Consumables Store | ■ Loading Dock |

4.2. SCALE

The Service Model as presented recognises that there are two important factors that relate to scale for the new pathology facility:

- The current pathology services are operating in facilities that are not fit for purpose and space is inadequate for many services; and
- A core criterion for the Phase 2 Redevelopment is to develop **'like-for-like'** services, which is interpreted to mean like-for-like functional capacity, not like-for-like space.

For pathology, there is a need to consider increased space to continue to deliver the current functions to meet contemporary standards and expectations.

¹⁶ L2D Architects, Functional Brief, July 2023, pp14-15

Importantly, the Australasian Health Facility Guidelines (AusHFG) only provide limited guidance for a Level 6 pathology facility's area requirements as might be expected, as each major public pathology service will have different functional requirements across different catchment areas.

To ensue transparency, the scale of the expanded area that enables contemporary like-for-like functional capacity relative to any accepted expanded functionality requires explicit consideration and guidance.

Current area stands at 4,458 sqm Net Department Area (NDA), which is the total available usable space. The estimated proposed area by ACT Pathology is 6,589 sqm NDA inclusive of expanded/enhanced functions, this translates to 8,355 Gross Departmental Area (GDA) and ~11,700 Gross Building Area (GBA).

4.3. PRE-ANALYTICS

This section describes the current operating system and service model as well as identifying key issues for Pre-Analytics services.

4.3.1. Scope of Service

Pre-Analytic services are the 'front door' to pathology. Pre-Analytics maintains the pathology test register, manages distribution of test results and is responsible for patient care in collection areas. Pre-Analytics is custodian of patient specimens up to handover to other specialist departments.

Pre-Analytics department comprises two distinct services:

■ **Collection Services.**

- ▶ Customer engagement;
- ▶ Phlebotomy/specimen collection to support CH and non-CH services;
- ▶ Glucose Tolerance Testing;
- ▶ Electrocardiogram;
- ▶ Fine Needle Aspiration;
- ▶ Home Collection Service;
- ▶ Couriers;
- ▶ Client and service advocacy;
- ▶ Dispatch of tests to specialist labs for testing;
- ▶ Patient and client enquiries;

■ **Specimen Reception.**

- ▶ Pre-analytical request registration;
- ▶ Specimen receipt;
- ▶ Receipt of samples via the (Lampson) Pneumatic tube system from connected ward locations;
- ▶ Specimen processing;
- ▶ Loading, unloading and monitoring of the specimen tracking system;
- ▶ Delivery of test results and reports;
- ▶ Management of clinical trial samples; and
- ▶ Referral of samples.

4.3.2. Specimen Pathway

Specimens are received from the following places:

- Inpatient and outpatient services at CH;
- Other public and private hospitals in the ACT and parts of NSW;
- Community medical practitioners; and

- Collection centres operated by ACT Pathology.

Upon receipt of the specimen and the checking of the specimen details, the specimen is registered in the Laboratory Information System (LIS). This becomes a critical step in the quality, tracking and risk management of pathology's work.

Collection Services

Collection services comprise:

- Patient arrival and registration - with referral and identification;
- The specimen is collected from the patient (by various methods depending on the specimen); and
- Once collected, the specimen is appropriately handled and transported to specimen reception.

Specimen Reception

Specimens are delivered to Reception by:

- Pneumatic Tube from some areas of the Hospital;
- Hospital staff;
- ACT Pathology couriers; and
- ACT Pathology staff including Anatomical Pathology staff who perform the collection (e.g., fine needle aspiration).

Specimen reception has two main functions: 'logging' the specimen into the laboratory's information management system with cross-checking of the requisite details and forwarding the specimen to the Core Laboratory for routine testing or other appropriate department for processing. Each department has their own process(es) and systems that are described below.

Area

The current NDA for Pre-Analytics is ~391 sqm.

4.3.3. Hours of Operation

Pre-Analytics services at the new Pathology facility will operate 24 hours a day, 7 days a week and 365 days a year, with reduced resourcing after-hours and weekends¹⁷. Collection services may also be offered outside of this building, if this is the case, hours of operation of this (other collection) service will be in line with the building and staff arrangements.

4.3.4. Service integration and collaboration

As noted above, Pre-Analytics is the 'front door' of the pathology service, and always available at the hospital site to receive specimens from CH, other hospitals and other collection sites across the ACT.

17. ACT Pathology, 02508 02501 86751 aid.

An important current and future function of the Pre-Analytics services is the capacity to further develop and maintain the market share for pathology services, which means:

- Maintaining its availability;
- Maintaining and improving its collaboration with community referrers and its responsiveness, including the timely collection of specimens; and
- The corresponding need for timely testing and reporting of results that is the responsibility of the Pathology Core Laboratory and each department. This also means having compatible ICT platforms for receipt of referrals and for reporting results in a timely manner: a core requirement of current and future Pathology services.

4.3.5. Workforce Model

The workforce model ¹⁸¹⁹ determines the effectiveness of clinical capability of Pre-Analytics services. It is both the number of Full-Time Equivalent (FTE) as well as how staff are organised to meet demand in a timely manner that will be important to the viability of pathology as a business unit.

Current staffing levels provided in tables below, and total 99.1 FTE.

Table 4-1: Staffing by Workforce Category, Customer Services and Collection Services

Staff Category	Headcount	FTE
Customer Services Manager	1	1.0
Collections Manager	1	1.0
Collections Educator	1	1.0
Customer Liaison Officer	1	1.0
Receptionists	21	16.0
Phlebotomists	53	39.5
Pathology Courier	15	8.6
Total	93	68.1

Table 4-2: Staffing by Workforce Category, Specimen Reception

Staff Category	Headcount	FTE
Manager	1	1.0
Senior Technical Officers	5	5.0
Team Leaders	4	4.0
Technical Officers	28	21.0
Total	38	31.0

Staffing numbers are at a point in time and will not reflect future FTE or workforce mix needs.

18. ACT Pathology, SR Staff List - January 2023

19. ACT Pathology, January 2023 Customer Service Staff List.

4.3.6. Key Functional Relationships

Internal Relationships

Collection Services has a close clinical relationship with Specimen Reception. However, it does not need to be immediately proximal to the Specimen Reception or any other pathology function if patient-centred care considerations outweigh proximity (collection services must be close to outpatient public access/parking/ pickup/drop-off). There are other mechanisms such as pneumatic tubes that can reduce the need for close proximity.

Specimen Reception will be a part of the Pathology Core Laboratory services in the new facility along with (automated) Chemical Pathology, (automated) Haematology, and (automated) Immunology/Infectious Immunoassay, as one of its main future functions will be loading and unloading the tracking system.

External Relationships

Collection Services is the most outward facing department of ACT Pathology. It works with all CH departments, other CHS services, private health service providers, as well as pathology laboratories outside of CHS. Collection Services is strategically positioned to impact ACT Pathology's reputation and reflect 'customer needs'.

Specimen Reception is to be closely linked with courier services.

4.3.7. Environmental and Safety Considerations

There are important environmental components for the Service Model that incorporate:

- Space and zoning;
- Ventilation and air quality;
- Lighting (particularly for blood film reading),
- Temperature controls;
- Noise abatement;
- Floor loading; and
- Sustainable practices.

These considerations form part of the Functional Design Brief.

4.3.8. Key Challenges/ Future Service Trends and Innovations

At the moment, Collection Services and Specimen Reception are two separate departments of Pathology, but with the introduction of Digital Health Record (DHR), the two departments will merge into a single department.

Most of the key challenges are automation, operational or 'space' related, including:

- The future **collocation and structural integration** of Customer Services and Specimen Collection;
- Improved **security and data privacy measures** through advanced encryption methods, robust authentication protocols and compliance with evolving data protection regulations, which are essential to safeguard patient information. The potential risks to CHS of data breaches/hacking is particularly significant;

- **Robotic automated systems** can support the sorting, labelling, and organising of specimens, ready for transporting them to the appropriate processing areas. The progression towards a fully operational robotic system for Pre-Analytics is understood to be in progress at ACT Pathology;
- **Automated devices** can be used to a greater extent, assisting in tasks such as venipuncture, tissue biopsy, and sample preparation, which may enable more patient-centred collections at the bedside or clinic, or even patients' homes;
- A fully integrated **laboratory information systems** (LIS) has potentially powerful application for enhanced data management and workflow, facilitate real-time tracking of specimens, and automated data capture. It could also enable data analytics and reporting capabilities to support quality improvement initiatives and to better support business performance;
- The constant need for **equipment and ICT platform upgrading and replacement**.
- **Enhanced courier access** (e.g., at a loading dock rather than directly to and from an upper level in the facility to improve efficiency for pickups and drop-offs;
- Enhanced **storage facilities for blood products**, with separation from Specimen Reception;
- The **more widespread adoption of DHR** by more ACT health services will enable better integration between services (with ACT Pathology) and further enhancing automation and coordination for P&PA;
- **24/7 workforce issues**. With technology, Specimen Reception may become one of the only, if not the only overnight service within ACT Pathology in the future with high levels of automation in the Core Laboratory. This means workforce capacity and sufficient staff amenities in the Specimen Collection and Core Laboratory will enable staff to remain in the area during their overnight shift;
- **Administrative process and structures**
 - ▶ **DHR impacts**. Most of the impacts are positive in the centralisation of the patient record. There are administration processes that will adversely impact on quality in the short-term such as potential distortion of sensitive information arising from the pre-printing labels in the context of "actual time of collection"; and label printing continuing to rely on hospital clinicians being familiar with frequently misprinted colour coding/test types, leading to substantial (and unnecessary) manual override;
 - ▶ The importance of maintaining a separate external door to allow for the presentation of **infectious patients**;
 - ▶ Medicare checks not being undertaken which introduces errors due to incorrect reading of doctor's handwritten information;
 - ▶ The need to separate internal hospital staff foot traffic from courier traffic; and
 - ▶ ACT Pathology, being the only public pathology service in ACT, still frequently gets mixed up with Capital Pathology, due to similar naming conventions.

4.3.9. Pre-Analytics Strategic Developments

The Pre-Analytics service model represents a traditional 'front door' model of a pathology service. It has progressively developed practices that are now partly electronic and partly manual. There would appear to be room for the further automation of collection and reception of specimens, and thereby increasing operational efficiencies and reducing risks associated with specimen identification and tracking. More contemporary practices would necessarily form part of the development of Pre-Analytics in the new Pathology facility.

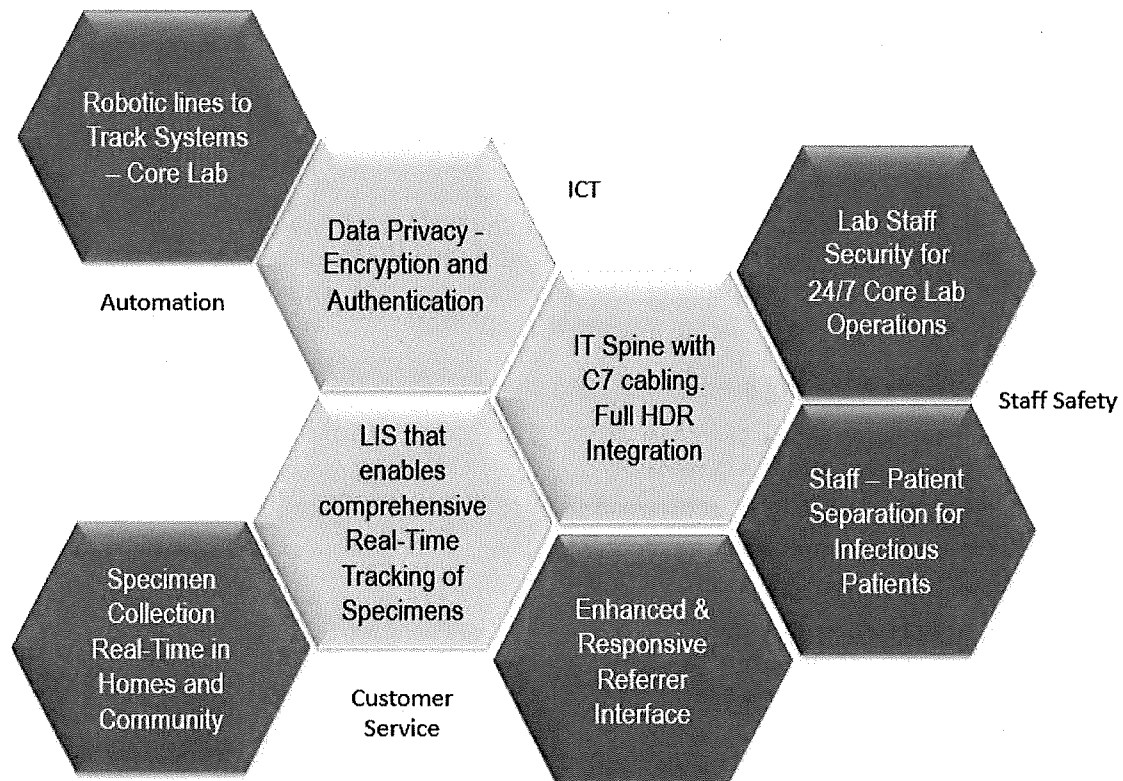
Consideration is given for two potential service model options for Collection Services:

- One Collection Service only, which continues the existing operations at the new Pathology facility, if the pathology facility is close to outpatients; or

- Two Collection Services, if pathology is too distant from outpatients. There would be one at the new Pathology facility to include usual collection services and all patients needing fine needle aspiration or other complex collection services. The second collection centre would be at one of the two new Inpatient and Outpatient building(s) for general collection.

The design of the Pre-Analytics area would effectively integrate work flow of Pre-Analytics with the Core Lab to maximise operational efficiencies. Over time, this is expected to enable the enhanced automation, a robust ICT spine, enhanced customer service, and staff safety, as identified in Figure 4-3 below.

Figure 4-3: Future State for Pre-Analytics



4.4. ANATOMICAL PATHOLOGY

4.4.1. Scope of Service

Test Volumes

Anatomical Pathology (AP) performs approximately 30,000 tests annually and is considered one of the most labour-intensive disciplines. The bulk of the testing is histology, which accounts for approximately 75% of the workload. The breakdown of testing, section and volume is provided Table 4-3 noting a slight decline year-on-year, which is most likely related to COVID.

Table 4-3: Anatomical Pathology Test Volumes – 2019-20 to 2021-22

Year	Histology	Cytology	Immuno-histochemistry	Perinatal Autopsies	Total
2019/2020	Not known	Not known	Not known	Not known	34,265
2020/2021	25,106	7567	Not known	95	33,157
2021/2022	22,507	7237	Not Known	77	30,221

Area

The current NDA for AP is ~939 sqm.

Specialty Scope

AP is a specialty of pathology that involves the study of human organs and tissues and has a large role in cancer diagnoses. The tissues examined usually include biopsy material taken from a patient in the operating theatre, on the ward, outpatients or during autopsy, and allows clinicians to give the most appropriate advice and treatment to patients²⁰. A significant number of referrals also come from external specialists and GPs.

AP has roles in the following areas, noting the most significant volumes of work are for “tissues of living patients”²¹:

- Determining the cause of disease;
- The effect(s) these diseases have on the body and specific organs or tissues;
- The choice of treatment to be given;
- Prediction of prognosis; and
- Determining cause of death.

There are three sub-divisions within anatomical pathology; histology, cytology and mortuary services.

Histology

Histology focuses on microscopic structure of tissue obtained from biopsies or surgical procedures, processed (see below) and then examined by an anatomical pathologist under a microscope. There are several important components of histology that impact on the Service Model and the design of future AP space.

Immunohistochemistry (IHC) is a form of specialised staining employed on both histology and cytology samples. IHC uses antibodies to detect specific antigens in tissue samples and provides information about the location and intensity of antigen expression, giving a more detailed and specific analysis than traditional histology. This includes tumour markers (proteins) that are overexpressed in certain types of cancer (like HER2/neu in breast cancer), amongst many others.

20. NSW Health Pathology, Clinical Services Plan 2019 – 2025 Version 2:2021, <https://pathology.health.nsw.gov.au/wp-content/uploads/2022/10/Clinical-Services-Plan.pdf>

21. NSW Health Pathology, Clinical Services Plan 2019 – 2025 Version 2:2021, <https://pathology.health.nsw.gov.au/wp-content/uploads/2022/10/Clinical-Services-Plan.pdf>

Cytology

Cytology examines cells or cluster of cells under a microscope. Cytology includes examinations most often related to body fluids, cervical screening tests and fine needle aspirations. Cytology scientists attend many interventional radiology procedures to provide on-site rapid assessment of samples for diagnostic adequacy.

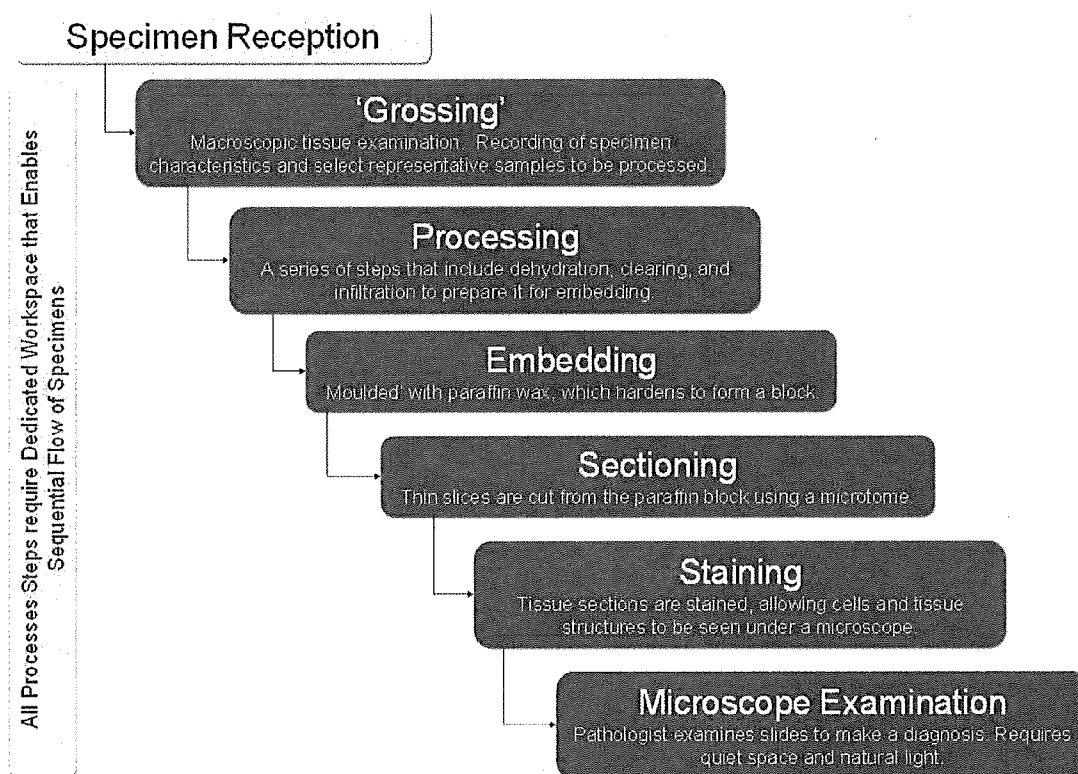
Mortuary services

See section 5.

4.4.2. Specimen Pathway

Figure 4-4: Unidirectional Specimen Flow for Histology

Following receipt and registration of specimens (from Pre-Analytics), processes in AP follow a generally linear flow, but with recursive loops through parts of the process if additional work or stains are required. There are slightly different pathways for each of the units as indicated in the following schematic diagram.



All findings/reports - including diagnosis and recommendations for treatment and/or management - are then documented, which is the principal means of communication with other clinicians involved in relation to overall patient care and management.

After analysis, specimens must be stored for a period of time (before disposal) based on CHS policies and statutory requirements. Disposal is similarly governed by policy and regulation/protocols, as biohazardous waste.

It is evident from the above description that AP requires space for receiving and managing/storing and processing a large variety of tissue types. Each of the stages of tissue examination requires dedicated space to ensure effective management and control of the tissue. Each process is sequential requiring the organisation of the histology unit to be established in a unidirectional and logical flow sequences.

Many of the process steps are currently manual but with an increasing propensity to automate most of these manual steps.

The pathologist may request additional sectioning and staining (including immunohistochemistry or in situ hybridisation) in order to make a diagnosis (looped workflow).

In some cases, specimens are sent fresh (rather than in formalin) for frozen section examination. Fresh tissues are also triaged and divided for examination by multiple other departments (for example, lymph nodes for Microbiology and Flow cytometry as well as Histology).

Triaging of samples is a large component of AP, requiring a close collaboration between scientists and pathologists. Close proximity is therefore essential.

For Cytology, the processes are a truncated version of Histology.

4.4.3. Hours of Operation

Usually, AP operates five days a week Monday to Friday, with laboratory staff present from 5.30am to 8.00pm. Additional rostered shifts occur during extended hours, weekends and Public Holidays i.e., Easter and Christmas-New Year break.

AP supplements the usual operating times with a 24/7 out-of-hours on-call service for emergency/urgent tissue analysis, which includes:

- A pathologist on-call, out-of-hours;
- Scientists on-call to assist pathologist with any Frozen Section and Renal Biopsy which occur after-hours, as well as attending to the laboratory if processor and/or other instrumentation issues arise.

4.4.4. Workforce Model

The workforce model reflects the clinical capability level of AP, with staffing levels provided in Table 4-4 below. The staffing complement includes clinical director, anatomical pathologists, registrars, chief scientist, administration support, laboratory/pathology scientists and technical officers.

Table 4-4: Staffing by Workforce Category, Anatomical Pathology²²

Category	Section/Unit	Head Count	FTE
Director	All	1	1
Deputy Director	All	1	1
Pathologists	All	13	11.1 ²³

22. ACT Pathology, March 2022, ASSESSMENT INFORMATION DOCUMENT SUPPLEMENT – NCSP.

23. There are 11.1 FTE pathologists plus an ANU-funded pathologist for running the undergraduate pathology course, this ANU funded position is not part of the FTE count for this table.

Category	Section/Unit	Head Count	FTE
Registrar	All	7	6.4 ²⁴
Chief Scientist	All	1	1
Scientific Supervisor	AP	1	1
Scientific Supervisor	Cytology	1	1
Senior Scientist	Histology	2	2
Senior Scientist	IHC	1	1
Senior Scientist	Cytology	1	1
Base Grade Scientist	Histology and IHC	13	11.4
Cytoscreener	Cytology	6	5.8
Technical Officer	Histology and IHC	4	4
Administration Support	All	4	4
Current Total		56	51.7

Staffing numbers are at a point in time and will not reflect future FTE or workforce mix needs.

4.4.5. Current Location

AP is currently located on Levels 1, 3 and 5, Building 10, CH as indicated:

- Histology (Level 3);
- Immunohistochemistry (Level 5);
- Cytology (Level 3); and
- Mortuary services (Level 1).

Additionally, archived 'slides and blocks' are stored in the basement primarily due to the weight of the blocks and also due to storage constraints on level 3 where a smaller store area is kept. The laboratory is required to retain slides and blocks generated as part of the diagnostic process for as many as 28 years.

The locations indicate that the nature of the department is too fragmented and operates inefficiently from over-crowded spaces. This service model proposes a consolidation of AP, an increase in area, and with strong connection with DG.

4.4.6. Key Functional Relationships

Internal Relationships

Within the department, Histology, Immunohistochemistry/Special Stains, EM and Cytology should be located together, as a single coherent unit. This is the primary functional relationship for AP.

24. There is a 0.2 FTE honorary registrar, not part of the FTE count for this table.

As the next most important relationship, AP should be located proximal to (or contiguous with) Diagnostic Genomics. Anatomical Pathology and Diagnostic Genomics will be managed as a single department in the future. The closer working relationship will provide an opportunity to better leverage new technologies (genomics and imaging in particular) and the evolving, closer professional relationships that are already emerging.

Anatomical Pathology site visits demonstrated that, new laboratories, even after a relatively short period of time e.g. 5 years, outgrow the space. This is due to the high level of manual labour, especially in areas such as cut up grossing. As workload increase, space requirements also increase due to additional staff a workplace. It is therefore critical to over spec the anatomical Pathology laboratory to ensure ACT Pathology can keep pace with future clinical requirements.

AP registrars will be located in a dedicated space to allow for their workstations/microscope, as well as registrars of other departments.

There is no requirement for Mortuary Services or the Pathology Museum to be collocated with the other AP units, but there will be a strong association between these services.

External Relationships

The key requirement for AP is similar to all other areas of pathology. The ICT connectivity and the IT platforms need to be robust in order that:

- Anatomical pathologists are able to communicate with other medical practitioners, with sufficient bandwidth to display high fidelity images; and
- Regular and constructive relationships with all referrers, including timely provision of results.

4.4.7. Storage and Specimen Retention

For AP, storage is a particular issue (and is one of the challenges noted below). The department requires various types of storage for different purposes, noting it shares processing similarities with closely linked departments – Histopathology (tissue processing) Diagnostic Genomics and Molecular Pathology. The design could create special efficiency by having shared storage.

Stock will need to be retrieved from storage locations strategically placed to optimise workflow. Waste should be relocated to a dedicated waste removal space awaiting collection by the waste disposal service.

Details on storage and waste are further outlined in the Functional Design Brief.

ACT Pathology is required to meet National Pathology Accreditation Advisory Committee's Requirements for the retention of laboratory records and diagnostic material. The relevant retention period is also outlined in the Functional Design Brief.

4.4.8. Environmental and Safety Considerations

There are important environmental components for the Service Model that incorporate:

- Space and zoning;
- Ventilation and air quality;
- Lighting (particularly for blood film reading),
- Temperature controls;

- Noise abatement;
- Floor loading; and
- Sustainable practices.

These considerations form part of the Functional Design Brief.

4.4.9. Anatomical Pathology Future Challenges, Trends and Innovations

Trends and Innovations

The future for AP is relatively clear. It incorporates a service model that has very significant investment in automation, particularly WSI, and embracing of the omics revolution, in order to minimise manual processes wherever possible.

Whole Slide Imaging and Artificial Intelligence

It is certain that AI and machine learning will assist AP with the automated evaluation of *digital slides*, improving accuracy, and reducing the time taken for manual diagnosis. This will reduce the workloads for Anatomical Pathologists.

The evolution to AI will be incremental. In the first instance, AI will be used as a clinical decision support tool. Nevertheless, even making the strategic decision to use slide imaging as a decision support tool for AP, it will require significant investment in the technology.

The technology currently exists and will continue to improve over time. *Whole Slide Imaging and Digital Pathology* technology can create digital slides that can be viewed on a computer, eliminating the need to manually handle glass slides. The digital images are easily shared and stored but will require additional digital storage capacity

Digital technologies in pathology are rapidly moving beyond imaging to guiding diagnosis. Some manufacturers are developing technology, dyes and analytic platforms to meet future demand and improve patient outcomes using nanotechnology. These new technologies are mostly replacing the staining technology and the scanner for new types of digital immunohistochemistry.

Integrated automation and tracking solutions.

While many steps of the pathology workflow are already automated, there is potential for even more automation using advanced robotics.

There are current automated processes for AP that are not yet operating at ACT Pathology. This is where 'leap frogging' investment is a key consideration. Indicatively:

- For histology and IHC workflow, individual components and workstations could become more automated, which highlights the need to design for open spaces as well as structural design of flooring to handle additional machinery and its weight;
- *Processing*: Automated tissue processors are a crucial part of the workflow in many labs including ACT Pathology. Future advancements in processing could involve more efficient or rapid methods, or using alternative chemicals that are safer or more environmentally friendly but will mostly be replacing equipment with similar sized equipment;
- *Embedding*: Automation of the embedding process is already available for simple specimen transfers and with advancements in robotics and machine learning, there will be more automated embedding systems in the future;

- **Sectioning:** Sectioning is currently primarily a manual task, as it requires a high degree of precision and skill. Automated microtomes are available with automatic, semi-automatic, and manual options available to meet a variety of circumstances and it's possible that with advancements in robotics and machine vision, more automated sectioning could become possible. Despite this advancement, however, scientists will still be just as needed and wanted as they will need to manage this process, with the automation part acting predominantly to reduce manual labour and hence prevent repetitive strain injury (RSI); and
- **Staining:** Automated stainers are already widely used in histopathology labs. Advancements will be the replacement of current technology with new technology that offers more and/or better features.

Omics and individual therapies.

The drive towards individually targeted therapies is expected to continue to increase the level of testing, workforce expertise and need for individualised reports, particularly in cancer treatments. *Perhaps more relevant, Diagnostic Genomic, and the 'omics revolution' for personalised diagnoses and treatments will become core business for ACT Pathology.*

Challenges

There are other challenges that will impact on how pathology is delivered in the future, including:

- ICT systems with sufficient bandwidth, and robust IT platforms will be a critical enabler to a contemporary AP pathology service. It requires a capacity for on demand case discussions/presentations.
- Designing flexibility into the workspace including mobile workstations,
- Mobile equipment to transport microscopes around the laboratory;
- Designing spaces that embedded/specialised laboratory workstations with protection against any disturbances such as airflow and movements;
- Purpose design specimen storage for AP is a critical enhancement to the current capacity;
- Ensuring protocols and systems are consistent with Royal College of Pathologists of Australasia (RCPA) protocols for Structured Reporting of Cancer;
- A regular reassessment of the number and core skill sets of the workforce. Training and retraining will be a core part of the flexibility needed of a tertiary pathology service; and
- Develop a stronger reputation of being available and responsive to pathology queries from CH staff and external referrers.

4.4.10. Anatomical Pathology Strategic Developments

*The most important strategic option is to commence AP in the new building with a **substantial investment in automation and 'omics'**, which would place ACT Pathology at the fore of AP across jurisdictions. The default position is to progressively enhance technology capability in automation and 'omics' as the investment funds would ordinarily become available.*

*An operational consideration relates to **archiving slides and blocks**. With the statutory requirement to keep slides and blocks for up to 28 years in some instances, the current archive in the basement will require a solution that does not rely upon the existing practice of continuing to store in the B1 basement. The existing basement room is nearing capacity, using approximately 55-60sqm. The future requires storing/archiving at an alternative archive site off-campus.*

It is also clear that the current space allocations will need to be increased for both the specimen flows and future automation.

4.5. CHEMICAL PATHOLOGY

Chemical Pathology is the largest of the pathology departments by volume of testing. Examinations are broadly applicable to detect substances in blood and body fluids, measures cancer markers, hormones, poisons, and therapeutic and illicit drugs.

4.5.1. Scope and Capacity of Services

Chemical Pathology operates as a Level 6 laboratory²⁵.

Test Volumes

Chemical Pathology's test panel volumes are combined with Immunopathology & Infectious Immunoassay, performing more than 1 million tests annually. The year-by-year breakdown is as below.

Table 4-5: Chemical Pathology, Immunopathology & Infectious Immunoassay Test Panel Volumes – 2019-20 to 2021-22

Year	Total
2019/2020	1,661,806
2020/2021	1,756,151
2021/2022	1,748,351

Area

The current NDA for Chemical Pathology is ~417 sqm, excluding support services.

Specialty Scope

Chemical Pathology comprises four distinct sub-sections:

- Routine Chemistry;
- Endocrinology;
- Special Chemistry; and
- Point of Care Testing (POCT).

Routine Chemistry (in Core Lab)

Routine chemistry focuses on the analysis of bodily fluids such as blood, urine, and cerebrospinal fluid. It involves the measurement of various chemical components and biomarkers present in these fluids to evaluate the normal functioning of organs, diagnose and monitor diseases, assess and monitor treatment efficacy, and detect abnormalities or imbalances within the body. The tests for routine chemistry are typically automated. Chemical pathology tests are expected to be part of the routine 'Core laboratory' processes.

²⁵ NSW Role Delineation of Clinical Services,(2021). The NSW Role Delineation of Clinical Service is used as the default clinical capability framework for NSW, Victoria and ACT, unless there is a specific jurisdictional capability framework

Common tests include:

- Blood glucose tests to diagnose and monitor diabetes;
- Lipid profiles to assess cardiovascular health and disease risk;
- Liver and kidney function tests to detect conditions such as hepatitis, cirrhosis, and renal failure;
- Electrolyte panel to assess the body's fluid balance, acid-base balance, and overall electrolyte status.

These functions would be undertaken in laboratories, including levels 3 to 6 clinical capability.

Endocrinology (in Core Lab)

Endocrinology focuses the study of endocrine disorders, including:

- Hormone assays;
- Metabolic markers;
- Bone markers;
- Steroid hormone analysis; and
- Pituitary hormone assessment.

Endocrinology involves the integration of laboratory test results with other clinical findings to help diagnose and manage endocrine-related conditions. Endocrinologists, along with chemical pathologists, registrars and laboratory scientists, collaborate to interpret these results accurately and provide optimal patient care. Endocrine pathology would be typically undertaken in Level 3 to 6 laboratories.

Special Chemistry

Special Chemistry focuses on advanced and specialised laboratory testing for the diagnosis and management of complex or rare diseases. It involves the analysis of specific analytes, biomarkers, or metabolic pathways that may not be included in routine chemistry panels. Special chemistry would only be undertaken in a Level 6 laboratory.

Point of Care testing

POCT is the performance of specific laboratory tests outside the traditional laboratory setting using portable or handheld devices, which typically include but are not limited to:

- Glucose monitoring;
- Coagulation monitoring;
- Electrolyte analysis;
- Cardiac markers;
- Haemoglobin analysis; and
- Lipid profiling.

POCT enables immediate, real time test results, convenience, and the ability to make prompt clinical decisions at the patient's bedside, clinic or even patient's home. However, these devices also come with limitations in terms of accuracy, precision, and the range of tests they can perform compared to central laboratory analysers.

4.5.2. Specimen Pathway

The specimen pathway for Chemical Pathology is described below.

Specimens are received in specimen reception as for all specialty areas. The sample then typically follows the steps in Figure 4-5.

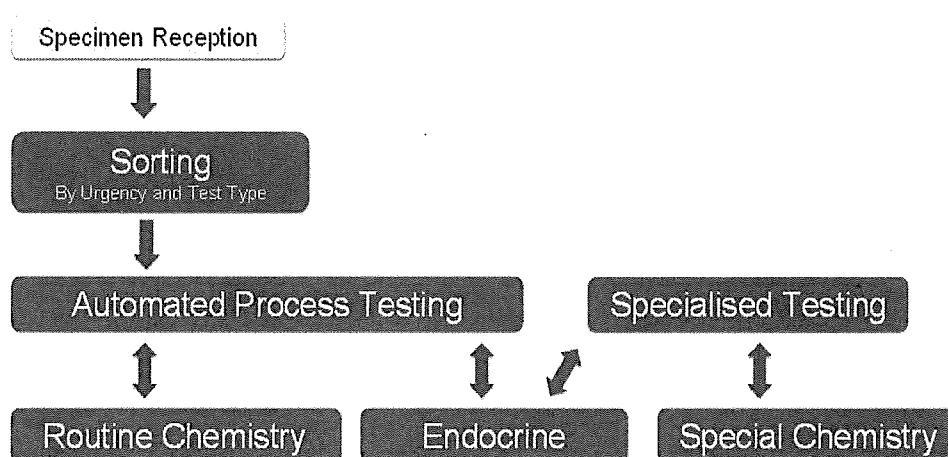
The pathway is multi-directional following the automated testing step where sample also have specialised tests or second sample tests or are transferred to another department for further testing.

All findings/reports – including diagnosis and recommendations for treatment and/or management - are then documented, which is the principal means of communication with other clinicians involved in relation to overall patient care and management.

After analysis, specimens may be stored for a period of time (before disposal) based on CHS policies and statutory requirements. Disposal is similarly governed by policy and regulation/protocols, as biohazardous waste.

The specimen pathway impacts service models and related issues of ongoing storage, teaching and operational efficiencies that are able to be introduced.

Figure 4-5: Specimen Pathway for Chemical Pathology



4.5.3. Hours of Operation

Routine Chemistry and Endocrinology operates 24/7 every day of the year. The remainder of Chemical Pathology (that is, Specialised Endocrinology, Special Chemistry and POCT) routinely operate between 8.30am – 5.00pm Monday – Friday²⁶.

4.5.4. Workforce Model

The workforce model²⁷ reflects the clinical capability level of Chemical Pathology, with staffing levels provided in Table 4-6 below. The staffing complement includes clinical director, chemical pathologists, registrars, chief scientist, laboratory/pathology scientists and technical officers.

Table 4-6: Current Staffing by Workforce Category, Chemical Pathology

Category	Section/Unit	Head Count	FTE
Director	All	1	1
Pathologist	All	1	0.5
Registrar	All	1	1

26. ACT Pathology, Chemical Pathology.

27. ACT Pathology, Chemical Pathology.

Category	Section/Unit	Head Count	FTE
Chief Scientist	All	1	1
Senior Scientists	Routine Chemistry	2	2
Base Grade Scientists	Routine Chemistry	15	12.68
Technical Officers	Routine Chemistry	2	2
Senior Scientist	Endocrinology	1	1
Base Grade Scientist	Endocrinology/	1	1
Senior Scientist	Special Chemistry	1	1
Base Grade Scientist	Special Chemistry/ Routine/Chemistry	1	1
Senior Scientist	POCT	1	1
Base Grade Scientist	POCT	1	1
Current Total		29	26.18

Staffing numbers are at a point in time and will not reflect future FTE or workforce mix needs.

4.5.5. Current location

Chemical Pathology (automated and manual) are located on Level 2, contiguous with Specimen Reception and adjacent Haematology. Manual testing, Mass Spectrometry and Point of Care Testing are also on level 2, at the rear of the automated section.

Infectious Immunoassay and Special Protein Chemistry (part of Immunopathology) are currently located on level 6. This is seen as a dislocation of the Chemical Pathology due to overcrowding on Level 2.

4.5.6. Key Functional Relationships

Internal Relationships

Chemical Pathology has a close clinical relationship with Specimen Reception (mainly due to volumes), Haematology and Immunopathology & Infectious Immunoassay (due to the move to automating as much of the analysis process as possible). This will include a direct pneumatic tube.

Specimen Reception, Automated Chemistry and Automated Haematology/transfusion will be joined by Automated Immunopathology & Infectious Immunoassay to form the **Core Laboratory**. Aspects of Microbiology and Molecular Pathology are increasingly becoming more automated and could also form part of the core laboratory in the future – These areas must be collocated in an open plan configuration as per the L2D functional designs.

While the Chemical Pathology department manages both automated and manual testing, it is necessary that the automated processes are contiguous, and integral to the Core Lab.

External Relationships

The key requirement for Chemical Pathology is similar to all other areas of pathology. The ICT connectivity and the IT platforms need to be robust in order that:

- Chemical pathologists are able to communicate with other medical practitioners, with sufficient bandwidth to display high fidelity images; and
- Regular and constructive relationships with all referrers, including timely provision of results.

The future development of this specialty will require close and frequent communication with referrers to build the specialty and broaden the scope of services.

4.5.7. Storage and Specimen Retention

For Chemical Pathology, storage is one of the continuing challenges on Level 2, especially with space being at a premium for testing. The department requires various types of storage for different purposes, noting it shares processing similarities with closely linked departments – Haematology and Immunopathology & Infectious Immunoassay.

Chemical Pathology, Haematology, and Immunopathology & Infectious Immunoassay departments will operate as part of a broader core laboratory in the new pathology facility, details on the core laboratory and its storage/waste requirements are further outlined in the Functional Design Brief

ACT Pathology is required to meet National Pathology Accreditation Advisory Committee's Requirements for the retention of laboratory records and diagnostic material. The relevant retention period is also outlined in the Functional Design Brief.

4.5.8. Environmental and Safety Considerations

There are important environmental components for the Service Model that incorporate:

- Space and zoning;
- Ventilation and air quality;
- Lighting (particularly for blood film reading),
- Temperature controls;
- Noise abatement;
- Floor loading; and
- Sustainable practices.

These considerations form part of the Functional Design Brief.

4.5.9. Chemical Pathology Future Challenges, Trends and Innovations

The main challenges and expected future trends are outlined below. Many of the therapeutic trends are inter-related. Whilst highly automated at present, future technologies provide for significant increases in productivity and efficiency.

Evaluation of new technology and the development of new tests is an ongoing process in Chemical Pathology. Emerging trends encompass advancements in laboratory testing methods, diagnostic technologies, and approaches to personalised medicine.

For Chemical Pathology there are particular opportunities in relation to:

- **New generation automated systems** for existing routine and common tests, and the automation of existing manual steps that remain in Chemical Pathology.
- **Development of a Core Laboratory:** Urgent testing on existing instruments are likely to shift to a Core Laboratory operating 24/7 and operated by multi-disciplinary pathology staff. Robotics will be extended to accommodate more of the high-volume testing of a Core Laboratory.
- **POCT innovations** enabling increasingly more rapid and accurate testing at the patient's bedside or in remote settings.
- **Artificial Intelligence.** AI and machine learning will help automate processes (analysing big data sets in chemistry. Like other specialties, Chemical Pathology will be in a position to utilise AI as a decision support tool and security checks that are not systematically built into current day-to-day processes. This will not reduce the staff or building footprint but instead give the adopting laboratory more capacity to increase the range of services offered.
- **Recycling and sustainability:** each department will have equipment and technology designed to help recycle.
- **Liquid biopsies** have emerged as a non-invasive cancer diagnostic tool, which may assist in the early detection, residual disease monitoring, and treatment response assessment for haematologic malignancies;
- **Gene editing and gene transfer therapies** are potentially achievable for ACT Pathology, again with targeted investment.
- **Biomarkers and predictive models** help predict disease progression, treatment response, and patient outcomes. It is an important area of research in haematology and has the potential to make a massive difference to patient outcomes alongside other technologies such as the omics revolution.
- **Quality assurance and standardisation** is another area of growing focus in order to ensure high-quality laboratory testing and harmonisation across different laboratories, including the standardisation of reference intervals, establishment of proficiency testing programs, and implementation of quality management systems to enhance the accuracy and reliability of laboratory results.
- **Cramped Space.** This is an issue for Chemical Pathology, mainly for new generation automated machines as well as storage.

4.5.10. Chemical Pathology Strategic Developments

The future for the high volume and routine Chemical Pathology testing will be a progressive elimination of the remaining manual processes.

The future for the interface between chemical pathology, genomics and molecular pathology will continue to challenge ACT Pathology as it develops capability to extends beyond the current 'norms' at leading interstate laboratories.

4.6. DIAGNOSTIC GENOMICS

section describes the current operating system and service model as well as identifying key issues for Diagnostic Genomics (DG).

4.6.1. Context

Diagnostic Genomics is a rapidly evolving area of pathology that has the potential to have significant impacts on the future development of medicine. DG is likely going to change the way we understand and manage cancer and disease-causing constitutional variants through diagnosis, screening, and monitoring. This will revolutionise disease diagnosis, tailored curative treatments, and clinical management based on each individual patient's genetic information.

At ACT Pathology, the DG laboratory initially operated as a cytogenetics lab, providing karyotype and Fluorescence In Situ Hybridization (FISH) services to various medical specialties, at which time only a small number of DNA extractions were performed manually. By 2000, the lab moved to its current location, initially equipped with very basic infrastructure and equipment, but experienced significant expansion and diversification over the 15 years from 2008 to 2023. During this period:

- The FISH service expanded to include analysis of paraffin embedded tumour samples from Anatomical Pathology;
- The number of DNA extraction requests increased from a handful to hundreds per year;
- The lab started performing multiple PCR-based assays, with specific PCR machines;
- Traditional karyotyping transitioned into molecular-based karyotyping using Single Nucleotide Polymorphism (SNP)s array technology, necessitating additional analytical software and scientists; and
- New technology, such as NGS has come to the fore, and is being developed for 2024/2025.

Demand has rapidly increased. The scale of operation, and the breadth of testing, has not been able to keep pace with the demand.

4.6.2. Scope of Service

Test Volumes

DG performs ~2,000 tests annually and is considered one of the smallest specialties. The noted decline in activity is principally due to COVID and higher levels of 'Refer Outs' (>2500, many of which will be performed in-house in the future with the development of NGS.

Table 4-7: Diagnostic Genomics Test Volumes – 2020-21 to 2022-23 (Projected)

Year	Diagnostic Genomics
2019/2020	2,131
2020/2021	4,597 (2,452 + 2,145) send outs
2021/2022	4,581 (1,978 + 2,603) send outs

Area

The current NDA for DG is ~319 sqm.

Specialty Scope

Technology advances have merged molecular genetics and cytogenetic laboratories over time, into the area of genomics. As a discipline, there are three broad categories of genomic testing:

- **Cancer genomics.** This includes familial cancer predisposition testing; tumour profiling (e.g. solid tumours, haematological tumours), predictive selection of therapeutic cancer drugs, and monitoring of disease progression; and
- **Constitutional Genomics.** This includes inherited conditions (e.g. cystic fibrosis, haemochromatosis, population specific conditions), congenital disease diagnosis, pre-conception and post-conception screening, and post-natal genomic diagnostics (e.g. products of conception, fetal demise including post-mortem cases, newborn, and paediatric).

From the above potential scope of DG, ACT Pathology focuses predominantly on²⁸:

- **Cancer diagnostic genomics** for haematological disorders and solid tumours utilising conventional karyotyping, FISH, single gene assays, and NGS; and
- **The investigation of fetal death** utilising SNP microarray, fertility investigations and rapid diagnosis of neonates utilising conventional karyotyping, and FISH.

4.6.3. Specimen Pathway

Typical genomic tests performed include²⁹:

- Conventional Karyotyping (haematological and constitutional);
- FISH, including the analysis of formalin fixed paraffin embedded (FFPE) tissue, solid tumor (haematological and constitutional);
- Cryopreservation of cells;
- SNP Microarray (products of conception);
- DNA extraction and storage;
- Single Gene PCR Molecular Assays; and
- NGS (2024).

DG at ACT Pathology is currently modest, however, as a burgeoning specialty, there are active plans and considerable scope to invest in technologies and workforce to significantly develop this specialist field by 2025 and into the future. The area proposed for DG offers a considerable expansion.

Specimens are received in specimen reception as for all specialty areas.

The pathway requires close proximity to molecular pathology. To comply with regulatory requirements, the department also needs to include a separate clean room for PCR preparation noting separate isolated spaces are required to reduce risk of contamination of specimens.

28. ACT Pathology, Diagnostic Genomics.

29. ACT Pathology, Diagnostic Genomics.

4.6.4. Hours of Operation

DG operates largely within business hours, 8.30am – 5.30pm Monday to Friday, with a Saturday roster in place to harvest bone marrow cultures and prepare peripheral blood cultures³⁰. On-call service is provided for emergency analysis between 9.00am – 5.00pm Saturdays and Sundays as well as public holidays, covered by experienced laboratory scientists at HP3 level or above.

4.6.5. Workforce Model³¹

The workforce model³² reflects the clinical volumes and capability level of DG, with staffing levels provided in Table 4-8 below. The staffing complement includes clinical director, chief scientist, senior scientists, HP2 scientists and technical officers.

The workload is currently divided into two streams – *constitutional and oncology genomics*, each stream supervised by a senior scientist, under a single leadership model.

The senior scientists get rotated regularly to ensure they gain experience in each other's area. A similar process applies to the scientific and technical staff, with movement between tests to multi-skill all team members for redundancy planning, and to prepare for times of staff shortage:

- All HP2 staff will gain experience in all aspects of DG laboratory bench work and analysis; and
- Technical officers will gain experience in most aspects of DG lab bench work and ancillary tasks, but do not perform analysis with the exception of FV/FII Genexpert tests.

Table 4-8: Staffing by Workforce Category, Diagnostic Genomics

Category	Section/Unit	Head Count
Clinical Director	1	1
Supervising Pathologists/Clinical Supervisors	1	8 (part-time components, multiple individuals)
Supervising Scientist (HP4)	1	1
Senior Scientist (HP3)	2	2
Base Grade Scientist (HP2)	5	6
Technical Officer (TO1)	1	1
Total	11	19

Staffing numbers are at a point in time and will not reflect future FTE or workforce mix needs.

30. ACT Pathology, Diagnostic Genomics.

31. ACT Pathology, Diagnostic Genomics.

32. ACT Pathology, Diagnostic Genomics.

4.6.6. Key Functional Relationships

Internal Relationships

Diagnostic Genomics utilises similar technologies and laboratory equipment as Molecular Pathology, so rather than duplicating laboratory space, Diagnostic Genomics and Molecular Pathology should be colocated to allow for the sharing of laboratory facilities and optimisation of space usage. The area proposed to be shared are the DNA Amplification laboratory with separate PCR set up and specimen preparation areas for both departments.

If Diagnostic Genomics is not co-located with Molecular Pathology, then shared areas would need to be duplicated on the other floor, including DNA amplification.

The Diagnostics Laboratory will need to have close relationships with and to have sample workflows established from Anatomical Pathology, Haematology, Immunopathology and specimen reception.

External Relationships

Diagnostic Genomics receives a significant and important volume of samples from external referrers (private in vitro fertilization [IVF] clinics, GP's, private obstetrician and gynaecologist [OBGYN] clinics), and blood collections from outpatient collection centres. The key requirement for DG is similar to all other areas of pathology. The ICT connectivity and the IT platforms need to be robust in order that:

- Genomic pathologists are able to communicate with other medical practitioners, with sufficient bandwidth to display high fidelity images;
- Regular and constructive relationships with all referrers, including timely provision of results; and
- Analytical software is securely housed, backed-up, and located on virtual servers with ample space and speed to allow timely genomic analysis by multiple users. Karyotype, FISH, SNP array and NGS are software based, using large data files and high-resolution images hence breakdowns in processing speed and file back-up poses clinical risk.

The future development of this specialty will require close and frequent communication with referrers to build the specialty and broaden the scope of services.

4.6.7. Location

DG is located on Level 4.

4.6.8. Storage and Specimen Retention

For DG, storage is a particular issue (and is one of the challenges noted below). The department requires various types of storage for different purposes, noting it shares processing similarities with closely linked departments – Microbiology and Molecular Pathology. The design could create special efficiency by having shared storage.

Stock will need to be retrieved from storage locations strategically placed to optimise workflow. Waste is relocated to a dedicated waste removal space awaiting collection by the waste disposal service.

Details on storage and waste are further outlined in the Functional Design Brief.