The Children's Hospital at Westmead Clinical Services Plan 2018 – 2031

August 2020

Helping children and young people live their healthiest lives

The Sydney children's Hospitals Network
care, advocacy, research, education

Compiled by the Planning & Redevelopment Unit
Sydney Children's Hospitals Network

Version Control

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Version 2.0	21st August 2018	Incorporating comments from clinicians and key stakeholders
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Version 4.1	31 March 2020	Confirmation of bed numbers
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Acknowledgement of country

Sydney Children's Hospitals Network respectfully acknowledges Aboriginal people as the traditional custodians of the land in which our health facilities are located and the areas from which our patients reside. We pay our respects to the Elders, community members and the Aboriginal services and organisations who partner with us to improve health outcomes for Aboriginal and Torres Strait Islander peoples in our Network.

Sydney Children's Hospitals Network facilities are situated on the traditional lands of the Gadigal and Bidjigal people of the Eora nation in the east, and the Burramattagal people of the Dharug nation in the west.

The Children's Hospital at Westmead – Fast Facts

The Sydney children's Hospitals Network care, advocacy, research, education	The Children's Hospital at Westmead is part of the Sydney Children's Hospitals Network (the Network). The Network comprises the Children's Hospital at Westmead (CHW), Sydney Children's Hospital, Randwick (SCH), Newborn and Paediatric Emergency Transport (NETS), NSW Pregnancy and Newborn Services Network (PSN) and Children's Court Clinic (Parramatta and Broadmeadow) With over 48,000 inpatient admissions and 94,000 Emergency Department presentations annually, it is the largest paediatric health care provider in Australia.
	CHW is the largest paediatric centre in NSW and provides quality care and clinical services to over 88,000 sick and injured children annually. This includes 32,406 inpatient separations and 57,676 Emergency Department presentations and 219,832 non-admitted patient service events. The hospital offers specialist paediatric services on the national, statewide and supra-local health district basis and district level services to the population of the its local catchment Local Government Areas – The Hills Shire, Holroyd and Parramatta.
	CHW is located in the population growth corridor and demographic centre of Sydney and at the heart of a network of freeways flowing north, south, east and west. One-third of the NSW's population aged 0 – 15 years lives in Greater Western Sydney Region its population is projected to increase from 472,340 in 2016, to 590,620 in 2026 and 678,490 in 2036. An increase of 44% over 20 years with an additional 206,150 residents. The local catchment of Parramatta, Holroyd and The Hills shire Local Government Areas is projected to increase from 102,470 in 2016 to 134,380 in 2026 and 158,280 in 2036. An increase of 54% over the 20 year period with an additional 55,810 residents.
	CHW activity is projected to increase from 2016/17 by: + 15,722 Emergency Department presentations (27%) in 2025/26 and a further 11,691 presentations in 2031/32 + 5,614 day only inpatient separations (40%) in 2026/27 and a further 3,126 in 2030/31 + 4,342 overnight inpatient separations (25%) in 2025/26 and a further 2,441 in 2030/31 + 13,793 overnight bed days (16%) in 2025/26 and a further 8,225 in 2030/31

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1. EXECUTIVE SUMMARY

1.1 Introduction

The Sydney Children's Hospitals Network (the Network), established in 2010, brought together The Children's Hospital at Westmead (CHW), Sydney Children's Hospital Randwick (SCH), the Neonatal Emergency and Paediatric Transport Service (NETS) and NSW Pregnancy and Newborn Services Network (PSN) and the Children's Court Clinics – Parramatta and Broadmeadow.

The Network is the largest provider of paediatric health services in Australia. In 2016/17 the Network's activity accounted for 94,685 Emergency Department presentations, 48,487 inpatient separations, 147,349 inpatient bed days and 300,000 non-admitted service events and a workforce of over 5,596.

CHW has provided paediatric health care for over 125 years and relocated from its inner Sydney location to the Westmead in 1995. The hospital offers quaternary and tertiary level services on a national and state-wide basis together with district level services to its local catchment.

CHW, together with Kids Research (KR), The Children's Hospital Medical Centre, are accommodated on a campus of 102,000m² on Hawkesbury Rd Westmead.

CHW is designated as a Peer Group 2 – Specialist Paediatric Hospital and a Nationally Funded Centre (NFC) for paediatric liver transplantation and pre and post-transplant management:

- The supra-LHD provider of cardiac services for hypo-plastic left heart syndrome;
- The state-wide referral services for the management of paediatric severe burn and part of the NSW Statewide Burn Injury Service;
- Hosts the NSW Poisons Information Centre; and
- The statewide screening program of all newborn babies for the NSW Newborn Screening Service.

Since relocating to the Westmead, CHW has experienced significant and rapid changes in clinical care, growth in the number, range and complexity of services and associated increase in both inpatient and non-inpatient activity and in its workforce. However, the Hospital's built environment has remained essentially unchanged and is now operating at physical capacity. Whilst there has been efficiencies implemented to better manage the demand, there is limited ability to further address demand particularly in relation to children requiring specialist paediatric tertiary care including emergency care, intensive care, isolation, surgical procedures, complex medical imaging procedures and rehabilitation services.

In late 2015 and early 2016, master planning for CHW was undertaken to inform the expansion and renewal of the hospital site to 2031. It provided the Network with a strategic direction for the future development and expansion of the hospital including the feasibility of partnering in the development of the Westmead Precinct. Partnership in the Westmead Precinct sought to provide a unique opportunity to address the priority clinical services issues confronting CHW, facilitate access to high cost medical technology and address the pressing requirement for growth and functionality of the CHW built environment.

The preferred option outlined in the Master Report encompassed the following:

- **CHW Stage 1 expansion as part of the Westmead Precinct Central Acute Services Building (CASB).** This stage will be delivering an expanded Emergency Department (ED), a 32-bed Short Stay inpatient unit, enhanced surgical and peri-operative capacity with access to four operating rooms and interventional facilities, Intraoperative Magnetic Resonance Imaging (MRI), Computerised Tomography (CT), an adolescent and young adults (AYA) ambulatory unit, and access to medical imaging and pharmacy to support paediatric services in the building.
- **CHW Stage 2 expansion.** This stage is proposed to deliver a new CHW clinical services building adjacent to the CASB to accommodate a perioperative suite (to replace the existing Operating Room (OR) service), a new Neonatal Intensive Care Unit (NICU), a new Paediatric Intensive Care Unit (PICU), a surgical and procedural day only and short stay, surgical inpatient units, a Comprehensive Cancer Centre, PET MRI, new inpatient units, pharmacy services, clinical support, provision of pathology services, parent and carer support services and allied health support areas. In addition, refurbishment of vacated Emergency Department and any required modification to medical imaging and nuclear medicine to enable efficient delivery of services.

- **CHW Stage 3 redevelopment.** This stage involves the redevelopment of the remainder of the hospital including the creation of an ambulatory care zone with the existing main entry to become the Ambulatory Care Zone entry together with refurbishment of other vacated space to enable the relocation of clinical services closer to the central core to achieve appropriate functional relationships with other clinical services and to provide greater efficiency in the use of space within the building.

The SCHN Asset Strategic Plan, submitted to MoH in 2017, outlined five priority projects for capital investment, the scope of the projects and estimation of project costs. CHW Stage 2 expansion was determined to be the number one priority for the Network.

1.2 Planning context

Context

Healthcare reforms at a national and state-wide level are significant considerations in the Network's operational environment, determination of its goals and parameters of proposed strategies. Planning for the Network's healthcare provision and management of assets considers numerous factors including health and social policy.

SCHN is specified as a Specialty Network Governed Statutory Health Corporation in Schedule 2 of the New South Wales (NSW) Health Services Act 1997 with the Board and Chief Executive undertaking functions, responsibilities and obligations carried in accordance with the Act.

The primary purpose of the Network is to promote, protect and maintain the health of the community, and to provide relief to sick and injured people through care and treatment *(s9).* The functions of the Board include ensuring *(s28) e*ffective clinical and corporate governance, efficient, economic and equitable operations, strategic planning and performance management.

The NSW Health Service Agreement sets out the service and performance expectations for the funding of and support services provided to the Network to ensure the provision of safe, high quality, patient-centred healthcare services. The Agreement lists those services provided by the Network to other LHDs.

In addition to service provision outlined in the Service Agreement, the Network is required to reflect NSW Health Strategies and Priorities in its strategic, operational and business plans.

NSW State Health Plan: Towards 2021

The NSW state Health Plan: Towards 2021 provides a strategic framework which brings together NSW Health's existing plans. Program and policies and sets priorities across the system for the delivery of the right care, in the right place at the right time.

There are 30 key state priorities being actioned by the NSW Government; including those identified as Premiers Priorities.

NSW Health Strategic Priorities 2019 - 20

The annual Strategic Priorities builds on and complements the NSW Health Plan and aligns with the NSW Government and Premier's Priorities.

A number of priorities have been selected for the oversight of the Secretary. These are:

1. Patient Safety and Experience
2. Value based healthcare
3. Systems Integration
4. Digital Health and Analytics
5. Strengthening Governance and Accountability.

LHDs and Networks are required to focus on:

Value based healthcare (VBHC), a framework for organising health systems around the concept of value in NSW that improves:

- The health outcomes that matters to patients
- The experience of receiving care
- The experience of providing care
- The effectiveness and efficiency of care

Improving the patient experience which is consistent with the NSW Government priorities. MoH was tasked with progressing a strategic approach to improving patient experience across the NSW public health system.

Sydney Children's Hospital Network – Future Direction and Vision for Care

The purpose of the Sydney Children's Hospital Network is *helping children and young people live their healthiest lives*[1] . The objectives of the Network's Strategic Plan align with those of the NSW Government and Ministry of Health business planning priorities.

[1] Sydney Children's Hospitals Network Strategic Plan 2017 – 2022 p20

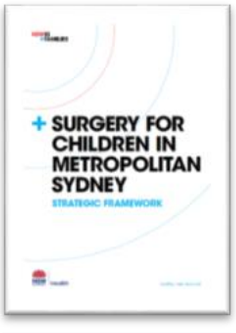
Through big shifts in the way the Network does business its vision for the future is to become an international leader in children's health where:

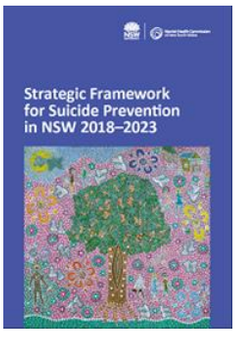
- Children and their families shape the care the Network provides;
- Research enriches clinical care;
- Teams work together in agile and collaborative ways;
- Care fits around patients and the lives of families;
- Greater value is delivered;
- Early intervention to prevent poor health;
- Great care is provided and the basics are right, first time and every time;
- Empowering families and staff through education;
- Infrastructure and technology is used to support the Network's agility; and,
- Positive and sustainable engagement with the Network's ecosystem.

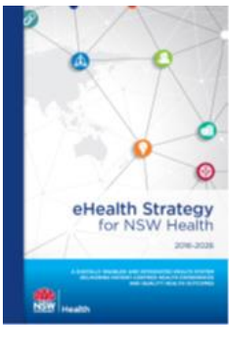
The Network has identified actions to drive change over the next five years in the areas of clinical care, people and culture, education, research, early intervention, networking and partnerships, systems and processes, infrastructure and finances.

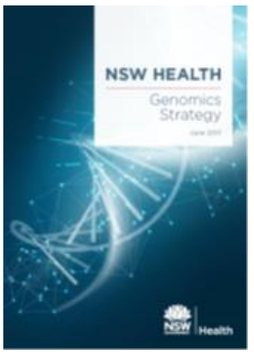
Enabling Plans

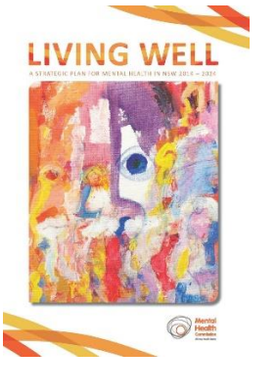
In addition the NSW and Network policies and frameworks the planning context for the CHW is underpinned by the following enabling documents.

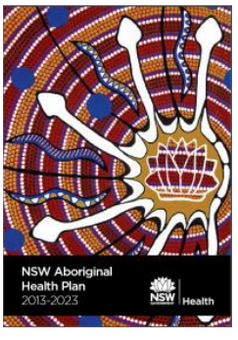


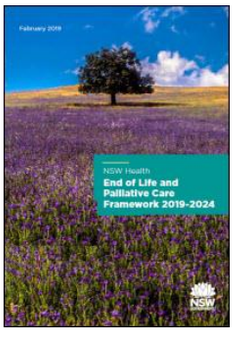












Service Planning Framework

The CSP details the delivery of health services in the context of the prioritised capital investment for CHW Stage 2 expansion and builds on the Clinical Services Plan developed for the CHW Stage 1 expansion.

Figure 1 – Services Planning Framework

In accordance with the NSW Health Services Planning Framework (Figure 1), the Plan includes an analysis of current and projected activity and outlines changes in services, models of care, opportunities for partnerships, opportunities for innovation and identification of benefits through the delivery of the capital investment.

1.3 Development of the Plan

When the Network was establishment in 2010 a whole-of Network Clinical Service Plan was developed for 2013 – 2017. This plan defined how each service within the Network would operate and develop.

The development of the CHW Clinical Services Plan has been undertaken in parallel with the SCH-R Clinical Service Plans to ensure that a "whole-of-Network" approach is embedded into clinical planning and in serving the children of NSW.

Moving forward the Network will need to consider the strategic development of NETS and the preferred long term location beyond the current lease which is due to expire in 2026. SCH and CHW will both be considered along with other sites in line with the strategic direction development.

The CHW Clinical Services Plan 2018 – 2031 is focused on the priorities for the CHW Stage 2 development to support the Hospital's models of care, gain Government commitment to Stage 2 CHW expansion to enable the hospital to continue its role as a provider of paediatric services for the rapidly increasing paediatric population of western Sydney and NSW. The Plan:

- Sets out the long term aspirations for service development of CHW to deliver transformational health, social and economic benefits;
- Defines the local, State, and national role of CHW as part of the wider Westmead Health, Research and Education Precinct into the future; and,
- Sets out the service strategy for Stage 2 of CHW Expansion as part of a broader staged investment in the Westmead Redevelopment.

The focus of the Plan is on the following services prioritised to be accommodated in CHW Stage 2 Acute Services Building including:

- Intensive Care Services (NICU and PICU);
- Cancer Services;
- Perioperative Service including operating rooms;
- Surgical Inpatient Units;
- Surgical and Medical Day-only Procedural Services; and,
- Pathology Services and Parent/Carer Support Services.

The consultation process for the CHW Clinical Services Plan (2018 – 31) has involved consultation since late 2015 including:

- The CHW Clinical Services Plan (2016 – 2026) to support CHW Stage 1 expansion. The focus being the in-scope services for Stage 1, including the Emergency Department and Paediatric Short Stay Unit;
- The CHW master planning, October 2015 to March 2016. A consultative process with clinicians and consumers to outline the strategy for development and renewal of CHW to 2031.
- The CHW Clinical Services Plan (2018 – 2031) has been developed over the period March to June 2018. Consultation to June 2018 has been limited to the Clinical Program Directors, selected clinical leaders and department heads.
- The Clinical Service Plan was submitted to Ministry of Health in February 2019 and feedback received.
- Consultation and communication regarding CHW Stage 2 business case processes continued.

Planning Principles

The development of the CHW Clinical Service Plan is based on the principles that the Plan:

- Reflects the Network's purpose of "helping children and young people live their healthiest lives";
- Provides a framework for the future provision of clinical services provided by CHW to 2030;
- Achieves a fundamental change in clinical service delivery to support investment in transforming models of care which are contemporary and sustainable;
- Addresses the Network's most urgent service requirements;
- Builds on the quality framework of patient and family centred care, safe, effective and efficient service provision;
- Supports delivery of care to children at the right time, in the right place and by the right team;
- Supports the health care needs of the community's vulnerable children and their families;

- Harnesses the potential of improving the health and wellbeing of the paediatric community; and,
- Embeds core elements of an Aboriginal worldview into practice to achieve equitable health outcomes.

1.4 Clinical Organisation and Structure

Services are organised across the Network including two acute hospitals, Bear Cottage, NETS, Children Court Clinics and two Child Health Networks.

The Network is managed by nine Directorates reporting to the Board:

- Chief Executive
- Clinical Governance
- Clinical Operations
- Clinical Integration
- Finance and Corporate Services
- Community Relations and Marketing
- Nursing, Midwifery, Education
- Workforce
- Research

Clinical Service Organisation

The Clinical Operations Directorate has responsibility for managing the clinical services across the Network through a number of Clinical Programs. The Clinical Programs are either whole-of-Network or site based. CHW clinical services are managed by the following Clinical Programs

- Critical Care (SCHN)
- Priority Populations (SCHN)
- Community Health, Ambulatory, Rehabilitation, Population Health, Allied Health – CARPA (CHW)
- Diagnostics (CHW)
- Medical (CHW)
- Surgery and Anaesthetics (CHW)

1.5 Trends in Activity

- CHW Emergency Department treated 57,676 patients in 2016/17 and was one of the busiest ED in NSW. Presentations have increased by 12.0 % (6,166) over the five-years since 2012/13. In 2016/17 the majority of patients (62%) were treated and discharged home. The proportion was similar in 2012/13. Over half of patients (57%) presenting to the ED are aged 0 to 4 years and the number of patients in this age group has increased by 3,035 over the period.
- CHW has provided 32,404, inpatient separations in 2016/17. Separations have increased by 11.0 % (3,216) over the five year period. Day only separations accounted for 46.5 % of total separations in 2016/17 compared with 42.5 % in 2012/13. Day only separations have increased by 21.0 % (2,655) between 2012/13 to 2016/17.
- In 2016/17 a total of 101,018 bed days were used and bed days have increased by 7.0 % (6,895) since 2012/13. An increase in overnight bed day utilisation was the equivalent to 2 overnight acute beds over five years at 80% occupancy. Over half of the CHW acute inpatient separations are categorised as 'Specialist Paediatric' the proportion is higher for surgical/procedural activity.
- In 2016/17 there were 230,000 non-admitted service events. These service events include procedures, medical consultations, diagnostic services, allied health and nursing interventions. Not all services are reported through the non-admitted data system and services vary considerably in volume and frequency.

1.6 Activity projections

Activity projection for CHW were undertaken using HealthApps, the NSW Ministry of Health's endorsed source of projected activity for emergency department and admitted inpatient activity.

Projections for mental health, chemotherapy and renal dialysis activity are undertaken outside of the projection tool.

For the purposes of service planning for CHW, the HealthApps the base case was reviewed and used as a comparator for the development of an alternate scenario.

Acute

- The base case projections for acute episodes were considered appropriate with minor changes to a small number of clinical groups. The proportion of day-only activity of 47 % to be achieved in 2030/31 was supported.

- The base projections for bed days were considered to be an underestimate with total bed days in 2016/17 having exceeded the 2020/21 base case, similarly with many of the high volume SRGs. The base-case reduction in the average length of stay for overnight stays from 4.6 days to 3.8 days was considered excessive. The scenario results in 4.4 days in 2025/26 and 4.2 days in 2020/21. Bed days were projected to increase by a highest percentage (27%) than the base case from 94,212 to 119,811.
- Growth in critical care, organ transplantation, respiratory medicine, cancer and cardiac services as high volume activity will be sustained into the future as CHW continues to provide a broader range of complex services.
- A flow of the proportion of Blacktown LGA residents to Blacktown Hospital for specific specialties in the future. This is the result of consultation with WSLHD regarding enhancement of paediatric services. However it is estimated that approximately six beds (four medical and two surgical) could flow back to WSLHD and dependent on the establishment paediatric services at Blacktown Hospital had been established and sustained for at least two years.

Sub-Acute

- CHW sub-acute service provision is primarily related to palliative care and rehabilitation.
- Inpatient palliative care activity at Bear Cottage Manly has remained relatively stable and the base-case projections to 2031 have been accepted as .appropriate.
- Rehabilitation activity has been constrained due to lack of overnight bed capacity. The demand for sub-acute rehabilitation overnight beds will increase in response to the implementation of the NSW Paediatric Rehabilitation Plan and to facilitate access to rehabilitation services for neurosurgery, orthopaedic, burns and respiratory and long term-ventilated patients.
- Day only rehabilitation activity has been minimal. The planned establishment of the paediatric rehabilitation day-program will result in a projected activity in excess of the base case.

Mental Health

- The Network's child and adolescent mental health (CAMHS) integrates acute mental health and eating disorders with the proposed emphasis on access to day-programs.
- The increased demand for CAMHS) in western Sydney, particularly around Parramatta and Blacktown is well known and reflected in the impact on the CHW service.
- The Network is moving to service delivery model based on the principles that care is person-centre, holistic, instils hope, empowers the child and family and is "recovery-oriented care as defined by the person rather than the clinician. An important aspect of the model is the support of peers with lived service transformational model of clinical service delivery experience. The development of alternatives to hospitalisation is an important focus in the model of care and the establishment of the day-hospital model will facilitate this change.
- To ensure that CHW is able to respond to the increasing demand for inpatient care the Mental Health Inpatient Unit will need to increase from the existing 8 beds to 12 in 2031.
- The introduction of a day-hospital program will require 4 day-only beds for mental health and 4 day-only beds for eating disorders.
- Medically unstable patients with a mental health condition will continue to be accommodated in inpatient units (IPU). This includes patients with a range of behavioural conditions and eating disorders. The design of IPUs will need to take account of the requirement of the child and young person with mental health conditions.

Table 1 – CHW Activity Projections – Acute, Sub-acute, mental health and other

EPISODES		EPISODES				BED DAYS			
CATEGORY	**Stay type**	**2014/15**	**2020/21**	**2025/26**	**2030/31**	**2016/17**	**2020/21**	**2025/26**	**2030/31**
		Base Yr	**Projected**			**Base Yr**	**Projected**		
Acute	Day-only	13,882	16,113	18,277	20,613	13,882	16,113	18,277	20,613
	Overnight	16,585	18,738	20,763	23,062	77,004	83,329	88,397	94,832
	Total	30,467	34,851	39,040	43,675	90,886	99,442	106,674	115,445
Sub-Acute	Day only	112	117	482	482	112	117	482	482
	Overnight	311	350	361	383	3,214	3,479	3,614	3,904
	Total	423	467	843	865	3,326	3,596	4,096	4,386
Total	Day only	13,994	16,230	18,759	21,095	13,994	16,230	18,759	21,095
	Overnight	16,896	19,088	21,124	23,445	80,218	86,908	92,011	98,736
	Total	30,890	35,318	39,883	44,540	94,212	103,038	110,770	119,811

		EPISODES				BED DAYS			
Category	**Stay Type**	**2016/17**	**2020/21**	**2025/26**	**2030/31**	**2016/17**	**2020/21**	**2025/26**	**2030/31**
		Base Yr	**Projected**			**Base Yr**	**Projected**		
Mental Health	Day-only	41	49	890	1,680	41	49	840	1,680
	Overnight	366	430	480	600	5,590	6,300	7,500	9,000
	Total	407	479	1,370	2,280	5,631	6,349	8,390	10,680

		EPISODES			
Category	**Stay Type**	**2016/17**	**2020/21**	**2025/26**	**2030/31**
		Base Yr	**Projected**		
Ambulatory	Renal Dialysis	795	947	1077	1205
	Chemotherapy	275	277	318	348

1.7 Vision to 2031 – priorities and strategic directions

In 2031 CHW core clinical roles will continue to be the provision of specialist paediatric service delivery and District-level services for children and their families from areas located close to CHW.

The Network's vision for facility development is to develop SCHN into a national and international children's hospital's Network through excellence in world class care, education, research and clinical trials:

- One Network
- Two comprehensive paediatric hospitals
- Operating on two world class academic health precinct.

The clinical priorities for CHW include appropriate provision for:

- Critically ill infants, children and young people requiring admission to a paediatric or neonatal intensive care unit;
- Children and young people diagnosed with cancer, their immediate and ongoing care in a Comprehensive Cancer Care facility and the integration of bench to bed translational research;
- Infants and children diagnosed with congenital heart disease (CHD), initial treatment including surgery and ongoing management and follow-up care and the capacity to expand the service to include heart transplantation;
- Patients admitted for surgery on a planned or emergency basis in operating facilities which are contemporary and enabled to accommodate the range and complexity of procedures using the latest technology;
- Patients admitted as a day-stay for medical as well as surgical treatment within a collocated facility;
- Significantly enhancing children's care at Home (Hospital in the Home, Hospital Avoidance and Hospital substitution);
- Regional services including delivery of care models which build capacity of local service providers and adopting technology assisted alternative models of service delivery; and,
- Enhanced care co-ordination involving general practitioners or paediatricians close to where the child lives

A key principle in the provision of clinical care moving forward for CHW is ensuring that every child and young person receives the right care, at the right time and by the right team.

The clinical streaming model transforms the delivery of clinical care. It will ensure that the patient journey and hospital experience is more focused on bringing services to the patient and family, rather than the patient needing to attend individual services. The new streaming model will be embedded in the models of care for all clinical services including:

- Presentations to the emergency department;
- Inpatient admissions;
- Day-only programs and ambulatory care;
- Community outreach and Hospital in the Home (HITH);
- Transitioning of children with chronic conditions to adults services; and
- The Virtual hospital.

CHW works collaboratively with LHDs and organisations in the community as service partners. There is a strong partnership with Western Sydney Local Health District (WSLHD) working in collaboration to enhance paediatric services in the LHD including for Blacktown Hospital, future development at Rouse Hill, Child and Adolescent Mental Health Services and Adolescent and Young Adults (AYA) Service at Westmead.

On-going consultation with South Western Sydney (SWSLHD) and Nepean Blue Mountains (NBMLHD) Local Health Districts is aimed at achieving enhancement of paediatric services and building capacity within those Local Health Districts.

The Network has a target to increasingly deliver services close to the family's child's residence including a target that 5% of its separations will be partially delivered under the Hospital in the Home (HITH) model of care.

1.8 Infrastructure priorities to 2031

Based on the projected activity alternative scenario the facility requirement for CH to 2031 has been developed. The bed requirements have been determined for day-only and overnight using projected bed days.

Emergency Department have been determined based on the projected emergency department presentations and the allocation of resuscitation bays and treatment spaces.

Table 2 – CHW Infrastructure requirements to 2031

CATEGORY		Beds/chairs or equivalent	BUILT	REQUIRED BASED ON PROJECTIONS			
			2016	2021	2026	2031	Comments / Note
Inpatient	Intensive Care	PICU	23	26	33	39	3 pods x 15 beds. COU beds are incorporated with PICU
		Close Observation Unit	0	6	6	6	
		NICU	27	30	35	40	
	Medical / Surgical	Day only	29	29	75	80	MoH confirmation of DO beds
		Overnight	214	224	236	247	
		Total	243	253	311	327	
	Hospital in the Home		8	14	15	16	Virtual ward Only
	Mental Health	Overnight	8	22	26	30	Acute MH Unit x 12 beds. Ward Medical x 18 beds
		Day only	0	0	4	8	Mental Health x 4. Eating Disorders x 4
	Sub- Acute	Rehab – Overnight	0	4	4	5	
		Rehab – Day only	0	0	4	2	
		Palliative Care (Bear Cottage)	8	8	8	8	Located at Manly
		TOTAL	8	12	14	15	
Emergency Department		Resuscitation Bays	4	5	5	6	
		Treatment spaces	29	50	43	50	
		Emergency Medical Unit (EMU)	8	20	20	20	
Ambulatory	Renal Dialysis	Chairs / Beds	10	4	4	4	
	Chemotherapy	Chairs / Beds	12	12	14	20	

SURGICAL AND MEDICAL IMAGING						
		2016 (Built)	2021	2025	2031	Comments / Notes
Operating Suite (including interventional)	Operating Theatres	9	13	15	18	Convert to OR in Stage 2
	Hybrid Cardiac Catheter Lab	1	1	1	1	Proposed strategy to accommodate EPS service in CHW
	Neurovascular Interventional	1	1	2	2	
	Total	**11**	**15**	**18**	**21**	
Medical Imaging	General X-Ray	3	5	5	6	
	Ultrasound	3	4	5	7	
	Fluoroscopy	1	1	1	1	
	CT Scanner	1	1,5	1.5	1.5	Shared access in CASB
	MRI	2	2	3	4	Neonatal MRI system in Stage 2
	PET CT	0	0.4	0.4	0.4	PET CT requirements will change when PET MRI is realised.
	PET MRI	0	0	0	1	If MRI is delivered PET CT requirements will lessen
Nuclear Medicine	SPECT CT	1	1	1	1	
	Gamma Camera	2	2	2	2	

1.9 CHW Stage 2 Investment Benefits

The CHW Stage 2 expansion and redevelopment of CHW will result in significant benefits to the achievement of:

- Improved timely access to children's health services by increasing the number of beds available at CHW and thereby reducing patient wait times for health services;
- Improved access to intensive care beds for patients requiring critical care management;
- Enhanced operating theatre capacity and timely access to services through collocation of the paediatric services in the CASB and in the CHW Stage 2 as reflected in elective surgery access performance and emergency theatre access targets;
- Better value for money through increases in safety, productivity and the efficiency of resource use;
- Greater sustainability of the physical environment;
- An improved environment for both patients and families as demonstrated by patient and carer experience surveys;
- Improved environment for the workforce as demonstrated by Staff Survey – Your Say Workplace Survey index and Employee Engagement;
- Enhanced environmental aspects for patients and the workforce, through the increased use of more modern, energy efficient buildings to provide services at CHW; and,
- Wider economic benefits for the community as a whole.

1.10 CHW Stage 2 cost implications

The 2018 SCHN Asset Strategic Plan included estimated capital cost for CHW Stage 2 expansion as $550 million. The proposed location for the facility adjacent to the CASB is currently the location of the CHW Staff Car Park.

The early works involving the construction of a new car park and preparation of the site for construction of Stage 2 is estimated at $ 49 million. Development of the critical linkages between the existing hospital, CASB and CHW Stage 2 is estimated at $20 million. The 2019 NSW Budget included the allocation of $619 million for the CHW Stage 2.

Recent developments with the Westmead Innovation District Master Plan may have an impact on the scope of Stage 2 that may deliver better long term benefits to the precinct overall.

2. THE CASE FOR CHANGE

CHW strives to provide the very best of clinical care for children and families with the vision that the hospital is responsive to the changing needs and expectations of the community it serves.

The most challenging issue confronting CHW is meeting the needs of the growing paediatric population in NSW and the changing burden of disease. Many of the hospital's models of care are considered unlikely to meet the future challenge of delivering care. There is a need for transformational and flexible models of care delivered in a variety of settings. More children are living longer and a growing number of children have multiple medical conditions increasing demand for health and other services. People can be empowered to self-care and CHW needs to be agile to respond over time.

Expectations of the public hospital system are also growing. Carers and families expect more and higher quality care services, including greater access to on-line services and access to information 24/7 and the ability to make choices and be part of the decision making process related to their health care.

The hospital's current built environment was designed some thirty five years ago and CHW is operating at physical capacity and whilst efficiencies have been implemented to better manage the demand there is limited ability respond to this sustained demand particularly for those patients requiring specialist paediatric tertiary care including intensive care, isolation, surgical procedures, complex medical imaging procedures and rehabilitation services.

Responding to the projected increase in the hospital's activity, implementing strategies to reduce demand on services, addressing the requirement for additional physical space and infrastructure to accommodate clinical and non-clinical, education and research services, are important considerations for CHW moving forward.

The Westmead Redevelopment has afforded a unique opportunity to address some of the priority clinical services issues confronting CHW, facilitate the implementation of the transformational models of service delivery and access to high cost medical technology and address the pressing requirement for growth and functionality of built environment.

The changing health profile of the paediatric community and the increasing number of neonates and children surviving with complex and long-standing conditions and rare diseases has seen an increase in the need for highly specialised services including sleep and respiratory disorders, inpatient and ambulatory rehabilitation, genetics, eating disorders, complex gastroenterology and bowel disorders and complex ENT. There is a need to address the unmet demand and long waiting lists for access to these services.

The majority of critical clinical services such as the Paediatric Intensive Care Unit, Neonatal Intensive Care Unit, Operating Room Suite including the Day Surgery Unit are at capacity and landlocked with no physical space for expansion. The issue of physical space is compounded by the fact that many of the services are functioning at capacity, with high occupancy rates, limited isolation capacity during winter months and with insufficient bed stock to meet current and future demand. Currently the CHW is operating at an average occupancy level of 94%.

2.1 Development of Western Sydney

The Greater Sydney Commission is coordinating and aligning planning that will shape the future of Greater Sydney for development, transport and housing. *A Metropolis of Three Cities*[2] is a plan that aligns land use, transport and infrastructure planning to transform Greater Sydney as three connected cities:

- the **Eastern Harbour City** with the aim to build on the existing economic strength and to address liveability and sustainability
- the **Central River City** involving investment in a wide variety of infrastructure and services and improving amenity
- the **Western Parkland City** and the establishment of a Badgerys Creek Aerotropolis as a world-class city precinct.

The **Central River City** Plan sees a substantial and unprecedented public and private investment contributing to a new transport and other infrastructure. The Plan focuses on four quarters for

[2] Greater Sydney Commission, Greater Sydney Regional Plan A Metropolis of Three Cities – connecting people https://gsc-public-1.s3-ap-southeast-2.amazonaws.com/greater-sydney-region-plan-0618.pdf

success - the Parramatta CBD and Westmead Health and Education Super Precinct, Next Generation living Camellia to Carlingford, Advanced technology and Knowledge Sector (Camellia, Rydalmere and Silverwater) and Sydney Olympic Park Lifestyle super precinct. The development of the Westmead Precinct, the Parramatta North Urban Transformation Program (PNUT), the construction of the Parramatta Light Rail from Westmead to Camilla and beyond and the inclusion of the underground station at Westmead as part of the Sydney MetroWest heavy rail Project will together contribute to the establishment of Westmead as one of the largest health, research and education and training precincts in the world.

Western Parklands City and the development of Sydney second airport will see activation of significant proportion of the south-west and north-west corridor east of the Blue Mountains. The Western Sydney City Deal, a partnership between the Australian Government, NSW government and local governments of Blue Mountains, Camden, Campbelltown, Fairfield, Hawkesbury, Liverpool, Penrith and Wollondilly sets out the investment foundation for the Western Parkland City to become a global city and for the transformation of western Sydney and delivery of key elements including the realising the 30-minue city by delivering the North South Rail Link.

Health is integrally involved in the planning and implementation of the goals of the Greater Sydney region Plan and the delivery world class health and education precincts. Design-led planning has the potential to transform how health services are planned by incorporating place-based service provision to support the population.

The Network is well placed to partner with South Western Sydney and Nepean Blue Mountains LHDs in strategic planning for paediatric health services in the region and in the adoption of innovative and person-focused approaches to how and where children and their families access care. In addition to take advantage of the benefits offered by emerging technologies and digital connectivity as a result of the establishment of the Aerotropolis and creative, digital and technology businesses in the precinct.

The involvement of the Sydney Children's Hospitals Network as part of the alliance of Western Sydney LHD, University of Sydney, the Research Institutes (Children's Medical Research Institute and the Westmead Institute of Medical Research) and Parramatta Council will ensure that paediatric clinical care, education and research are addressed.

3. POPULATION & DEMOGRAPHICS

3.1 Population Profile

The 2016 Department of Planning and Environment Projection Series are for Local Government Areas as defined by the 2011 Australian Geographical Classification (2011 LGAs) and pre the 2016 LGA amalgamation and better aligns with LHD boundaries.

NSW

Over the 20 year period 2016 to 2036 the NSW population is projected to increase by 28 % from 7,718,270 to 9,925350. The paediatric population aged 0 to 15 years accounts for 18.9% of the NSW resident population.

The population in this age group is projected to grow by 23.1 % (338,140) from 1,462,870 to 1,801,010 and:

The population aged 0 – 4 year old is projected to grow by 17.8 % (91,050), aged 5 – 9 years by 22.7 % (111,130) and 10 – 15 years by 29.5 % (135,960).

Local Health Districts

SWSLHD has the largest resident population aged 0 – 15 years (206,950), followed by WSLHD (201,040) and HNELHD (172,850).

Over the 20 year period projected several LHDs are projected to experience high growth rates in their paediatric populations - WSLHD's population by 52.6 % (105,660), Sydney LHD by 41 % (42,070) and SWSLHD by 40.9 % (84,690).

Declining populations are projected for Murrumbidgee LHD (9.0 %, and Far West LHD (15.0 %)

The highest rate of growth is projected in the WSLHD population aged 10 – 14 years – 63.6 % (38,270) over 20 years.

Greater Western Sydney (GWS) LGAs

GWS is recognised as an area of national importance and CHW is located at the geographic centre of the Sydney Basin and at the intersection of major transport corridors means that developments in GWS impacts directly on the hospital.

The GWS comprises fourteen Local Government Areas from Auburn in the east to Penrith to the west and Parramatta at its centre. 9 % of Australia's population lives in GWS and one third of NSW's population aged 0 – 15 years.

Figure 2 – Greater Western Sydney Region

Between 2016 and 2036 the paediatric population in GWS is projected to grow by 44 % from 472,340 to 678,180 – an additional 206,150 residents.

For many LGAs the paediatric population growth is much higher. Blacktown LGA has the highest population in NSW with 80,320. Blacktown LGA is projected to increase by 43 %, Parramatta by 58 %, Hills Shire by 67 %, Campbelltown by 39 %, Auburn by 84 % and Camden by 168 %.

CHW Local Catchment LGAs

The local catchment for CHW comprises the Local Government Areas (LGA) of Holroyd, Parramatta and The Hills.

Over the 20 year period the population of the combined LGAs is projected to increase by 54 % (55,810) from 102,470 to 158,280.

Table 3 – NSW Population projections by LHD and LGA

NSW POPULATION PROJECTION BY AGE GROUp							
Age Group	2016	2021	2026	2031	2036	Change (%)	Change (n)
0 – 4 years	512,690	547,760	570,300	584,850	603,740	17%	91,050
5 – 9 years	488,680	527,860	561,860	584,590	599,810	23%	111,130
10 – 14 years	461,500	501,810	540,500	574,310	597,460	30%	135,960
TOTAL	1,462,870	1,577,430	1,672,660	1,743,750	1,801,010	23%	338,140
Other	6,285,400	6,729,210	7,171,780	7,643,230	8,124,340	29%	1,838,940
TOTAL	**7,748,270**	**8,297,640**	**8,844,440**	**9,386,980**	**9,925,350**	**28%**	**2,177,080**

POPULATION PROJECTION 0 -15 YEARS BY LOCAL HEALTH DISTRICT							
Local Health District	2016	2021	2026	2031	2036	Change (n)	Change (n)
Albury Wodonga Health - Vic	9,430	9,490	9,559	9,710	9,720	290	3%
Central Coast	63,720	66,650	69,440	71,190	73,810	10,090	16%
Far West	5,780	5,670	5,510	5,200	4,930	-850	-15%
Hunter New England	172,850	179,750	184,480	187,480	187,430	14,580	8%
Illawarra Shoalhaven	72,430	74,950	77,010	78,550	79,080	6,650	9%
Mid North Coast	39,540	40,920	41,690	41,950	41,930	2,390	6%
Murrumbidgee	47,470	46,760	45,760	44,670	43,220	-4,250	-9%
Nepean Blue Mountains	76,550	81,540	85,320	87,900	90,330	13,780	18%
Northern NSW	54,220	55,830	56,770	57,160	57,110	2,890	5%
Northern Sydney	167,310	178,050	184,340	190,180	194,710	27,400	16%
South Eastern Sydney	149,470	163,820	171,440	175,740	178,520	29,050	19%
South Western Sydney	206,950	228,840	254,740	273,970	291,640	84,690	40%
Southern NSW	37,450	38,790	39,730	40,580	41,190	3,740	9%
Sydney	100,860	115,470	126,400	135,580	142,930	42,070	42%
Western NSW	57,800	58,420	58,230	58,100	57,760	-40	0%
Western Sydney	210,040	232480	262,250	285,790	306,700	105,660	53%
Grand total	**1,462,870**	**1,577,430**	**1,672,660**	**1,743,750**	**1,801,010**	**338,140**	**23%**

POPULATION PROJECTION 0 -15 YEARS BY GREATER WESTERN SYDNEY LGAs							
Local Govrnment area	2016	2021	2026	2031	2036	Change (%)	Change (n)
Auburn	18,250	23820	28,280	31,380	33,630	15,380	84%
Bankstown	44,290	47,600	50,710	52,840	54,880	10,590	24%
Blue Mountains	15,480	15,610	15,750	15,810	16,000	520	3%
Blacktown	80,320	89,730	99,590	107,340	114,790	34,470	43%
Camden	18,320	24,760	33,390	41,850	49,250	30,930	168%
Campbelltown	35,770	39,780	44,320	47,200	49,910	14,140	40%
Fairfiel	41,050	42,430	43,460	42,960	42,600	1,500	4%
Hawkesbury	13,840	14,580	15,400	16,040	17,720	2,880	21%
Holroyd	23,840	26,930	28,420	29,550	30,790	6,950	29%
Liverpool	47,960	54,360	61,870	66,840	71,460	23,500	49%
Parramatta	37,730	44,510	50,280	55,390	59,490	21,760	57%
Penrith	43,500	47,720	50,730	52,780	54,500	11,000	25%
The Hills Shire	40,900	47,470	55,680	62,130	68,000	27,100	66%
Wollondilly	11,090	11,540	12,740	14,070	15,470	4,380	39%
Total	**472,340**	**530,840**	**590,620**	**636,180**	**678,490**	**206,150**	**44%**

POPULATION PROJECTION 0 -15 YEARS BY CHW LOCAL CATCHMENT LGAs							
Local Government area	2016	2021	2026	2031	2036	Change (%)	Change (n)
Holroyd	23,840	26,930	28,420	29,550	30,790	6,950	29%
Parramatta	37,730	44,510	50,280	55,390	59,490	21,760	57%
The Hills	40,900	47,470	55,680	62,130	68,000	27,100	66%
Total	102,470	118,910	134,380	147,070	158,280	55,810	54%

3.2 Births in NSW

Births in NSW currently number over 95,000 annually. Residents in WSLHD account for the highest number of births (15% of NSW total), followed by SWSLHD (14%), SESLHD (11%) and HNELHD (11%). In 2013 the total number of births numbered 96,971 compared with 95,825 in 2017.

SWSLHD there were 6% growth in the number of births in 2017 compared with 2013, 3% more for NBMLHD and 2% in ISLHD. Over the period the number of births declined in SESLHD, NLHD and FWLHD.

3.3 Health Profile of Children in NSW

Generally children in NSW enjoy good health. Infant and child mortality rates have declined significant over a 15 year period to a low of 2.95 deaths per 1,000 live births in 2014. Mortality rates for children in each age group in 2014 were not significantly different from 2013, and have not changed substantially in recent years. Mortality rates are higher for children who were born pre-term, small for gestational age and chromosomal conditions. The gap between aboriginal and non-aboriginal deaths has closed.

Childhood cancer accounts for 0.5% of all cancer cases diagnosed in NSW in 2010. In 2006 – 2010 there were 949 new childhood cancer cases (505 in males, 444 in females). Leukaemia is the most common type of early childhood cancer.

Suicide is the leading cause of death in children and young people aged 10-14 and 15-17 years. In 2016/17 there were 606 patients aged 16 years and under presenting with self-harm to NSW Emergency Departments (MoH EDAA17).

For the NSW population aged 0 – 15 years chronic conditions account for the large proportion of the burden of disease and[3]

- 1 in 7 children aged 2 – 15 years currently have asthma
- Over 1 in 4 children are overweight or obese
- 1 in 7 hospitalisations are due to injury or poisoning
- 1 in 5 children are developmentally vulnerable
- 1 in 10 young people report high level of psychological stress
- Dental decay among 6 year olds is increasing

[3] NSW MoH The Health of Children and Young People in NSW. Report of the Child Health Officer 2014

Early detection of treatable disease in children allows for early intervention and results in better health outcomes:

- 1 in 760 screened newborns were diagnosed with a rare congenital metabolic disorder
- 1 in 10 screened preschool children had a potential vision problem
- 1 in 200 screened infants had a potential hearing problem.

Infant and child mortality rates in the Aboriginal and Torres Strait Islander population have improved, however there is continuing disparity between the Aboriginal and non-Aboriginal populations:

- Aboriginal mothers, teenage mothers and older mothers are most likely to have low birth weight or premature babies.
- Hearing loss is more common in Aboriginal children than non-Aboriginal children with the main cases including repetitive unresolved middle ear infection
- Diabetes hospitalisations are 36% higher in Aboriginal children and young people
- Hospitalisation for dental caries is disproportionately high in Aboriginal children and children living in areas that are more remote or have a lower socioeconomic status.

Emergency Department presentations for NSW residents aged 0 to 15 years totalled 578,341 presentations with an increase by 15% over the five year period. Injuries and poisonings were the most common reasons for Emergency Department presentations. The number of ED presentations for mental health issues has increased by 33% over the five-year period.

3.4 Socio-economic status

The socio-economic environment in which children and young people live is a major determinant of health and developmental outcomes. Unemployment, family breakdown and physical and psychological trauma directly correlate with mental health problems, behavioural problems and risky behaviour. High rates of infant and child mortality are strongly associated with social and economic disadvantage (AIHW 2009 p12).

The 2011 Burden of Disease Study Report (pg 64) stated *that lower socioeconomic groups had greater total burden than higher groups. Mental & substance use disorders, cardiovascular diseases, cancer and injuries had the greatest disparity in burden rates*

when comparing the lowest and highest socioeconomic groups.

The 2016 Socioeconomic Indexes for Areas (SEIFA), as calculated by the Australian Bureau of Statistics (ABS), shows wide disparity between areas of relative disadvantage in NSW. Brewarrina, in western NSW, had the lowest SEIFA (757) of any LGA in NSW and Ku-ring-gai LGA in metropolitan Sydney had the highest score (1121).

In Greater Western Sydney The Hills Shire, with a score of 1107, has the 7th highest score for LGAs in NSW whereas Fairfield, with 856, is the 4th lowest scoring LGA in NSW.

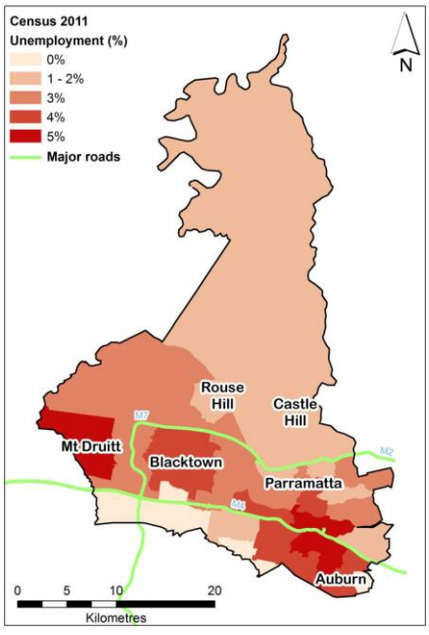
In 2008, approximately 15% of Aboriginal people in NSW reported living in an overcrowded house compared with 5% of non-Aboriginal people. Aboriginal children are more likely to leave school early and are less likely to achieve national benchmarks for literacy and numeracy

Unemployment is a significant contributor to socio-economic disadvantage and impact on the health and welfare of children.

Employment status (as a percentage of the labour force) in Greater Western Sydney compared with Greater Sydney shows that there was a high proportion of unemployed.

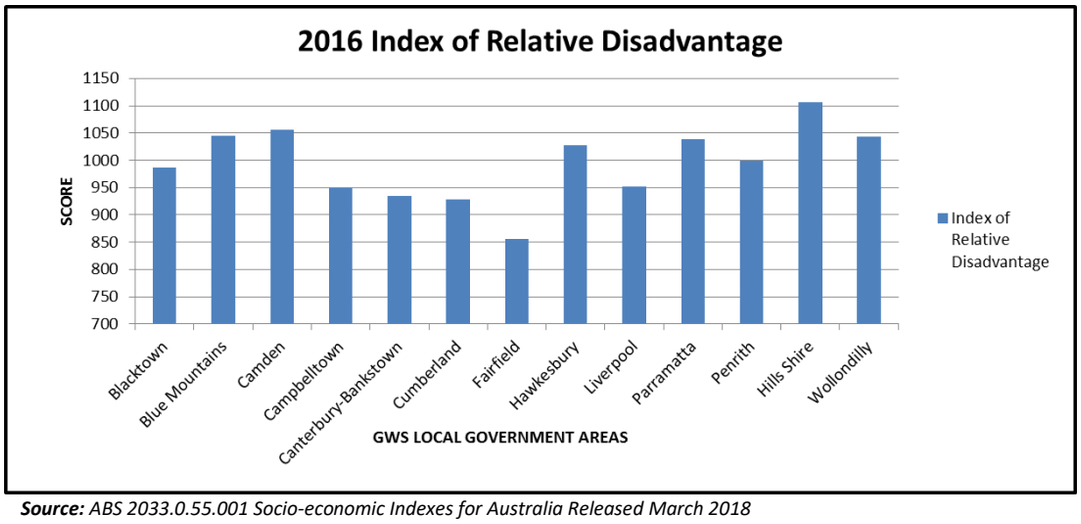
The rates of unemployment vary significantly and generally mirror those pockets of socio-economic disadvantage.

Figure 3 – Percentage of unemployment in Western Sydney



Source: Salvador-Carulla, L. et al. Integrated Mental health Atlas of Western Sydney – Draft for Comments (2016) p 14

Figure 4 – 2016 Index of relative disadvantage for GWS LGAs



Source: *ABS 2033.0.55.001 Socio-economic Indexes for Australia Released March 2018*

3.5 Cultural diversity

One in four Australians are born overseas. Half of all migrants live in Sydney or Melbourne. Suburbs near universities also have a high proportion of migrants. In NSW the highest proportion of people born overseas live in Haymarket in Sydney, one in five residents in Harris Park was born in India and Hurstville has the highest proportion of people born in China.

3.6 Aboriginality

Aboriginal and Torres Strait Islander people make up 2.9% (216,172) of the NSW population in 2016. Over one-third of the Aboriginal population lives in capital city areas – 70,135 (32.4%) in Sydney. In GWS the highest number of Aboriginal people lives in Blacktown LGA (9,526) which represents 2.8% of the LGAs total population. The smallest population is in the Hills Shire with 813 people (0.5% of total residents)

3.7 Burden of disease

The burden of disease studies provide important information in terms of clinical service planning because they quantify the size of health problems and assist in the determination of where interventions are more likely to result in benefits gain.

The Australian Burden of Disease Study 2011 compares the impact of different diseases, conditions or injuries of the Australian population.

With regard to children and adolescents and young people the burden of disease for the 0 to 5 age group is associated with infant and congenital conditions including pre-term birth complications, birth trauma and asphyxia, sudden infant death syndrome, cardiovascular defects and other disorders of infancy.

Asthma, conduct disorders and autism are the main causes of burden in boys aged 5–14 whereas anxiety and asthma are the main cause of burden in girls in the same age group.

Suicide and self-inflicted injuries were the main causes of health loss for males (15–24 years) and for females it continued to be anxiety disorders.

Table 4 – Leading causes of total disease burden in Australia by age group

		Under 5 years	5 – 14 years	15 – 24 years
Males	1	Pre-term / Low birth Weight (LBW) complications	Asthma	Suicide / Self-inflicted injuries
	2	Birth trauma / asphyxia	Anxiety disorders	Alcohol use disorders
	3	Other disorders of infancy	Autism spectrum disorders	Road Trauma Injury (RTI) / motor vehicle occupant
	4	Sudden Infant Death Syndrome (SIDS)	Conduct disorder	Depressive Disorders
	5	Other congenital conditions	Depressive disorders	Asthma
		Under 5 years	**5 – 14 years**	**15 – 24 years**
Females	1	Birth trauma / asphyxia	Anxiety Disorders	Anxiety Disorders
	2	Pre-term / Low birth Weight (LBW) complications	Asthma	Depressive Disorders
	3	Other disorders of infancy	Depressive disorders	Asthma
	4	Sudden Infant Death Syndrome (SIDS)	Dental caries	Suicide / self inflicted injuries
	5	Cardiovascular defects	Upper respiratory conditions	Bipolar affective disorder

LEGEND	Infant/Congenital	Oral	Injuries	Respiratory	Mental

Source: *Australian Burden of Disease Study 2011; Extract from Table 3.6 pg 26*

4. CHW PROFILE & ACTIVITY TRENDS

This section of the Plan describes the current services provided by CHW, including a summary of the functional units (beds for hospital services), networking arrangements and activity details including a snapshot of the catchment population access to services.

Activity analysis uses data from the MoH CaSPA FlowInfo Inpatient and the ED Activity Analysis (EDAA) programs. FlowInfo contains in excess of ten years of statewide historic admitted patient data. EDAA contains fifteen years of Emergency Department activity data. These tools enable health service planners to analyse activity for residents by LGA as well as place of treatment. AR-DRGs are grouped up into Service Related Groups (SRGs) to allow for a standardised approach to analysing activity for patient populations. It should be noted therefor that SRGs do not necessarily align with clinical specialities of any individual hospital.

4.1 Clinical profile

The Children's Hospital at Westmead is a Peer Group 2 - Specialist Paediatric Hospital providing an extensive range of specialist clinical services for children, young people and their families and:

- Is NFC for paediatric liver transplantation and pre and post-transplant management;
- Is the location of the NSW National Poisons Information Centre;
- Hosts the NSW Newborn Screening Service which manages a state-wide screening program of all newborn babies in NSW;
- Is the state-wide referral centre for the management of children with a severe burn injury and part of the NSW Burn Service;
- Provides Statewide and Supra-LHD clinical services as outlined with the Network's Service Agreement.

The clinical operations of the hospital are organised into five Programs which are either whole-of-Network or site specific.

The Medical, Surgery and Anaesthesia and Diagnostics Programs are CHW site specific. Critical Care, Priority Populations and CARPA (Community Health, Ambulatory, Rehabilitation, Population Health, Allied Health) are SCHN whole-of-Network Programs.

Figure 5 – CHW Clinical Organisation

MEDICAL	SURGERY & ANAESTHESIA	CRITICAL CARE#	PRIORITY POPULATIONS#	CARPA	DIAGNOSITCS
• Gastroenterology • General Medicine • Renal Treatment Centre • Neurology • Neurosurgery • Oncology • Palliative Care# • Pain Managment • Respiratory Medicine • Liver Transplant • Dysphagia • Long Term Ventilation • Pharmacy • Sleep Medicine • Renal Treatment Centre	• Anaesthesia • Dental • Ear, Nose & Throat • General Surgery • Ophthalmology • Orthopaedics • Plastic Surgery • Urology • Biomedical Engineering • Trauma • Burns & Plastics Treatment Centre • Operating Suite • Orthoptics • StEPS	• Emergency Department • Paediatric Intensive Care Unit (PICU) • Neonatal Intensive Care Unit (NICU) • Cardiac Services# • NSW Poisons Information Centre** • Organ & Tisue Donation Service#	• Adolescent Medicine# • Child Protection • Psychological Medicine# • Aboriginal Health# • Academic Depart of Adolescent Medicine • Child Wellbeing Service** • Connecting Care (Trapeze)# • Eating Disorders • MH Children and Young People • Refugee Health • Mental Health Inpatient Unit	• Child Development Unit • Children's Hospital Institure of Sports Medicine (CHISM) • Deafness Centre • Dermatology • Kids Rehabilitation • Appliance Centre • Audiology • Child Life & Music Therapy • Kids GPS# • Kids Rehabilitation • Nutrition & Dietetics • Occupational Therapy • Orthotics • Outpatient Dept • Physiotherapy • Social Work • Speech Pathology	• Allergy & Immunology • Biochemistry • Clinical Genetics • Endocrinology • Haematology • Histopathology • Infectious Diseases • Medical Imaging • Nuclear Medicine • Western Sydney Genetics Program • Biochemical Genetics • Cytogenetics • Molecular Genetics • NSW Newborn Screening Service

A whole of Network Program or Service ** A Statewide Service

Table 5 – CHW built Bed and service distribution

	DEPARTMENT	SERVICE	BEDS/COTS	
			Over night	Day only
Acute Medical / Surgical	Clubbe Ward	Burns, Medical, Surgical	16	0
	Hunter Baillie Ward	Medical, Long Term Ventilation and MAU	29	0
	Wade Ward	Adolescent	15	0
	Camperdown Ward	Oncology	20	0
	Turner Ward	Medical Day Stay	0	15
	Surgical Ward	Surgery	20	0
	Orthopaedic Ward	Orthopaedics	24	0
	Variety Ward	Infectious Diseases	18	0
	Commercial Travellers Ward	Neurology/Neurosurgery	24	0
	Edgar Stephens Ward	Cardiac	20	0
	Clancy Ward	Organ transplant, gastroenterology	22	0
	Close Observation Unit		6	0
	Middleton Ward	Day Surgery/DOSA	0	14
	Total		**214**	**29**
	Emergency Department	Emergency Medical Unit	8	
Intensive Care	Paediatric ICU	Paediatric Intensive Care	23	0
	Grace Centre for Newborn Care	Neonatal Intensive Care	27	0
	Total		**50**	**0**
Acute Total			**272**	**29**
Sub-Acute	Bear Cottage (Manly) – Off campus	Palliative Care	8	0
Sub-Acute Total			**8**	
Mental	Hall Ward	Mental Health	8	0
Mental Health Total			**8**	
Other	Oncology Treatment Centre (OTC)	Oncology Day-Stay	0	12
	Renal Treatment Centre (RTC)	Renal Dialysis Day Stay	0	10
Other Total			**8**	**22**
GRAND TOTAL (excluding Bear Cottage)			**283**	**46**

SURGICAL SERVICES AND MEDICAL IMAGING		
Operating Suite (Including interventional)	Operating Theatres	**9**
	Procedure Room	**1**
	Hybrid Cardiac Catheter Suite	**1**
	Neurovascular Suite	**1**
Total		**12**
Medical Imaging	X-Ray	**6**
	Fluoroscopy	**1**
	MRI	**2**
	CT Scanner	**1**
Total		
Nuclear Medicine	SPECT CT	**1**
	Gamma Camera	**1**
Total		**2**

4.2 Emergency care

- CHW Emergency Department treated 57,676 patients in 2016/17 and is one of the busiest ED in NSW. Presentations have increased by 12 % (6,174) since 2012/13. This represents an annual increase of 2 %.
- In 2016/17 9 % of patients arrived by road/air ambulance and 90 % by private vehicle. The number of patients arriving by private vehicle has increased by 13 % (6,082) in 2012/13.
- Children in the 0 – 4 years account for over half of the presentations, 23 % aged 5 – 9 years, 16 % aged 10 – 14 years and 4 % aged 15 years plus. These proportions are similar year on year.
- Admission rates vary by age group. Overall 24 % of ED presentations are admitted. 24

% in the 0 – 4 years age group, 21 % aged 5 – 9 years, 23 % in the 10 – 14 years and 29 % in the 15 year plus age group.

- The number of patients who did not wait (DNW) varied year on year – 7 % in 2014/15 to 11 % in 2016/17.
- Children living in WSLHD accounted for 63 % (36,348) of presentations in 2016/17 and over the period presentations from WSLHD increased by 4,929 – greater than the increase from all other LHDs combined.
- SWSLHD residents accounted for 9,311 in 2016/17 with an increase of 10 percent over the five years.
- In 2016/17 43 % (24,710) were residents of the CHW local catchment LGAs with a growth of 19 % over the period

Table 6 – ED activity summary 2012/13 to 2016/17

TRIAGE CATEGORY	2012/13	2016/17	Change (n)	Change (%)
1 – Resuscitation	281	475	195	69%
2 – Emergency	1812	2125	311	17%
3 – Urgent	14272	14501	222	2%
4 – Semi Urgent	34511	40192	5681	16%
5 – Non Urgent	626	383	-243	28%
Total	51502	57676	6166	12%

Source: *MoH CaSPA EDAA 2017*

4.3 Admitted Care

- CHW accounted for a total of 32,406 separations and 101,018 bed days in 2016/17. Over the five-year period 2012/13 to 2016/17 inpatient separations have increased by 11 %.
- The average length of stay for total separations was 3.1 days and 5.0 days for overnight separations.
- Total bed days have increased by 7 % with an addition 6,985 between 2012/13 and 2016/17. Overnight bed days have increased by 5 % – an addition 4,240 bed days over the period.
- In 2016/17 70% of separations (including day only) had a length of stay of 2 days or less and accounted for 25% of bed days. Short stay activity has increased over the five-year period with a 15 % increase in separations and 14 % in bed days. The long stay activity has increased to a lesser extent – 2 % for separations and 5 % for bed days

Table 7 – Inpatient activity by length of stay

IN PATIENT	Length of stay	12/13	16/17	% change
Seps	2 days or <	20,378	23,450	15%
	> than 2 days	8,812	8,956	2%
	Total	29,190	32,406	11%
Bed days	2 days or <	21,979	25,158	14%
	> than 2 days	72,144	75,860	5%
	Total	94,123	101,018	7%
ALOS (days)	2 days or <	1.07	1.07	
	>than 2 days	8.2	8.5 days	
	Total	3.2	3.1 days	

Source: *MoH CaSPA FlowInfo V17 (Excl entirely within ED)*

- Children living in WSLHD account for the highest number of inpatient separations (42% of total separations in 2016/17) and over the five-year period separations for this patient population has increased by 20% from 11,326 to 13,591. Residents of SWSLHD account for a further 19% of total separations. Separations for residents of HNELHD have increased by 25% over the period and by 37% for Southern LHD residents.
- Children aged 5 years and under account for the greater proportion of inpatient separations and bed days. The number of day-only separations was also highest for those in the 0 – 4 year age group.
- The MoH Specialist Paediatric Activity Flag is a data element in FlowInfo and enables planners to identify activity which should appropriately by provided in a specialist paediatric hospital. In 2016/17 65% of CHW inpatient separations were classified as "Specialist Paediatric" compared with 68% in 2012/13. The number of specialist paediatric separations has increased by 11% over the period.
- The proportion of specialist paediatric activity is highest in the 10 year to 15 year plus age group and particularly for SRGs - Cardiac, Haematology, Transplant and tracheostomy. Acute Psychiatry activity contributed to the overnight long length of stay.
- Non-Specialist paediatric separations accounted for 35% of total separations in 2016/17. The proportion of non-specialist separations is higher for LGAs closer to the hospital – Holroyd (57%) Baulkham Hills (54%), Parramatta (53%) Blacktown (46%) and Strathfield (48%) and much lower for those LGAs further away – Orange and Dubbo (4%), Gosford & Wollongong (12%).

- SRG Respiratory Medicine accounts for the highest number of separations for CHW and this activity has increased by 33% over the five-year period.
- Separations for Non Subspecialty medicine have increased by 24%, Orthopaedic separations have increased by 4%, Haematology and Gastroenterology by 22% and Non Subspecialty surgery by 5%.
- Aboriginal and Torres Strait Islander patients accounted for 895 separations in 2016/17 and 4,364 bed days. Over 60% of separations were day only and average length of stay for overnight and longer stays was 7.2 days.
- Over the five-year period, separations for Aboriginal children have increased by 10% and bed days by 4%. Children living in Blacktown, Penrith, Wyong and Dubbo LGAS had the highest number of separations in 2016/17. Respiratory conditions (particularly cystic fibrosis), orthopaedic conditions requiring surgery and general medicine accounted for the highest number of separations in 2016/17.

Day only

- Day-only activity accounted for 15,066 separations in 2016/17. Separations have increased by 21 per over the period – additional 2,655 patients. The proportion of day-only activity has risen steadily from 43 % to 46 %.
- The majority of day-only activity is planned (85% in 2012/13 and 80% in 2016/17). The majority of medical activity is planned (76%) as is surgical/procedural (90%).
- Medical activity accounted for 72 % (10,717) of day-only activity 2016/17 and increased from 67 % in 2012/13. Emergency activity has increased by 97% over the five year.
- Surgical/procedural activity accounted for 28 % (4,349) of the total in 2016/17 with only an addition 198 separations compared with 2012/13.

Acute overnight

- Acute Overnight separations totalled 16,658 in 2016/17 with a marginal increase of 165 (1%) from 2012/13. 77,004 bed days were utilised in 2016/17 compared with 76,291 in 2012/13 – an increase of 1 % (816).
- Emergency activity accounts for more than half of acute overnight activity - 66 % of separations and 51 % of bed days. Planned activity - 27 % of separations and 28 % of bed days. Other including transfers - 7 % of separations and 21 % of bed days.

Sub-acute care

- Sub-acute care includes rehabilitation, maintenance and palliative care.
- Inpatient palliative care activity at Bear Cottage has remained stable over time primarily due to available capacity.
- Rehabilitation activity has increased significantly primarily related to the patient type change.

4.4 Non-admitted Care

- Non-admitted activity encompasses service to patients who are not admitted and do not occupy a hospital bed including outpatient clinics, home-delivered services such as renal dialysis and chemotherapy, community based clinics, diagnostic services and allied health services.
- The number of service events in 2016/17 has been group into national Tier 2 service categories. A service event is defined as a healthcare interaction which may be for assessment, consultation, examination, treatment and/or education. On service event is recorded for each interaction regardless of the number of healthcare providers. In 2016/17 a total of 215,458 service events were reported.

Table 8 – Service Event by Clinical Program 1016/17

PROGRAM	Service Events
CARPA	104,083
CRITICAL CARE	27,53
DIAGNOSTICS - PATHOLOGY	15,051
MEDICAL	32673
PRIORITY POPULATION	9474
SURGICAL - ANESTHETICS	51207
TOTAL	215,458

Source: *SCHN Health Information Unit*

4.5 Hospital in the Home (HITH)

- In 2016/17 1.6 % of separations and 7.1 % of bed days were reported as HITH activity.

Table 9 – Trends in HITH activity

	2012/13	2016/17	Change (n)	Change (%)
HITH SEPS	371	505	132	36%
TOTAL SEPS	29991	33730	2762	10%
% HITH	**1.2%**	**1.5%**		
HITH BED DAYS	4622	6726	2104	46%
TOTAL BED DAYS	94946	102323	3262	4%
% HITH	**5.0%**	**7.1%**		

Source: *MoH CaSPA FlowInfo V17.0*

- CHW HITH activity has increased significantly over the five year period. In 2016/17 a total of 503 separations having all, or part, of their care as HITH compared with 371 in 2012/13.
- HITH Bed days have increase by 46 % (3262) over the period.
- Patients living in Blacktown (1222), Parramatta (969), Holroyd (648) and Penrith (614) LGAs accounted for the highest number of bed days in 2016/17. Over the period bed days utilised increased for patients living in Penrith (390%), Fairfield (188%) and Bankstown (176%).

Table 10 – Summary inpatient activity

		2012/13	2013/14	2014/15	2015/15	2016/17	Change (n)	Change (%)
Separations	Day only	12411	13693	14120	13945	15066	2655	21%
	Overnight	16779	17167	17471	17103	17340	561	3%
	Total	**29190**	**30860**	**31591**	**31048**	**32406**	**3216**	**11%**
Bed days	Day only	12411	13693	14120	13945	15066	2655	21%
	Overnight	81712	85172	87365	88493	85952	4240	5%
	Total	**94123**	**98865**	**101485**	**102438**	**101018**	**6895**	**7%**

Source: *MoH CaSPA FlowInfo V17.0 (Excl entirely within ED)*

Table 11 – Trends in acute inpatient activity

TOTAL ACUTE ACTIVITY		SEPARATIONS				BED DAYS			
		2012/13	2016/17	Change (n)	Change (%)	2012/13	2016/17	Change (n)	Change (%)
Medical	Emergency	9934	11354	1420	14%	27866	28229	366	1%
	Other	891	663	-228	-26%	4050	3279	-771	-19%
	Planned	7408	8501	1093	15%	13215	14642	1427	11%
	Total	**18234**	**20518**	**2284**	**13%**	**45147**	**46150**	**1003**	**2%**
Surgical / Procedural	Emergency	2273	2543	270	12%	13454	13731	277	2%
	Other	699	574	-125	-18%	12427	13211	784	6%
	Planned	6598	6946	348	5%	16574	17938	1364	8%
	Total	**9570**	**10063**	**493**	**5%**	**42455**	**44880**	**2425**	**6%**
Total	Emergency	12207	13897	1690	14%	41320	41960	640	2%
	Other	1590	1237	-353	-12%	16477	16470	13	0%
	Planned	14006	15447	1441	10%	29789	32580	2791	9%
	Total	**27804**	**30581**	**2777**	**10%**	**87602**	**91030**	**2328**	**4%**

Table 12 – Trends in sub and non-acute inpatient activity

SUB AND NON -ACUTE		SEPARATIONS				BED DAYS			
		2012/13	2016/17	Change (n)	Change (%)	2012/13	2016/17	Change (n)	Change (%)
84 - Rehabilitation	Day only	42	110	68	162%	42	110	68	162%
	Overnight	2	33	30	Sig %	46	1119	1073	Sig %
	Total	**45**	**143**	**98**	**218%**	**88**	**1229**	**114**	**Sig %**
86 – Palliative Care	Day only	1	2	1	Sig %	1	2	1	100%
	Overnight	0	276	n/a	n/a	0	1939	1939	n/a
	Total	**1**	**278**	**277**	**Sig %**	**1**	**1941**	**1940**	**Sig %**

87 - Maintenance	Day only	0	0	0	n/a	0	0	0	n/a
	Overnight	0	0	2	n/a	n/a0	156	156	n/a
	Total	**0**	**2**	**2**	**n/a**	**0**	**156**	**n/a**	**n/a**
Total	Day only	43	112	69	160%	43	112	69	160%
	Overnight	3	311	308	Sig %	46	3214	3168	Sig %
	TOTAL	**46**	**423**	**377**	**Sig %**	**89**	**3326**	**3237**	**Sig %**

Source: *MoH CaSPA FlowInfo V17.0 (Excl entirely within ED)*

Table 13 – Trends in mental health related inpatient activity

SRG 82 PSYCHIATRY - ACUTE		SEPARATIONS				BED DAYS			
		2012/13	2016/17	Change (n)	Change (%)	2012/13	2016/17	Change (n)	Change (%)
Acute	Day only	37	41	4	11%	37	41	4	11%
	Overnight	184	193	9	5%	2932	2791	-141	-5%
	Total	**221**	**234**	**13**	**6%**	**2969**	**2832**	**-137**	**-5%**
Psychiatric	Day only	0	0	n/a	n/a	0	0	0	n/a
	Overnight	94	173	79	84%	2434	2799	365	15%
	Total	**94**	**173**	**79**	**84%**	**2343**	**2799**	**365**	**15%**
Total	Day only	37	41	4	11%	37	41	4	11%
	Overnight	278	366	88	32%	5366	5590	365	15%
	TOTAL	**315**	**407**	**92**	**29%**	**5403**	**5631**	**228**	**4%**

Source: *MoH CaSPA FlowInfo V17.0 (Excl entirely within ED) SRG 82 Psychiatry - Acute*

5. SERVICE DRIVERS

Critical to determining the Hospital's future asset requirements, particularly in relation to the built environment, is the determination of future demand for clinical services. This section explores the changes in demand for services which are anticipated to occur based on altered policy directions, demographic and health profile changes, changes in the way services are delivered (models of care) and those pressures and challenges currently confronting the hospital which will are anticipated to persist into the future.

- **Population growth** and the location of CHW are considered to be the primary drivers of demand moving forward. CHW is located at the convergence of east-west and north-south major road and rail corridors in Sydney. The paediatric population in NSW and importantly Western Sydney is projected to increase significantly 2031. By 2031 there will be an additional 163,840 residents in GWS aged between 0 and 15 years and an additional 44,600 residents in the CHW local catchment.
- **The changing health profile of the paediatric population and the burden of disease** reflected in high rates of respiratory conditions (particularly asthma), allergies, obesity, diabetes, psychological stress, injuries and trauma and risky behaviour.
- **Increasing survival of children** particularly those seriously ill neonates, children diagnosed with cancer, children with congenital abnormalities/rare conditions, cystic fibrosis and the recipients of organ transplantation. The impact is greatest on the broad range of the hospital services involved in ongoing care, often until the child transitions to adult services.

The impact of advances in paediatric clinical practice and technologies. Many of the hospital's services are highly specialised accounting for small populations but requiring high cost and complex acute and ongoing care:

- The solid organ (kidney and liver) transplantation program is growing with the majority of children are aged under 5 years. As the cohort of transplanted children increases annually there is an impact on the respective clinical program.
- The interventional and surgical cardiac program has been enhanced through the establishment of the service for hypoplastic left heart. The necessity for a series of corrective surgical procedures in infancy and childhood will increase service demand.
- Broadening indications for complex surgical procedures such as spinal correction, limb lengthening, orthopaedic and airway surgery to correct deformity and improve the quality of life for children with disabilities.
- The increasing use of new technologies such as genomics in the diagnosis and treatment of childhood conditions and the evolution of personalised medicine and treatment regimens for the individual child and the use of 3D printing in clinical care.

The flow-on effect on rehabilitation, allied health and ambulatory services arising from increasing complexity of care and necessity for long term specialist paediatric care. This is of particular importance in terms of the level of unmet demand for managing neonates and children with complex gastroenterology and bowel disorders, rehabilitation services for neonates and children, complex ENT and respiratory support services and sleep disorders.

Those factors which have been identified as contributing to decreasing service demand for services provided by CHW:

- The expansion of paediatric services by other LHDs and the potential to reverse flows and provide care closer to home:
  - Blacktown Hospital will see the enhancement of paediatric services in 2020. Consultation between SCHN and WSLHD has identified the volume of WSLHD residents CHW ED activity and non-specialty paediatric inpatient activity which could flow-back to WSLHD.
  - Campbelltown Hospital development
  - Enhancement services at NBM LHD
  - The ongoing expansion of the CHW hospital avoidance strategies including the Integrated Care Program, Hospital in the Home and Kids GPS. It is envisaged that the telehealth program will morph to the next generation Virtual Hospital model and deliver significant benefits to patients.

6. MODELS OF CARE & FUTURE DIRECTION

6.1 Models of Care

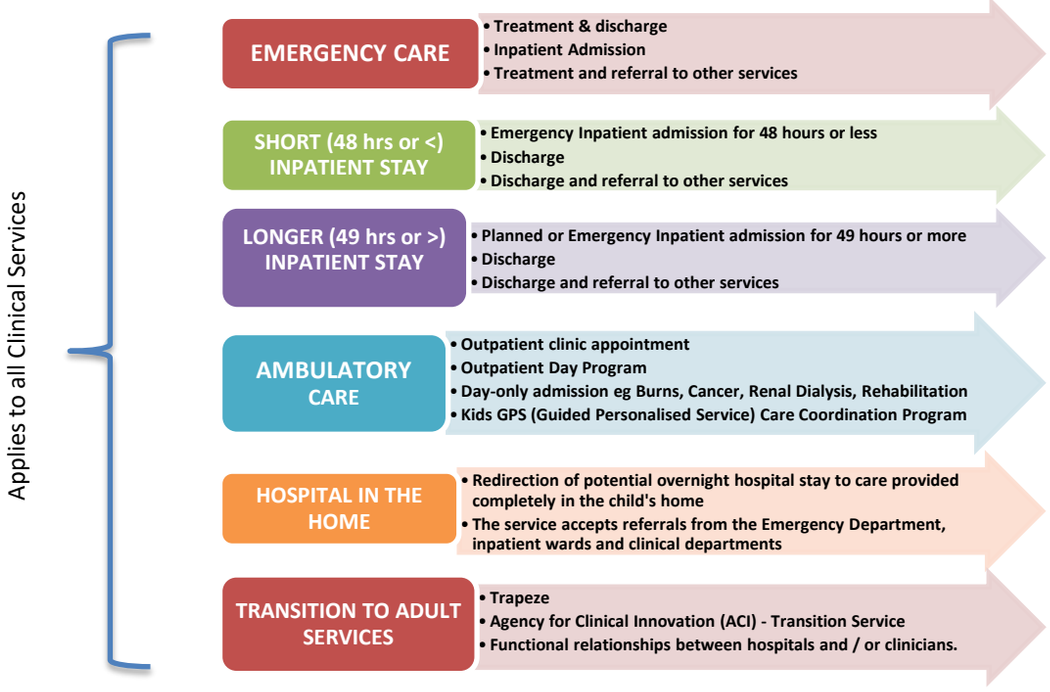
There are various models in paediatric clinical practice intended to reduce the length of hospital stay, minimise the need for hospital admission and reduce demand on health services. Short stay wards, multi-disciplinary specialist teams, outreach/community based care and transition are the primary models.

As part of the consultation process for the 2016 CHW Master Plan and Clinical Services Plan for CHW Stage 1 expansion a significant and robust analysis of the a number of current patient journeys, existing models of care and data analysis was undertaken to develop transformational models of care. With the aim of contributing to improving the health and wellbeing of children, including those with the most challenging and rare conditions requiring expert paediatric care, a number of principles were identified to underpin the development of those transformational models of care:

- The Network works in partnership with a focus on providing patient and family centred care;
- Patient and family centre empowers patients and their families and fosters independence and;
  - Supports care giving and decision-making,
  - Respects patient and families' choices and their values and cultural background
  - Builds on the strengths of the individual child and those of the family; and,
  - Encourages involvement of patients/families in planning of services and service improvement.

The Network strives to ensure that models of service delivery are sustainable as clinicians combine their skills, talents, expertise and resources to help children and young people live their healthiest lives. In line with the planning principles for the provision of clinical services provided, CHW has adopted a streaming model across all specialities to deliver care that is appropriate and safe.

Figure 6 – Streaming Model of Care



Emergency Care

Planning for the new and expanded CHW Emergency Department to be commissioned in the CASB in 2020 has been premised on the streaming model principles to ensure that any child presenting to the ED will be immediately assessed and triaged and streamed to appropriate team to be:

- Treated by the ED team and discharged home or referred to the referred to the Hospital in the Home (HITH) team;
- Admitted to the collocated Paediatric Short Stay Unit (PSSU) for up to 48 hours;
- Admitted to the NICU, PICU or other inpatient unit.

The design of the facility into clearly identified zones reflects the streaming model and supports the concept that the patient journey to their final destination is efficient.

Admitted Care – Short Stay

Over 70% of children admitted to CHW have a length of stay of 2 days or less. The streaming model is an innovation in the way high quality care is delivered to children and young people presenting to the hospital as an emergency/planned procedure and requiring a hospital stay of 2 days or less.

The consultant led and multidisciplinary team model focuses on the management of acute illnesses and injuries where observation, investigation and treatment can be provided in a child-friendly environment and dependent on the condition, capacity to provide in-ward isolation facilities.

The commissioning of the 32 bed PSSU collocated with the Emergency Department will provide 30 single patient rooms with ensuite and carer zone with a portion of the rooms as N-Class isolation. Access to paediatric operating rooms on the floor above, medical imaging and pharmacy on the same floor will enable patients requiring hospital stay of 2 days or less with a one-stop shop high quality service.

It is intended to build on the Short Stay model of care with the inclusion of a Surgical Short Stay Unit as part of the Peri-operative Suite in the CHW Stage 2 redevelopment.

Admitted Care – Long Stay

Patients with a length of stay of 2 days or more account for approximately 77 % of total bed days. Whilst the average length stay for this patient population is 8.2 days over 2,400 children annually are admitted for 7 days or more.

The Network is focused on ensuring that models of care developed for specific patient populations address the needs of the children and adolescents and their families with long lengths of stay. Further that requirement sub-acute and rehabilitation requirements are planned as part of the patient's journey.

Ambulatory Care

The Network has implemented a number of programs aimed at minimising or avoiding hospital admission and / or presentation to the Emergency Department.

- The Kids GPS (Guided Personalised Service) Care Coordination Program provides an integrated model of care for children with medical complexity (CMC). The Program is aimed to improving efficiency and patient outcomes by interfacing with the entire continuum of care and allowing families to navigate services and service provides within the Network and Local Health Districts.
- Acute Review Clinics receive referrals from the Emergency Department for following day review to avoid a hospital admission, from inpatient wards for follow-up to minimise the child's duration of hospital stay and prior to admission to avoid the need for presentation to the Emergency Department.
- Care Co-ordination Program provides Care Co-ordinators to support children with chronic and complex conditions and high consumers of services provided by the Network. The Program provides for the development of individualised care plans to personalise care for the child and facilitates streamlining of appointments to minimise impact on daily life.

A critical benefit in improving and expanding programs which result in better co-ordination and integration of services for the individual child is the opportunity for CHW to more effectively respond to the increasing demand on services and impact on the built environment.

To this end the Network is seeking to establish a stretch goal in 2020/21 of a 5% reduction in bed days and a 2% reduction in Emergency Department presentations through the expansion and support of these programs.

Hospital in the Home (HITH)

The Hospital in the Home (HITH) program delivers patient-centred and multi-disciplinary care to children in their homes as an alternative to hospital care.

HITH has been identified as a strategic priority for the Network and CHW and with continuing growth in the Program to meet demand for acute inpatient beds. Separations with an episode entirely or party met by HITH has increased from 1.3% of total separations in 2012/13 to 1.6% in 2016/17 (Source MoH CaSPA FlowInfo 17 HITH Flag).

The Emergency Department is a primary focus in terms of identifying children requiring long-tern antibiotics, infusions, complex dressings, cystic fibrosis (including physiotherapy), long-term enteral feeding, enteral device management and now progressed to provision of sleep studies in the home.

SCHN Telehealth Program

The Network has established a Telehealth Strategy as part of the Outpatient Clinical Redesign project with the aim of facilitating the provision of paediatric services locally and development of longer-term capacity to accommodate emerging technologies and models of care.

The appointment of a Digital Health Coordinator has enabled the Program to achieve a significant uptake of telehealth through active promotion and a staggered roll-out across the Network. By December 2018 there were in excess of 500 appointments conducted through the Program involving over of thirty clinical services. The 959 telehealth sessions conducted in 2018 saved families 16,983 kms in travel to attend the Network's hospitals.

The success of the Program has seen saw 80% of the Network's clinical services utilising Telehealth efficiently and that the majority of Outreach clinics conducted via telehealth. A stretch goal for the Program is expanding into the Emergency Department.

In collaboration with NSW e-Health it is envisaged that appropriate data capture systems will be developed to ensure that the Network has the capacity to measure and report continued performance analysis and that technological advances will facilitate transition of care to community settings.

The Virtual Hospital

The *Virtual Hospital* builds on the telehealth program to deliver care including the remote real time monitoring of patients at home through the use of wearable monitoring devices Through enhanced videoconferencing capability and clinical information transfer the hospital based clinical team will detect clinical deterioration and deliver 24/7 care to children.

Transitioning to Adult services

Many children diagnosed with a chronic medical condition, survived critical illness or living with a rare disorder require long term and ongoing treatment into adolescence and adulthood. Trapeze is the specialist adolescent chronic care service established in 2012 and adopts a whole person integrated care approach, supporting young people to make the leap from paediatric to adult healthcare and keeping the young person at the centre.

Trapeze aims to engage young people more actively in their healthcare; reduce the progression and complications of their condition at a time of change; reduce avoidable hospital admissions; and record the journey of young people as they transition to adult care. Trapeze offers comprehensive care coordination services to young people with chronic conditions aged 14-25 years strengthening links with primary and community services. The clinical management offered includes telephone and face to face psychosocial support, health coaching, telehealth interviewing, case planning services and a comprehensive HEADDSS assessment.

Network has partnered with WSLHD in relation to the provision of adolescent and young adult health services and the establishment of the Adolescent and Young Adults (AYA) facility as part of the Westmead Redevelopment.

Mental Health Services

There is an opportunity to develop a model of care that supports contemporary approaches to the care and management of children and young people with a mental health conditions. The Network has been consulting with WSLHD with regard to the development of a Mental Health Service Plan.

7. PROJECTED CAPACITY REQUIREMENTS

NSW MoH has a suite of planning tool which is required to be used to inform the process of clinical services planning and development of business cases for capital projects. These tools are updated in response to population changes, health service utilisation or anticipated changes resulting from new health policies, models of care or health technology.

HealthApps projection tool provides activity projection for emergency department and inpatient activity. Projected activity is generated to the financial year 2035/36 using 2016 NSW population projections, historical admitted data for the period 2000/1 to 2014/15.

For inpatient activity the methodology used to develop the projections includes analysis of trends in rate/1,000 population at state level, by ESRG, stay type, age and sex category. In addition, the projections are required at Local Government level. It should be noted, however, that Chemotherapy, Renal Dialysis, Acute Psychiatry activity is excluded and addressed outside of the HealthApps tool.

7.1 Inpatient activity projections

Base Case

The activity projections presented as the **Base Case uses 2014/15 as the base year** and assumes that service provision remains largely similar to current service delivery (no changes to where patients access services and growth is in-line with trends and population growth). The base case is important as this is the starting point in order to provide a comparator for adjustments and modelling of scenarios.

The CHW base-case shows that all SRG activity (acute and sub-acute) will continue to grow to 2030/31 and that over the 16 year period:

- Total separations will increase by 46%, day-only by 58 % and overnight by 37 %;
- Total bed days will increase by 16 %;
- The proportion of day-only separations will increase from 42 % to 47 %;
- The average length of stay for overnight will decline from 4.6 days to 3.8 days.

Table 14 – CHW Inpatient activity projections# - Base Case

		EPISODES				BED DAYS			
CATEGORY	**Stay type**	**2014/15**	**2020/21**	**2025/26**	**2030/31**	**2014/15**	**2020/21**	**2025/26**	**2030/31**
		Base Yr	**Projected**			**Base Yr**	**Projected**		
Acute	Day-only	13,027	15,998	18,170	20,433	13,027	15,998	18,170	20,433
	Overnight	16,603	18,691	20,701	22,785	74,881	74,812	79,831	85,256
	Total	29,630	34,689	38,871	43,218	87,908	90,809	98,001	105,689
Sub-Acute	Day only	45	100	119	169	45	100	119	169
	Overnight	357	350	358	382	3,111	2,797	2,893	3,256
	Total	402	450	477	551	3,156	2,897	3,012	3,425
Total	Day only	13,072	16,098	18,289	20,602	13,072	16,098	18,289	20,602
	Overnight	16,960	19,041	21,059	23,167	77,992	77,608	82,723	88,512
	Total	30,032	35,139	39,348	43,769	94,212	93,706	101,012	109,114

#MoH HealthApps Excluding SRGs - chemotherapy, renal dialysis, drug and alcohol and Psychiatry Acute

Preferred scenario

The analysis of the base case showed that for 30% of SRGs the 2016/17 separations has exceed the projected 2020/21 and 2025/26 numbers. It is acknowledged that for many of the SRGs small volumes test the reliability of projected volumes and necessitates further examination.

Bed days, for both total and individual SRGs, are considered to be an underestimate of projected activity moving forward. Current activity has surpassed projections for 2020/21 and 2025/26, importantly for high acuity SRGs such as transplant, tracheostomy and perinatology.

The average length of stay for overnight stays is projected to decline from 3.0 to 2.5 days. This

significant reduction is unlikely, particularly given the anticipated increase in the acuity of the patient population and longer lengths of stay.

The development of the scenario used CHW assumed that:

- The base-case projections for separations are accepted with minor changes to a small number of SRGs, similarly that the proportion of day-only activity of 47 % will be achieved in 2030/31.
- Bed days will increase but at a higher percentage (27%) from 94,212 to 119,811.
- The average length of stay will decline from 4.7 days to 4.2 days;
- Growth in critical care, organ transplantation, respiratory medicine, cancer and cardiac services as high volume activity will be sustained into the future as CHW continues to provide a broader range of complex services.
- A flow of the proportion of Blacktown LGA residents to Blacktown Hospital for specific specialties in the future. This is the result of consultation with WSLHD regarding enhancement of paediatric services. However the expected flow-reversal of activity is unlikely to be realised in the short to medium term until paediatric services at Blacktown Hospital are commissioned and paediatric services are operationally appropriate for at least three years.
- Expected increase in activity to be transferred to HITH.

Table 15 – Inpatient activity projections# - Scenario

		EPISODES				BED DAYS			
CATEGORY	**Stay type**	**2016/17**	**2020/21**	**2025/26**	**2030/31**	**2016/17**	**2020/21**	**2025/26**	**2030/31**
		Actual*	**Projected**			**Actual***	**Projected**		
Acute	Day-only	13,882	16,113	18,277	20,613	13,882	16,113	18,277	20,613
	Overnight	16,585	18,738	20,763	23,062	77,004	83,329	88,397	94,832
	Total	30,467	34,851	39,040	43,675	90,886	99,442	106,674	115,445
Sub-Acute	Day only	112	117	482	482	112	117	482	482
	Overnight	311	350	361	383	3214	3479	3614	3904
	Total	423	467	843	865	3326	3,596	4,096	4,386
Total	Day only	13,994	16,230	18,759	21,095	13,994	16,230	18,759	21,095
	Overnight	16,896	19,088	21,124	23,445	80,218	86,908	92,011	98,736
	Total	30,890	35,318	39,883	44,540	94,212	103,038	110,770	119,811

*MoH CaSPA Flow Info17 (Excl entirely within ED) and excl SRGs - chemotherapy, renal dialysis, drug and alcohol and Psychiatry Acute
#MoH HealthApps Excluding SRGs - chemotherapy, renal dialysis, drug and alcohol and Psychiatry Acute

7.2 Mental Health activity projections

Development of mental health inpatient activity projections have been undertaken outside of the HealthApps tool. The provision of child and adolescent mental health services is a priority for the Network. The demand for child and adolescent mental health services in western Sydney is a major consideration for CHW moving forward. The development of the activity projections for CHW mental health service was based on the historic activity in the years 2012/13 to 2016/17, SCHN Mental Health Service future model of care and on the following assumptions:

- The establishment of an acute mental health day-program is aimed at providing for 480 separations and bed days in 2025/26 and increasing to 840 separations and bed days in 2030/31.
- The Eating Disorders Program will be expanded to include a Day Program with the aimed at providing for 480 separations and bed days in 2025/26 and progressing to 840 separations and bed days in 2030/31.
- The increasing number patients with complex and often long standing medical condition and long lengths of stay managed in acute general wards. Growth of 5% in overnight separations. This includes patients with eating disorders with long lengths of stay
- The length of stay for patients requiring admission to a mental health unit averages 15 days. It is considered that any reduction in length of stay is marginal.

Table 16 – Inpatient mental health activity projections

		EPISODES				BED DAYS			
Patient Type	**Stay Type**	**2016/17**	**2020/21**	**2025/26**	**2030/31**	**2016/17**	**2020/21**	**2025/26**	**2030/31**
		Actual*	**Projected**			**Actual***	**Projected**		
Acute	Day-only	41	49	440	840	41	49	440	840
	Overnight	193	226	280	360	2791	3,400	4,500	5,400
	Total	234	275	720	1200	2832	3,449	4,940	6,240
Psychiatric	Day only	0	0	440	840	0	0	440	840
	Overnight	173	204	200	240	2799	2,900	3,010	3,600
	Total	173	204	640	1080	2799	2,900	3,450	4440
Total	Day only	41	49	890	1,680	41	49	890	1,680
	Overnight	366	430	480	600	5590	6,300	7,500	9,000
	Total	**407**	**479**	**1,370**	**2,280**	**5631**	**6,349**	**8,390**	**10,680**

*MoH CaSPA Flow Info17 (Excl entirely within ED) SRG 82 - Psychiatry Acute

7.3 Other activity projections

The demand for Renal Dialysis in paediatrics is generally small and the n. The optimal outcome for the child or and adolescents with end-stage renal failure is kidney transplant.

The success of the CHW Transplant Program results in significant fluctuations in activity year on year and projections of future activity is challenging. The HealthApps projection to 2030/31 is supported.

Table 17 – Renal Dialysis Activity Projections

	ACTUAL					PROJECTED		
	2012/13	**2013/14**	**2014/15**	**2015/16**	**2016/17**	**2020/21**	**2025/26**	**2030/31**
Day only	898	1,118	608	399	716	947	1077	1205

*MoH CaSPA Flow Info17 (Excl entirely within ED) SRG 23 – Renal dialysis

7.4 Emergency Department activity projections

Projections of Emergency Department activity was undertaken in 2015/16 to inform planning for CHW Stage 1 expansion for the Westmead Precinct CASB and prior to the release of the HealthApps..

Projections used 2014/15 as the base year and by triage Category with the following assumptions:

- Annual growth rate of 3%
- Triage Category as a proportion of total presentations - Category at 1 0.6 %; Category 2 at 5 %; Category 3 at 24 %; Category 4 at 69 % and Category 5 at 1.4 %.
- Reversal of 33% of Triage Category 3, 4 and 5 presentations in 2014/15 for residents of Blacktown LGA resulting the planned paediatric ED at Blacktown Hospital. 3% reduction in total presentations in 2020/21 resulting from implementation of targeted avoidance strategies.
- 23% of presentations will require admission.

Table 18 – Emergency Department activity projections

TRIAGE CATEGORY	ACTUAL						BASE YEAR	PROJECTED		
	09/10	**10/11**	**11/12**	**12/13**	**13/14**	**14/15**	**14/15**	**20/21**	**26/27**	**31/32**
1	261	276	284	281	316	340	340	380	440	511
2	1460	1362	1593	1812	1768	1669	1669	3169	3670	4254
3	11129	10719	11247	14272	12796	12602	11833	15209	17616	20421
4	11779	11693	16018	34511	38390	40899	38790	43726	40645	58711
5	25202	24649	22479	626	676	487	441	887	1028	1191
Total	49831	48699	51621	51502	53946	55997	53072*	63371#	73398	85089

Reversal of 30% Blacktown LGA presentations # 3% reduction from avoidance strategies

7.5 Bed requirements

The indicative bed requirements have been developed based on the following assumptions:

- The majority of day-only activity is planned and provided over 240 days per year. Generally paediatric patients occupy a bed for more than 4 hours and therefore 90% occupancy is used. Day only beds calculated = total day only bed days/240/0.9
- Overnight activity covers 365 days and average utilisation of 80%. Overnight beds calculated = total overnight bed days/365/0.8.
- Following consultation with MoH acute day-only beds have been adjusted to 75 in 2025/26 and 80 in 2030/31.

Table 19 – Bed requirements to 2031

		BED REQUIREMENTS			
CATEGORY	**Stay type**	**2016/17**	**2020/21**	**2025/26**	**2030/31**
		Actual	**Projected**		
Acute	Day-only	64	75	75	80
	Overnight	264	285	303	325
	Total	328	360	378	405
Sub-Acute	Day only	1	1	2	2
	Overnight	11	12	12	13
	Total	12	12	14	15
Total	Day only	65	75	87	98
	Overnight	275	297	315	338
	Total	340	372	402	436
Mental Health	Day-only	0	0	4	8
	Overnight	19	22	26	30
	Total	19	22	30	38
Grand Total	Day-only	65	75	91	106
	Overnight	294	320	341	368
	Total	359	395	427	459

8. CRITICAL CARE PROGRAM

This section provides an overview of the clinical services impacted by the investment in Stage 1 and Stage 2 of the CHW expansion and priorities.

8.1 Emergency Department

The Emergency Service is a role delineation Level 6 service providing acute assessment, diagnosis, stabilisation and treatment of children and young people presenting to the hospital in an emergency. The Department provides specialist emergency care to residents of NSW and internationally. Hospitals in other LHDs are supported with emergency advice and transfer for tertiary care.

Models of care and current activity

For many children a visit to the Emergency Department is the first contact with health care system. The majority of patients presenting to the CHW Emergency Department arrive by private vehicle (90%).

The Emergency Department utilises several models of care which ensure that the patient is assessed and either promptly treated in the Emergency Department, referred to alternative hospital or community services or admitted as an inpatient to the hospital.

The proximity of the Emergency Department waiting area to the hospital's front entrance enables a senior nurse to undertake a visual and initial assessment of the child before registration and triage.

The multi-disciplinary approach ensures that emergency care is timely, safe, effective and responsive to psycho-social and developmental needs of the child.

There is recognition that the Emergency Department is a stressful environment for the child and the family and a family-centred philosophy is embedded in the model of care. Children and their carers are involved in the process of treatment and given the opportunity to provide feedback on their experiences.

The CHW Emergency Department is one of the busiest in NSW with a 12% increase in presentations from 51,502 in 2012/13 to 57,676 in 2016/17 (extra 6,174 presentations). This represents an annual increase of 2%.

Challenges and opportunities

The demand for emergency care provided by the hospital has been consistent and growing since its commissioning in 1995 and it is envisaged that the hospital will experience a similar growth in ED presentations consistent with other major hospitals in NSW.

The constraints posed by the physical environment impacts on the capacity of CHW to achieve ED performance targets. Despite the increasing volume of activity the size and configuration of the Department is dated. The number of treatment spaces is insufficient to accommodate daily demand, provide the required capacity for the isolation of patients and incorporate the requirement to support emergency management of children and young people presenting with mental health conditions.

The effect of the increase in the paediatric population in western Sydney and the increasing trend for restricted access to general practitioner services, particularly after-hours are the significant drivers of growth in the emergency department workload.

CHW is the closest public Emergency Department for residents of the local catchment LGAs and these LGAs are projected to have significant increases in their paediatric populations.

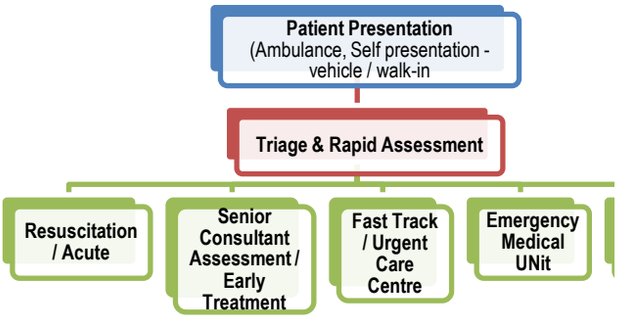
Community expectations are important factors in parents/carers presenting to the CHW Emergency Department for treatment, particularly for infant and toddlers.

Currently 60% of ED presentations are aged 4 years and under. There is a long-lived regard for CHW with a high level of community trust for quality paediatric care. In addition, there is a preference of parents/carers with children who have been, or are, patients of the hospital to attend CHW rather than another hospital.

Strategic response

- Over the next two years a change management process will be undertaken to implement a streaming model of care to facilitate the flow of patients through the Department.

Figure 7 – ED streaming Model of Care



The ED streaming model will support the key priorities of minimising delay in children being assessed and treated and to:

- Continually improve the quality of care, and efficiency and effectiveness of consultation and treatment;
- Ensure that children spend the least possible time in the Department;
- Ensure that patients with specific conditions (acute mental-health episodes, requiring isolation) are managed in an appropriate physical environment

The ED models of care include:

- **Streamlined triage and registration.**
- **Resuscitation** for the management of patients (generally Triage Category 1 and Category 2) requiring urgent care stabilisation. Transfer to the Intensive Care Unit or Operating Suite for ongoing treatment is often required.
- **Acute care** for the management of patient who are unstable and diagnosis is undifferentiated. Patients will be cohort based on acuity, complexity and state of disposition.
- **Senior Consult Assessment** provides for the assessment of patients by senior medical staff within 20 minutes of presentation to the Emergency Department
- **Fast Track / Urgent Care Centre** for the management of patients with less complex (single system problem) and assessed as Triage Category 3, 4 and 5.
- **Mental Health** for the management of patients presenting with an acute mental health episode requiring management and possible admission

The implementation of the streaming model in the Emergency Department is dependent on the construction of a new and expanded facility designed to zone the physical environment to accommodate the clinical elements of the streaming model, facilitate the patient journey through the department to the patients final destination, improve patient outcomes, efficient operations of the Emergency Department and education and training.

The requirement for treatment Spaces (excl *procedure, plaster, interview rooms and other specialised rooms*) was calculated using the MoH methodology

- **Admitted patients** = (((55,997*90% during 18hrs*26% admitted)/365 days/(18 hours/6.0hrs LOS)))/85% occupancy
- **Non admitted** = (((55,997*90% during 18hrs*74% admitted)/365 days/(18 hours/2.8hrs LOS)))/85% occupancy

Treatment space requirements projected for 2020/21, 2025/26 and 2030/31 are based on the activity profile for 2014/15.

The commissioning of the CASB in 2020 will deliver the CHW Emergency Department configured to accommodate the transformational models of care and the built capacity as required to respond to the projected increased activity to 2030/31.

Table 20 – Emergency Department Treatment space requirements to 2030/31

	2014/15	2020/21	2025/26	2030/31
Presentations	55,997	63,371	73,398	85,089
Treatment spaces - admitted	14	16	18	21
Treatment spaces – non-admitted	19	21	25	29
Total treatment spaces	31	37	43	50
Resuscitation Bays	4	4	5	6
Emergency Medical Unit (Additional to Treatment Spaces)	8	16	20	20

8.2 Neonatal Intensive Care

The Grace Centre for Newborn Care comprises the Neonatal Intensive Care Unit (NICU), Department of Neonatology, Research Unit and the Development Followup Clinic. The Grace Centre works in close collaboration with the perinatal services at Westmead Hospital in the management of mothers whose babies have been identified with birth defects and are referred for delivery to enable early transfer to the Centre.

The Centre has a strong research program aimed at improving the outcome of babies admitted to the Neonatal Intensive Care Unit and monitoring the outcome of those babies who undergo surgery in the critical first 90 days of life.

The Grace NICU is a role delineation Level 6 service and part of the NSW Perinatal Services Network providing acute assessment, diagnosis, stabilisation and treatment of critically ill neonates. Whilst the majority of neonatal treated by the Centre are admitted in the first 28 days of life, older babies requiring critical or high dependency or prematurity are also admitted to the Centre.

Model of Care

The Grace model of care is family centre with a focus on supporting families whose infants require hospitalisation and includes a range of assessment, treatment, management and support programs to provide optimal care for the patient and family.

The majority of pre-operative cardiac conditions are diagnosed and referred antenatally and are admitted initially to the NICU to ensure optimal neonatal outcomes. Infants undergoing “closed” (non-bypass) procedures return to the NICU post-surgery whilst those who have “open” (bypass) procedures are admitted to the Paediatric Intensive Care Unit and may return to the NICU some days later.

Neonates are returned to the NICU for the establishment of feeding, optimal nutrition, growth, developmental care and parent craft support.

The NICU nursing and medical staff is supported by a multidisciplinary team which includes lactation specialists, occupational and physiotherapists, speech pathologists, social works and administrative staff.

In addition to the provision of critical care services follow-up programs for babies treated in the NICU. The programs are provided by paediatricians experienced in the follow-up care of neonates with access to allied health professionals including occupational therapy, physiotherapy, speech pathology, dieticians and social work.

Admitted activity

The majority of patients (80% in 2016/17) admitted to NICU are transferred from other hospitals and requiring surgical intervention and critical care management pre and post-surgery. In 2016/17 there were 922 babies who spent time in NICU and utilised a total of 7,307 bed days. . In 2016/17 there was a daily average of 20 babies occupying a cot.

Over the five year period 2012/13 to 2016/17 inpatient separations increased by 6 % and bed days by 12 %. The occupancy rate for the last two years based on 23 funded beds was 86 % and 87 %.

The caseload of babies managed in the NICU comprises those requiring complex surgery for congenital or acquired acute conditions; congenital heart conditions requiring surgery and complex medical conditions including:

- Congenital malformation of the circulatory system such as coarctation of the aorta, transposition of the great vessels, hypoplastic left heart, mitral valve insufficiency
- Congenital malformations of the digestive system such as atresia of bile ducts, Atresia of oesophagus with trachea-oesophageal fistula, gastroschiasis, congenital diaphragmatic hernia
- Digestive system disorders of foetus and newborn such as necrotising enterocolitis of foetus and newborn, Intestinal adhesions (bands) with obstruction and Hirschsprung’s disease
- Congenital malformations and deformations of the musculoskeletal system
- Extreme prematurity
- Respiratory and cardiovascular – obstructive sleep apnoea, bronchiolitis

The majority of activity (74% of and 84% of bed days) is accounted for in one SRG – 75 Perinatology. The highest number of bed days was recorded for neonates with significant surgical procedures and with multiple major problems.

Non-admitted activity

The Grace Centre for Newborn Care conducts a follow-up clinic. In 2016/17 there were 438 service events with the majority (330) involvement by the occupational therapist.

Challenges and opportunities

The change in demand for neonatal intensive care service is the major challenge for CHW NICU:

- The pattern of births including that more women in the older age group (particularly associated with the use of assisted conception) has resulted in an increased risk of multiple births, prematurity and/or with congenital abnormalities. In addition, there is an increase in babies born with birth defects (including) and disability as the result of the increase in consanguineous relationships.
- Advances in foetal medicine and increased level of antenatal diagnosis of foetal abnormality has resulted in the Centre for New Born Care and High Risk Birth Unit at Westmead Hospital becoming the major referral centre for high risk pregnancy, foetal abnormality and cardiac foetal conditions. This in turn has drawn activity to Grace NICU and CHW.
- The survival rate of premature neonates less than 26 weeks gestation has increased from 26% in 1980 to 80% in 2010. Over eighteen years the survival rate has increased from 83% to 98% despite increasing complexity and acuity. High survival rates for neonates admitted to the NICU then impacts on post discharge management.
- Complexity of neonates treated in the Unit particularly in relation to multiple problems and the requirement for multi-speciality and multi-disciplinary intervention during admission and requiring long-term support.
- NICU is now managing an increasing diversity of respiratory support mechanisms. The incidence of respiratory support requirements for infants as broadened over time and now includes Continuous Positive Airway Pressure (CPAP) devices, Face Mask CPAP and the expansion of sleep studies to include a greater number of infants
- Currently 60% of infants are discharged home from the Neonatal Intensive Care Unit due to an inability to transfer to another unit and the need for training of parents in complex feeding and care. Other NSW NICU units having exclusion criteria including; central lines, CPAP and complex wounds contributes to bed block in the Unit.
- The size and configuration of the Unit is inadequate to respond to the current and future patient care and staff requirements. The facility is overcrowded and there is a lack of physical capacity in the existing footprint of the Unit.
- There is a requirement to provide additional intensive care spaces to meet growing demand, provide surge and isolation capacity and ability to accommodate the increasing number and range of bed-side technologies
- CHW provides laser therapy for Retinopathy for Prematurity (RPO) for neonates in NICU, patients in Westmead Hospital Neonatal unit and/or transferred from other hospitals. Currently these patients have their procedures performed in the Operating Suite when operating time is available.
- Critically ill neonates requiring MRI are transferred to the hospital's Medical Imaging Service. Leading practice in neonatal care has resulted in the development of purpose-built neonatal MRI scanners with clinical trial conducted by Children's Hospital Medical Cincinnati [4]
- Community expectations are changing resulting in the need to provide contemporary and collocated facilities for mothers of babies admitted to the Unit.

Strategic Response

1. Expansion of the NICU to include an increase in the number of beds to meet current and future demand for neonatal intensive care services
2. Provision of isolation capacity within the Unit including access to N-Class isolation rooms
3. Establishment of a high dependency unit
4. Provide for end-of-life care
5. Continue the engagement with LHD to transfer neonates to other Units which are closer to the family's home.
6. Consider the inclusion of a laser therapy facility within the NICU
7. Incorporate a Neonatal MRI System within the NICU facility.

[4] Clinical Use of a Neonatal MRI System https://clinicaltrials.gov/ct2/show/NCT03476343

Table 21 – NICU Activity summary 2012/13 to 2016/17

		2012/13	2013/14	2014/15	2015/16	2016/17	Change	
							(%)	
Separations	Spent time in NICU	468	469	461	419	501		75%
	Spent time in HDU	398	422	330	345	421		5%
	Total	866	891	791	764	922		6%
Bed days	Spent time in NICU	3206	3447	3766	4090	3761		17%
	Spent time in HDU	3294	2966	3239	3124	3546		8%
	Total	6500	6413	7005	7214	7307		12%
% occ22 beds		81%	80%	87%				
% occ23 beds					86%	87%		

Source: *MoH CaSPA FlowInfoV17 NICU Flag & HDU Flag*

Table 22 – NICU activity by Urgency of Admission 2012/13 to 2016/17

		2012/13	2013/14	2014/15	2015/16	2016/17	Change (n)	Change (%)
Separations	Emergency	101	121	112	72	108	8	7%
	Other	703	688	649	650	738	35	5%
	Planned	62	82	30	42	76	14	23%
	Total	866	891	791	764	922		6%

Source: *MoH CaSPA FlowInfoV17 NICU Flag & HDU Flag*

Table 23 – NICU SRG activity 2012/13 to 2016/17

SRG V5.0	12/13	13/14	14/15	15/16	16/17	12/13	13/14	14/15	15/16	16/17
	SEPARATIONS					**BED DAYS**				
75 - Perinatology	603	580	596	572	642	5814	5212	6036	6443	6149
73 – Qualified Neonate	191	209	126	114	166	394	682	361	345	510
54 – Non Subspecialty Surgery	26	22	14	17	35	29	24	36	27	73
42 - Cardiothoracic Surgery	7	7	2	4	12	35	25	3	28	68
50 - Ophthalmology	7	8	0	11	12	17	7	0	13	18
63 - Tracheostomy	8	13	13	11	11	92	92	321	100	142
48 – ENT, Head & Neck	3	8	1	0	8	5	50	7	0	92
15 – Gastroenterology	2	2	5	3	5	5	23	10	8	17
Other	19	42	34	32	31	109	299	230	250	238
Total	866	891	791	764	922	6500	6414	7004	7214	7307

Source: *MoH CaSPA FlowInfoV17 (Excl entirely within ED) NICU Flag & HDU Flag*

Table 24 – NICU patients discharge

		2012/13	2013/14	2014/15	2015/16	2016/17	Change	
							(n)	(%)
Spent time in NICU	01 - Discharge by Hospital	276	266	306	273	338	64	23%
	05 – Transfer to other Hospital	175	168	133	119	139	-36	5%
	Other	17	35	22	27	24	7	41%
	Total	468	469	461	419	501	33	7%
Spent time in HDU	01 - Discharge by Hospital	296	288	249	256	325	29	10%
	05 – Transfer to other hospital	98	122	73	82	87	-11	-11%
	Other	4	12	8	7	9	5	Sig%
	Total	398	422	330	345	421	23	6%

Source: *MoH CaSPA FlowInfoV17 NICU Flag & HDU Flag*

Table 25 – NICU activity projections and cot requirements

	2012/13	2013/14	2014/15	2015/16	2016/17	2020/21	2025/26	2030/31
	ACTUAL					**PROJECTED**		
Separations	866	891	791	764	922	796	929	1,061
Bed days	6,500	6,413	7,005	7,214	7,307	8,760	10,220	11,680
Bed requirements @ 75% occup	24	23	26	26	27	30	35	40

8.3 Paediatric Intensive Care

The Paediatric Intensive Care Unit is a role delineation Level 6 service providing definitive care for a wide range of complex, progressive, rapidly changing, medical, surgical and traumatic disorders. Paediatric intensive care services are provided on a state-wide network beds located at CHW (21 beds), SCH (13 beds) and John Hunter Children's Hospital (4 beds).

PICU forms part of the continuum of acute care for services provided by the Network's national and state-wide programs and provides complex multi-system life support and ongoing advanced management of critically ill children and adolescents for an indefinite period and includes:

- A full range of respiratory support, from high-flow nasal cannulae and non-invasive ventilation;
- Invasive haemodynamic monitoring, cardiac output measurement & ICP monitoring;
- Extracorporeal Membrane Oxygenation (ECMO) (cardiac and non-cardiac/VA and VV); and,
- Renal Replacement Therapy, including continuous veno-veno-haemofiltration, peritoneal dialysis, and plasmapharesis.

Model of care

Patients arrive in PICU as an emergency or planned admission:

- Emergency via presentation to the CHW Emergency Department, inter-hospital transfer, following emergency surgery or as an emergency transfer from another CHW ward; and,
- Planned admission for surgery via Middleton Ward and Operating Theatre Suite.

Family-centred care with a multi-disciplinary team approach is the fundamental principle underlying the PICU model of care for the delivery of care for critically ill children and their families. The specific aspects on the PICU model of care are:

- Facilitating and support parent/carer participation in the care of their hospitalised child
- "Team Talk" as an integral part of inter-disciplinary communication to mechanism situational awareness now incorporating the Safety Pause, facilitated by a medical lead. It enables clinical/ non-clinical managers and organisational leaders to develop 'real time' awareness of patient movement and access to care performance within each site including 'SCHN watchers' and mitigation plans, safety concerns, delays and pressure points.

Current activity

In 2016/17 there were 1,099 CHW inpatients who spent time in the PICU and utilised 6,676 bed days. Over the five year period 2012/13 to 2016/17 separations have declined by 7% whereas bed days have increased by 24%. The occupancy rate has increased significantly from 70% in 2012/13 to a high of 97% in 2015/16.

Cardiac related diagnoses account for the highest volume of activity in the PICU The largest volume of separations have a diagnosis associated with congenital with a diagnosis of congenital malformations, deformations and chromosomal abnormalities. Diseases of the respiratory system account for a further volume of activity.

Although the number of children who have spent time in PICU has been relatively stable year on year from 2012/13 to 2016/17 the service is facing increasing pressure. The average length of stay has increased from 4.5 days to 6.0 days and the small number of patients dependent on technology is consuming an increasing volume of resources.

Admissions to PICU vary considerably by month. The pattern of admission shows an increase in emergency activity over the winter period and an increase in planned activity associated during the summer period.

The 2016/17 the activity profile showed that children aged:

- 0 to 4 years cardiac surgery (including the requirement for extra-corporal mandatory oxygenation – ECMO), bone marrow transplantation and neurosurgery accounted for the highest number of bed days and separations:
- 5 to 9 years liver transplantation, cardiac surgery, ventilation with/without tracheostomy accounted for the majority of bed days;
- 10 to 14 years ventilation with/without tracheostomy; and,
- 15 years plus liver transplantation and spinal procedures accounted for the majority of bed days.

Children living in WSLHD account for the highest number patients managed in the PICU, followed by SWSLHD and NBMLHD. In 2016/17 56% (n=622) were for residents of western Sydney LHDs (WS, SWS

and NBM), 28 were overseas residents and 33 residents of ACT. Over the period, separations for WSLHD residents increased by 6%, 3% for SWSLHS residents and 65% for ACT residents.

Challenges and opportunities

Many issues confronting CHW PICU are the same or similar to those experienced by units overseas[5] and primarily related to responding to service demand, increasing complexity of the patient population and the constraint of the physical environment.

- Admissions to the Unit are increasing and the growth in the variety and complexity of surgical procedures performed by CHW contributes to the requirement for intensive care management of patients post and prior to surgery.
- Balancing planned and emergency admissions to the Unit is a major issue. The growth of the CHW organ transplantation program and the increasing occurrence of multiple organ recipients concurrently impacts on demand for PICU beds. There is a flow-on effect to children and families as planned surgery is invariably rescheduled due to lack of a PICU Bed.
- A growing number of children and adolescents with poorly managed chronic conditions including asthma and require intensive care management.
- The increase in the survival of neonates admitted to NICU and requiring transfer to PICU for ongoing management
- Responding to increasing demand for critical care support the Cardiac Program is a major demand driver for intensive care management and the high complexity of children undergoing cardiac surgery

The constraints of the current size and configuration of the Unit is

- The footprint of the Unit and the number of built bed spaces is unchanged since the Unit was commissioned in 1995 and there is no physical capacity to flex in response to changing demand.
- Significant seasonal pressures every winter exacerbated by the lack of appropriate isolation facilities within the Unit.
- The increasing survival rate of children admitted to PICU and the contribution of new and more sophisticated technologies by the bed-side including to better outcomes for patients.
- There is a requirement for greater psychosocial support and provision of end-of-life care.

Strategic response

1. The CHW PICU will continue to operate as a Level 6 intensive care service and provide support to paediatric services across the state and support the Network's national and statewide services.
2. Expansion of the PICU to include an increase in the number of beds to meet current and future demand for paediatric intensive care services
3. Provision of isolation capacity within the Unit including access to N-Class isolation rooms
4. Establishment of an end-of-life program and access to an appropriate facility within the Unit
5. Consideration of design of building infrastructure to future proof the Unit and minimise duration of retrofitting to accommodate changes in technology particularly with regard to patient bed spaces.
6. Activity projections indicate that CHW requires additional PICU capacity prior to the expected delivery of additional capacity between 2023 and 2026.
7. Managing PICU resources / beds across SCHN as one resource to manage planned and emergency demand. .
8. Build on the Clinical Redesign Project in PICU focused on timely discharge of patients to inpatient units.
9. Following commissioning of the CHW ED and Short Stay Unit in 2020 and some physical space is released at CHW investigate developing high acuity / high dependency zone or zones in one with ward realignment. This could be within inpatient units or in a dedicated area. This would allow for provision of appropriate levels of care to patients and timely discharge of patients from PICU to HDU or wards.
10. Continue the close work between PICU and Grace Centre for Newborn Care in managing demand.
11. Continue to work closely with surgery program in evening out the distribution of complex surgery across the week, month and year.

[5] NHS Paediatric Critical Care and Specialised Surgery in Children Review Nov 2017 Pg 6

Table 26 – PICU Activity Summary 2012/13 to 2016/17

		2012/13	2013/14	2014/15	2015/16	2016/17	% change
Separations	Emergency	394	420	432	397	379	↓4%
	Other	301	275	232	229	268	↓11%
	Planned	487	451	526	511	452	↓7%
	Total	1,182	1,146	1,190	1,137	1,099	↓7%
Bed days	Emergency	1,956	2,007	2,241	3,111	2,410	↑23%
	Other	1,928	2,398	2,123	2,771	2,434	↑26%
	Planned	1,508	1,447	1,774	1,522	1,832	↑21%
	Total	5,392	5,851	6,138	7,404	6,676	↑24%
% occupancy on 21 beds		70%	76%	80%	97%	87%	

Source: *MoH CaSPA FlowInfoV17 ICU Flag*

Table 27 – PICU Activity by SRG 2012/13 to 2016/17

SRG V5.0	12/13	13/14	14/15	15/16	16/17	12/13	13/14	14/15	15/16	16/17
	SEPARATIONS					**BED DAYS**				
42 - Cardiothoracic Surgery	246	240	257	243	217	587	560	732	623	602
24 - Respiratory Medicine	239	268	245	226	195	745	863	856	802	862
75 - Perinatology	82	76	99	93	109	794	889	803	1273	1050
63 - Tracheostomy	111	103	89	107	90	1743	1987	2110	3077	2274
46 - Neurosurgery	48	47	43	56	67	177	132	151	127	171
49 - Orthopaedics	76	68	80	74	65	139	145	165	154	152
21 - Neurology	55	39	46	31	47	167	96	211	91	136
27 – Non Subspecialty Medicine	39	44	34	27	46	105	60	82	80	105
48 – ENT, Head & Neck	37	29	38	44	35	71	56	80	73	85
44 – Upper GIT Surgery	33	21	28	34	35	60	41	74	97	172
61 - Transplantation	26	22	28	25	25	184	126	189	234	233
54 – Non Subspecialty Surgery	36	40	33	30	24	217	176	101	210	165
Other	154	149	170	147	144	4989	5131	5554	6841	6007
Total	1182	1146	1190	1137	1099	5392	5851	6138	7404	6676

Source: *MoH CaSPA FlowInfoV17 ICU Flag*

Table 28 – PICU Activity – separations mode

		2012/13	2013/14	2014/15	2015/16	2016/17	Change	
							(n)	(%)
Spent time in ICU	01 - Discharge by Hospital	1082	1041	1084	1024	975	-107	-10%
	05 – Transfer to other Hospital	46	45	34	37	45	-1	-2%
	Other	54	60	72	76	79	25	46%
	Total	1182	1146	1190	1137	1099	-83	-7%

Source: *MoH CaSPA FlowInfoV17 ICU Flag*

Table 29 – PICU activity and bed requirement projections

	2012/13	2013/14	2014/15	2015/16	2016/17	2020/21	2025/26	2030/31
	Actual					**Projected**		
Spent time in ICU - separations	1,182	1,146	1,190	1,137	1,099	1,500	1,800	2,075
Bed days	5,392	5,851	6,138	7,404	6,676	7500	9,000	10750
Bed required@ 75% occupancy	20	21	22	27	24	26	33	39

Source: *MoH CaSPA FlowInfoV17 ICU Flag*

8.4 Cardiac Service

Cardiac services are managed as a single service across CHW and SCH.

The Cardiac Service at CHW provides a comprehensive cardiology, interventional cardiology and cardiothoracic surgical service. The Service is a tertiary and quaternary referral centre for the diagnosis, treatment and follow-up care of infants, children and young people with cardiac related congenital and acquired conditions.

Cardiac Services are delivered in various locations:

- The Heart Centre for Children (Ambulatory Services) – Block 5 L3
- Cardiac Interventional Suite – Block 5 L2
- Operating Room Suite - Block 6 L3
- Edgar Stephens Inpatient Unit – Block 9 L3
- Neonatal ICU and Paediatric ICU – Block 5 L3

The Cardiac Service has a strong and long-standing engagement in conduct of research including genetic research, maintenance of a Kids Heart Research DNA Bank, psychological research and cardiac therapeutics and intervention.

Cardiology and interventional cardiology

Cardiology and interventional cardiology is designated as a role delineation Level 6 service. In addition to providing services to the CHW local catchment CHW provides tertiary cardiology services to children who are residents of NSW, interstate and overseas.

- Diagnostic services include electrocardiographs (ECG), Echocardiograms, Exercise Stress Testing and Event Monitoring services, cardiac ultrasound, cardiac CT Angiography, medical resonance imaging (MRI) and electrophysiological studies (EPS). Currently EPS is provided through a networked arrangement with Westmead Hospital.
- CHW has the only dedicated paediatric Cardiac Interventional Suite in NSW and is a critical component of the overall service provided for children with heart disease and essential to supporting the paediatric cardiac surgical program. Interventional cardiology comprises angiography, angioplasty and stenting, pacemaker implantation, and percutaneous cardiac procedures such as septal defect repair.

Cardiothoracic surgery

Cardiothoracic Surgery is designated as a role delineation level 6 service and fulfils its role in the provision of supra-LHD service for the management of hypoplastic left heart syndrome.

- Cardiothoracic surgery encompasses Interventional and open cardiac procedures for a range of complex congenital heart defects with either curative or palliative care intent.
- The Cardiology Department and the Cardiothoracic Department work collaboratively with the Grace Centre for Newborn Care, Paediatric Intensive Care Unit and Peri-operative Service and Edgar Stephens Inpatient Ward in the provision of high quality and patient/family centred care.

Each year an average of 1,500 new patients are referred to the Cardiac Service. The wait list is an issue for the Service with some 1,315 referrals waiting for an appointment.

Activity - admitted

In accordance with the MoH requirements for the development of Clinical Services Plans the MoH planning tools are used as the data sources and for the development of activity projections.

An alternative approach has been used for the analysis of activity and projections for the Cardiac Service because of the unique patient population, particularly in relation to neonates.

Service data was sourced from the SCHN MSAU and the Cardiac Service. Admitted activity was obtained for the financial years 2014/15 to 2018/19 using Cardiac Surgery and Cardiology as the discharging specialties.

In 2018/19 there were 1,022 separations – an increase of 6% (62) from 2012/13. Bed days have increased by 9% (649) from 7,516 to 8,165.

Approximately 19% of patients are admitted on a day-only basis. The majority of activity is related to:

- cardiology for cardiac catheter including Cardiac MRI, CT Angiography, sedated and/or transoesophageal Echocardiogram ,MRI under GA,
- interventional cardiology including balloon valvotomy, diagnostic cardiac catheter and defect repair, closure of ASD/VSD; and,
- Non Subspecialty medicine including adenosine/adrenaline challenges.

In 2018/19 neonates and babies aged less than one-year accounted for 35% (362) of separations and utilised 70% of bed days. Children aged 1 to 4 years accounted for 27% of separations, those aged 5 to 9 years for 16% of separations and those aged 10 years and over for 18%.

On any day there is an average of 22 cardiac patients in an overnight inpatient bed. Whilst the average length of stay for overnight stays was 10.2 days in 2018/19 there were over 174 patient (24% of the total) with a length of stay of 11 days or more.

The proportion was significantly higher (40%) for cardiac surgery patients and lower (10%) for cardiology patients.

Figure 8 – Cardiac Surgery inpatient length of stay 2018/19

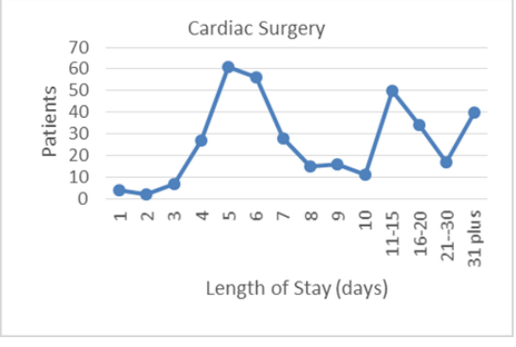
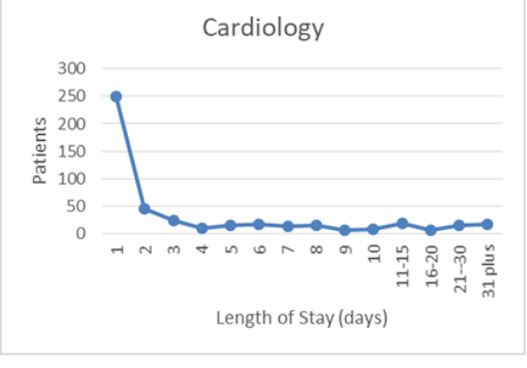


Figure 9 – Cardiology inpatient length of stay 2018/19



CHW inpatient activity is distributed across a range of SRG and ESRGs, specifically a significant volume of activity in SRGs Tracheostomy[6] and Perinatology. Perinatology accounted for the highest number of bed days and reflects the management of cardiac conditions in the neonatal period.

Children living in SWSLHD and WSLHD account for the highest number of overnight separations and bed days utilised. Some 22% of bed days are utilised by children living in regional NSW. Overseas and interstate residents account for approximately 10% of overnight and longer stays.

For many babies and children the acuity of their condition and/or the complexity of surgical interventional require admission to the intensive care unit. In 2018/19 cardiac patients accounted for 7,970 overnight bed day. 36% (2,860) were in NICU/PICU). This represents the equivalent of 10 ICU beds (at 75% occupancy) and 18 inpatient beds (at 80% occupancy). It should be noted that the commissioning of the Close Observation Unit (COU) in July 2018 has seen a transfer of cardiac patients from PICU and a decrease in intensive care bed days.

Table 30 – Cardiac Service SRG overnight bed days 2018/19

	2018/19		
	Cardiology	Cardiac Surgery	Total
11 – Cardiology	918	9	297
12 – Interventional Card	308	25	343
42 – Cardiothoracic Surg	125	2166	2291
63 – Tracheostomy	385	1112	1497
75 – Perinatology	238	1700	2494
Other	934	50	1048
Total ICU Bed days	760	2100	2860
Overnight Cardiac Bed days	2908	5062	7970
% ICU Bed days	26%	41%	36%

Source: *SCHN Cardiac Service*

Non-admitted activity

The Heart Centre for Children accommodates the diagnostic and outpatient services. The Centre caters for over 4,840 outpatient attendances in 2018/19 and increase of 33% (1,200) from 2014/15.

There has been a significant increase in the number of stress tests performed (27%) and holter monitors (25%).

Challenges and opportunities

Unlike adults, children with heart disease present a range of complex and physiological challenges that require surgery or ongoing management at any stage of development including in the neonatal period.

Electrophysiology service

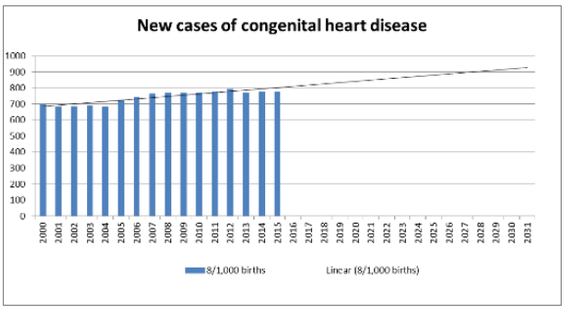
Electrophysiology is a growing paediatric cardiac service subspecialty in the diagnosis and treatment of electrical disturbance of the heart. The demand for EPS is increasing significantly. Access to EPS at Westmead Hospitals is being limited and resulting in an increase the wait-list for children requiring EPS, importantly for ablation, lengthening to unacceptable levels.

[6] SRG 63 – Tracheostomy includes AR-DRGs ventilation >=96 hrs and ECMO

Cardiac conditions in children

Congenital heart disease (CHD) affects between 6 and 8 in every 1,000 births. About a quarter of those requiring treatment will need surgery in the first year of life. Using NSW births data [7] it is estimated that in 2015 there were 700 babies born with CHD and this is projected to increase to over 900 by 2031. The cohort of NSW residents born since 2000 and diagnosed with CHD is approaching 10,000.

Figure 10 – New cases of congenital heart disease per 1,000 births in NSW



Most infants and children requiring single interventions can expect to lead a near-normal life. A small group of infants with complex lesions require multiple surgical procedures, intensive support and close monitoring during the first few years of life, although their quality of life may still be good.

Hypoplastic left heart syndrome (HLHS) is one of the rare and complex congenital heart disorders. It is estimated that HLHS occurs in between 2 and 3 per 10,000 births. Based on NSW Births data it is estimated that between 17 and 20 infants are diagnosed with HLHS annually and may increase to approximately 22 in 2031.

Heart transplant

The Royal Children's Hospital Melbourne (RCHM) is the Nationally Funded Centre (NFC) for the provision of paediatric heart transplant in Australia.

When heart transplant is indicted, the Cardiac Service refers children to Melbourne, or for older larger or adolescents, referral is to St Vincent's Hospital Sydney.

Referral to RCHM is a significant impost and disruption on the family unit with the necessity to relocate to Victoria for the initial assessment and workup for a minimum of 3 months and potentially for some years dependent on the condition of the child.

Dependant on the health status, patients are either admitted to RCHM or return home to wait until a heart becomes available and then urgently transferred down to RCH for transplant.

CHW Cardiac Service undertakes all aspects of management of children pre-transplant and the immediate and on-going care post transfer from Melbourne.

In the first six months of 2020 five-patients were assessed for transplant and the CHW heart transplant patient cohort includes:

- Seventeen patients post-transplant
- Two patients waiting for the availability of an organ,
- Five being assessed for transplant
- Ten for potential assessment in the event of further health deterioration.

The Cardiac Service provides high quality and safe patient care and has expertise to manage complex patients including hypoplastic left heart syndrome and the ongoing management of children post heart transplant undertaken in Melbourne.

It is expected that over the next five years at least five children who are NSW residents will undergo a heart transplant.

The maturity of the CHW cardiac surgical service, demonstrated expertise of the CHW surgical, anaesthetic and intensive care clinical teams in paediatric organ transplant and the desire for the Network's Cardiac Service to continue to develop its comprehensive and high quality paediatric cardiac service, expansion to include heart transplant is indicated.

This will provide enable continuity of care for patients and eliminate the need to for children and their families to relocate to another State, which is frequently for many months pre and post transplant.

The use of Ventricular assist device (VAD) to support children with advanced heart failure is expected to increase and planning for service expansion will need to take into account the use of VADs for patients particularly in relation to the use of the devices as a long term bridge to transplant.

Growing cohort of children with cardiac conditions

With the success of contemporary surgical procedures and improved survival, many patients with complex lesions are reaching adult life, and the population of adults with CHD now exceeds the

[7] Centre for Epidemiology and Evidence, Health Statistics New South Wales, Sydney: NSW Ministry of Health

number of children with structural heart abnormality. [8]

The growing cohort of children who may/or have had cardiology or surgical intervention is impacting on the workload of the Cardiac Service multi-disciplinary team and a concomitant increase in inpatient and non-inpatient activity, including on access to intensive care beds.

Activity projections

Over the period 2014/15 to 2018/19 overnight bed days for the Cardiac Service have increased at an annual growth rate of 2.1 %. This compares with the Hospitals growth rate of 1.2% over the same period. Cardiac overnight bed days projected at 2.5% allowing for growth would see overnight bed days increase to 10,719 in 2031. Projections of overnight separations assumes an average length of stay of 10.0 days.

Table 31 – Cardiac inpatient activity projections

		18/19	20/21	25/26	30/31
Seps	DO	195	195	203	283
	O'night	827	837	947	1071
	Total	1022	1032	1150	1354
Bed days	DO	195	195	203	283
	O'night	7970	8373	9474	10719
	Total	8165	8568	9677	11002
Beds	ICU	10	11	12	14
	IPU	18	19	22	23
	Total	28	30	34	37

Assuming that the current spilt of 35% of the bed days are in PICU/NICU and that 65% are in the inpatient unit and that this proportion is likely to continue the demand for NICU/PICU beds (at 75% occupancy) and inpatient unit beds (at 80% occupancy.

Strategic response

1. Continuation of the Cardiac Service as a whole-of-Network service provided as role delineation level 6 services at both CHW and SCH.
2. Develop a model of care for children requiring electrophysiological studies and identify the future demand for EPS including the demand drivers
3. Develop the model of care and a business proposal for the provision of heart transplant and a Ventricular Assist Device Program at CHW.
4. Develop, standardise clinical protocols and pathways across the Network for the provision of cardiac surgery and paediatric cardiology.
5. Develop a sustainable medical, nursing and allied health workforce model that determines arrangements across the Network for cardiac surgery and cardiology.

[8] Congenital heart disease: current knowledge about causes and inheritance Gillian M Blue, Edwin P Kirk, Gary F Sholler, Richard P Harvey and David S Winlaw Med J Aust 2012; 197 (3): 155-159. https://www.mja.com.au/journal/2012/197/3/congenital-heart-disease-current-knowledge-about-causes-and-inheritance

Table 32 – Cardiac activity summary 2014/15 to 2018/19

Activity		2014/15	2015/16	2016/2017	2017/18	2018/19	Change (%)
Cardiac Surgery	By-pass	351	345	314	328	342	-3%
	Non by-pass	188	186	182	185	173	-8%
	Other	105	109	89	78	133	27%
	Total	**644**	**640**	**585**	**591**	**648**	**1%**
Cardiac Catheterisation	Diagnostic	100	79	84	58	58	-42%
	Interventional	182	210	170	206	243	34%
	Total	**282**	**289**	**254**	**264**	**301**	**7%**
Electrophysiological Studies (EPS)	Diagnostic	8	8	6	5	2	
	Ablation	42	49	36	51	47	
	Total	**50**	**57**	**42**	**56**	**49**	**-2%**
NON-ADMITTED ACTIVITY							
Outpatient Clinics	**Attendances**	3660	3855	3498	4588	4860	33%
Investigations	Electrocardiogram (ECHOs)	4614	4353	3636	4171	4451	-4%
	Electrocardiograms (ECGs)	3955	4100	4333	4686	4767	21%
	Pacemaker checks	392	350	293	270	281	-15%
	Stress Tests	261	280	279	317	332	27%
	Holter Monitors	698	772	871	855	870	25%
Other	Clinical Nurse Consultant	276	288	536	383	370	34%
	Outreach Clinics	n/a	139	102	77	101	
	Psychology	33	6	67	75	37	

Source: *SCHN Cardiac Service*

Table 33 – CHW Cardiac inpatient activity summary 2014/15 to 2018/19

INPATIENT ACTIVITY		2014/15	2015/16	2016/17	2017/18	2018/19	Change(n)	Change(%)
Separations	Day Only	184	174	207	178	195	11	6%
	Overnight	776	762	724	771	827	51	7%
	Total	**960**	**936**	**931**	**949**	**1022**	**62**	**6%**
Bed days	Day Only	184	174	207	178	195	11	6%
	Overnight	7332	8921	7396	8070	7970	638	9%
	Total	**7516**	**9095**	**7603**	**8248**	**8165**	**649**	**9%**
ALOS (excl day only) Days		7.8	9.7	8.2	10.5	9.6		

Source: *SCHN Health Information Unit 2016*

Table 34 – CHW Cardiac Service activity 2016/17 and 2018/19

	SEPARATIONS						BED DAYS					
	Cardiology		Cardiac Surgery		Total		Cardiology		Cardiac Surgery		Total	
SRG 40	16/17	18/19	16/17	18/19	16/17	18/19	16/17	18/19	16/17	18/19	16/17	18/19
11 – Cardiology	187	201	40	31	227	232	669	1013	49	39	718	1052
12 – Interventional Card	199	215	17	9	216	224	287	348	41	25	328	373
42 – Cardiothoracic Surg	18	25	214	257	232	282	71	125	1842	2166	1913	2291
63 – Tracheostomy	3	12	34	40	37	52	89	385	1433	1112	1522	1497
75 – Perinatology	18	33	60	55	78	88	368	794	2188	1700	2556	2494
Other	127	130	14	14	135	144	1484	2665	5553	5042	7037	7707
Total	552	616	379	406	931	1022	1889	3067	5714	5098	7603	8165

Source: *SCHN MSAU – Discharging specialty – Cardiology and Cardiac Surgery*

Table 35 – Cardiac Service ICU bed days 2016/17 to 2018/19

	2016/17			2017/18			2018/19		
	Cardiology	Cardiac Surgery	Total	Cardiology	Cardiac Surgery	Total	Cardiology	Cardiac Surgery	Total
11 – Cardiology	36	4	40	87	0	87	99	1	100
12 – Interventional Card	5	1	5	0	2	2	29	3	32
42 – Cardiothoracic Surg	20	547	568	20	494	514	46	595	641
63 – Tracheostomy	38	909	946	310	806	1116	260	695	955
75 – Perinatology	238	1332	1565	147	1354	1501	296	803	1098
Other	30	25	61	32	6	38	30	3	34
Total ICU Bed days	367	2818	3185	596	2662	3258	760	2100	2860
Overnight Cardiac Bed days	1722	5674	7396	2365	5705	8070	2908	5062	7970
% ICU Bed days	21%	50%	43%	25%	47%	40%	26%	41%	46%

Source: *SCHN MSAU – Discharging specialty – Cardiology and Cardiac Surgery*

8.5 Poisons Information

The NSW Poisons Information Centre (NSWPIC), located at CHW, and funded by NSW Health, is an emergency service which provides current and evidence-based information and advice to assist in the prevention and management of poisoning.

The NSWPIC currently conducts over 100,000 consultations per annum and accounts for approximately half of the national poisons-information related calls. The majority of calls to the Centre are received from the community (79%) with a further 21% from hospitals. Half of the calls are related to children

The Centre has access to a range of consultants with expertise to respond to a wide range of emergencies. The Service has a workforce of over 50 staff. This includes almost all practicing Clinical Toxicologists in Australia (4 fellows and 22 Visiting Medical Officers) who provide the National Clinical Toxicologists Consulting Service. Specialists in Poisons Information comprise the majority of the remaining workforce.

Access to a 24/7 Poisons Information Service has significant benefit to the community. Through telephone-based risk assessment and triage with home-based self-care visits to the General Practitioner is reduced and presentations to hospital Emergency Departments minimised.

The development of a clinical governance framework and conduct of morbidity and mortality reviews has been enabled through the creation of a part-time temporary toxicology fellow.

Over the past two years, the NSWPIC has developed a clinical placement program for pharmacy within existing resources.

Challenges and opportunities

The sustained increase in workload is the primary issue confronting the service delivery. The number of calls is growing. Due to the increasing complexity of calls over the past four years the average call handling time has increased by 20%. There has been a tripling of calls from group homes. Many of these calls are complex and require extended handling times.

The average speed of call answer has increased to 45 seconds however wait times are in excess of 10 minutes during peak periods and approximately 5,000 calls per years are unanswered due to callers abandoning the call whilst queued.

Documentation of all cases is undertaken locally into a customised electronic medical record. Currently this does not integrate into any other health services medical record system.

Currently the majority of research output is the result of external grants rather than Network supported. This is a particular issue has critical world-leading research has improved the management of poisoning and informed regulatory responses.

The size and configuration of the space accommodating the NSWPIC is inadequate and has been a significant issue for the service over several years.

Strategic response

1. Undertaken facility planning to identify an appropriate location and schedule of accommodation for the NSWPIC
2. Develop workforce plan for the NSWPIC and develop business case for the establishment of a full-time toxicology fellow position for the Service.
3. Enhancement of the telephony to allow for better call handling and recording, data capture and provision of services remotely

9. MEDICAL PROGRAM

The Medical Program comprises:

- General Medicine
- Gastroenterology
- Renal Medicine
- Renal Dialysis
- Respiratory Medicine
- Cancer Services
- Neurology
- Neurosurgery
- Palliative Care
- Bear Cottage Hospice - Manly
- Pain Management
- Sleep Unit
- Inpatient Units (IPU)
- Pharmacy

Models of care

Medical services are based on a patient and family-centred and multidisciplinary approach to care and consistent with the philosophy of quality and safe care in the right time, right place and by the right team. The Program utilises a range of models of care to respond to the needs of the child and family and may include overnight inpatient admission, day-only inpatient admission, non-inpatient/ambulatory care and care in the community including HITH and partner-ship with LHD

Current activity

In 2016/17 medical inpatient separations totalled 21,743 and increased by 12% (2229) since 2012/13. Bed days have increased by 2% from 49,135 to 49,973. The proportion of day-only separations has increased from 42% to 48%.

Table 36 – Acute Medical Related Inpatient

		2012/13	3016/17	Change (%)
Separations	DO	8216	10605	29%
	O'night	11258	11138	-1%
	Total	19474	21743	12%
Bed days	DO	8216	10605	29%
	O'night	40919	39368	-4%
	Total	49135	49973	2%
ALOS O/N		3.6 days	3.5 days	
Ave no/day		135	137	

Source: *MoH CaSPA FlowInfo V17.0 Acute Medical Flag (excl entirely within ED)*

Emergency patients accounted for 55% of total medical separations in 2016/17. The number of emergency separations has increased by 14% from 9,934 in 2012/13 to 11,354 in 2016/17. Planned separations increased by 15% from 7,408 to 8,506.

In 2016/17 residents of WSLHD accounted for the highest number of separations and separations have increased by 21% from 7,919 to 9,581. Separations for SWSLHD residents have increased by 11%, 12% for SLHD residents and 18% for HNELHD residents.

In 2016/17 58% of acute medical separations were identified as specialist paediatric compared with 63% in 2012/13. Specialist paediatric separations have increased by 2% (193) over the five year period.

Specialist paediatric bed days accounted for 68% of bed days in 2016/17 and 71% in 2012/13. Specialist paediatric bed days have declined by 3% (-984) over the period.

Table 37 – Medical activity – specialist paediatric 2012/13 & 2016/17

		2012/13	3016/17	Change (%)
Sep	Non specialist	7088	9164	29%
	Specialist	12386	12579	2%
	Total	19474	21743	12%
Bed days	Non specialist	14083	15905	13%
	Specialist	35052	34067	-3%
	Total	49135	49973	2%

Source: *MoH CaSPA FlowInfo V17.0 Acute Medical Flag (excl entirely within ED) Specialist Paediatric Flag*

Table 38 – Medical Program Non-admitted activity 2016/17

Department	Service events (patient contact)
Bear Cottage	43
Gastroenterology	2,870
General Medicine	2,737
Nephrology	1,501
Neurology	3,549
Neurosurgery	259
Oncology	10,732
Pain Medicine Depar	882
Palliative Care Dept	1,151
Pharmacy	142
Renal Treatment centre	51
Respiratory Medicine	2,765
Respiratory Support Service (Sleep Unit)	3,033
Total	29,715

Non Sub-specialty medicine

SRG 27 – Non-subspecialty medicine accounts for the highest volume of medical activity with 4,472 separations and 9,279 bed days in 2016/17. The high volume diagnosis includes ear and upper respiratory infections, non-surgical injuries, cellulitis, kidney and urinary tract infections, head injuries, metabolic conditions and food challenge.

Table 39 – SRG 27 - Non Subspecialty Medicine activity 2012/13 & 2016/17

INPATIENT ACTIVITY		2012/13	2016/17	Change (%)
Separations	DO	1054	1812	2%
	O'night	2555	2664	4%
	Total	3609	4472	24%
Bed days	DO	1054	1812	72
	O'night	7287	7467	2%
	Total	8341	9279	11%

Source: *MoH CaSPA FlowInfo V17.0 (excl entirely within ED)*

Over the five-year period separations have increased by 24% from 3,609 to 4,476 and bed days by 11% from 8,441 to 9,279 and:

- Overnight separations have increased by 4% (105) and bed days by 2% (105).
- Day-only separations as a proportion of total has increased from 29% to 40%.
- The length of stay for overnight stay has increased marginally from 2.8 days to 2.9 days.
- In 2016/17 65% (2,888) of separations were unplanned/Emergency compared with 68% (2,463) in 2012/13.
- 48% (2,164) of separations were classified as paediatric specialist and 48% (1,724) in 2012/13. 58% of patients (2,595) were aged 5 years and under.

Respiratory Medicine

SRG 24 - Respiratory medicine activity accounted for 4,507 separations and 11,375 bed days in 2016/17 and includes high volume includes general respiratory condition, bronchitis and asthma, respiratory infection, cystic fibrosis, bronchoscopy, chronic obstructive airways disease and respiratory neoplasms.

Table 40 – SRG 24 - Respiratory Medicine activity 2012/13 & 2016/17

INPATIENT ACTIVITY		2012/13	2016/17	Change (%)
Separations	DO	517	1291	150%
	O'night	2869	3216	12%
	Total	3386	4507	33%
Bed days	DO	517	1291	150%
	O'night	9069	10084	11%
	Total	9586	11375	19%

Source: *MoH CaSPA FlowInfo V17.0 (excl entirely within ED)*

Over the five year period 2012/13 to 2016/17 separations have increased by 33% from 3,386 to 4,507 and bed days by 19% from 9,586 to 11,375.

- Day-only separations have increased from 29 % of the total to 46% and length of stay for overnight stays has increased marginally from 3.1 days to 3.2 days.
- Specialist paediatric activity has 32% (1,442) of separations were classified as paediatric specialist compared with 48% (1,613) in 2012/13.
- 72% of separations (3,267) were aged 5 years and under.

Gastroenterology

Gastroenterology activity accounted for 2,043 separations and 4,601 bed days in 2016/17 and the high volume activity included inflammatory bowel disease, oesophagitis and gastroenteritis, gastrointestinal obstruction and conditions of the liver.

Table 41 – SRG 15 - Gastroenterology activity 2012/13 & 2016/17

INPATIENT ACTIVITY		2012/13	2016/17	Change (%)
Separations	DO	478	938	96%
	O'night	1194	1105	-7%
	Total	1672	2043	22%
Bed days	DO	478	838	96%
	O'night	3896	3663	-8%
	Total	4,467	4601	3%

Source: *MoH CaSPA FlowInfo V17.0 (excl entirely within ED)*

Over the five-year period 2012/13 to 2016/17 separations have increased by 22% from 1,672 to 2,043 and bed days by 3% from 4,467 to 4,601. In 2016/17:

- 46% of separations were day-only and this has increased from 29% (excludes ED SSU activity).
- The length of stay for overnight stays was 3.3 days and consistent with 2012/13.
- 1,086 (53%) separations were unplanned/emergency compared with 66% (1,098) in 2012/13.
- 1,210 (59%) of separations were classified as paediatric specialist compared with 48% (809) in 2012/13.

- 40% of separations (814) were aged 5 years and under.

Neurology

Neurology activity accounted for 1,829 separations and 4,999 bed days in 2016/17 and the high volume activity includes telemetric EEG monitoring, seizures, meningitis, cranial and peripheral nerve disorders and malignancy of the brain.

Table 42 – SRG 21 - Neurology activity 2012/13 & 2016/17

INPATIENT ACTIVITY		2012/13	2016/17	Change (%)
Separations	DO	846	811	-4%
	O'night	1013	1018	0%
	Total	1859	1829	-2%
Bed days	DO	846	811	-4%
	O'night	4538	4188	-8%
	Total	5384	4999	-7%

Source: *MoH CaSPA FlowInfo V17.0 (excl entirely within ED)*

Over the five-year period 2012/13 to 2016/17 separations have declined by 2% from 1,859 to 1,829 and bed days by 7% from 5,384 to 4,999. In 2016/17:

- 44% of separations were day-only and this has declined from 46% (excludes ED SSU activity).
- The length of stay for overnight stays was 4.1 days compared with 4.5 days in 2012/13.
- 556 (30%) separations were unplanned/Emergency compared with 30% in 2012/13 (556).
- 1,554 (85%) separations were classified as paediatric specialist compared with 86% (1,608) in 2012/13.

Neurosurgery

The Department of Neurosurgery is a role delineation Level 6 service providing comprehensive surgical and non-surgical management of children with injury or disease of the brain, spinal or peripheral nerves.

As CHW is a major trauma centre the service fulfils the role of neurosurgical trauma. The Department works closely with a multidisciplinary team to provide expert training and management of complex neurosurgical and spinal cases.

The Neurosurgery SRG shows that over the five year period separations have increased by 6% from 421 in 2013/14 to 445 in 2016/17 and bed days have declined by 8% from 3,124 to 2,880. The majority of patients are admitted overnight or longer and have an average length of stay of 6.7 days.

Table 43 – SRG 46 - Neurosurgery activity 2012/13 & 2016/17

INPATIENT ACTIVITY		2012/13	2016/17	% change
Separations	DO	6	13	↑117%
	O'night	415	432	↑4%
	Total	421	445	↑6%
Bed days	DO	6	13	↑117%
	O'night	3118	2867	↓8%
	Total	3124	2880	↓8%

Source: *MoH CaSPA FlowInfo V17.0 (excl entirely within ED)*

In 2016/17:

- 43% of separations were aged 0 – 4 years, 24% aged 5 – 9 years, 25% were aged 10 – 14 years and 7% aged 15 years plus
- 39% (173) of patients were planned and 61% (272) were admitted as emergency/other.

The CASB provides access to intra-operative MRI facility for the CHW neurosurgical service and the Trauma Service.

Palliative Care

Palliative Care is a whole-of-Network service and collaborates with John Hunter Children's Hospital (JHCH) in the NSW Paediatric Palliative Care Program to support families to care for a child with a life limiting illness. The SCHN Palliative Care Service provides:

- Support to patients and their families in the home and during hospital stays;
- Support to the primary medical team of a patient referred to the service;
- Advice and support for complex symptom management and psychosocial support for all members of the family; and
- Supports coordination of care to patients in the hospital and in the community.

Bear Cottage (Manly) is a children's hospice delivering 24-hour care for children and families including temporary respite care in the earlier phases of illness and:

- Support for families as the child's condition progresses
- End-of –life care according to the family's needs
- Facilitation of bereavement support and referrals to counselling.

The model for care for provision of palliative care services is based on a multi-disciplinary and family-

centred approach. The palliative care team comprises medical, nursing and allied health staff, a Bereavement Coordinator and Volunteer Coordinator.

Palliative Care activity for SCHN has been categorised as sub-acute since 2013/14 and this is reflected in the MoH FlowInfo Program. In 2016/17 there were 267 separations and 1941 bed days. The inpatient activity for palliative care has been relatively stable.

Challenges and opportunities

Uncertainty in the workforce is an important issue for the service with approximately 40% of CHW and SCH staffing FTE required beyond June 2018 is yet to be confirmed.

There is a requirement for improved pain management and end-of-life planning for specialist palliative care.

Many children, young people and their families have a long engagement with the Network's palliative care services and need varying levels of assistance during that time.

There is a lack of appropriate and family-centred facilities to support end-of-life care in CHW inpatient units including NICU and PICU and the Oncology Inpatient Unit (Camperdown Ward).

Strategic directions

1. Develop an integrated Network-wide approach to palliative care.
2. Advocate for ongoing MoH funding to continue the current level of service provision.
3. Integrate eMR processes for improved information transfer.
4. Explore current workforce issues and alignment.
5. Ensure appropriate ABF type changes occur within the Network.
6. Improve the quality of relevant documentation and data capture.
7. Develop a streamlined governance/oversight process for the SCHN Palliative Care Service
8. Incorporate end-of-life facilities as part of the facility planning for Cancer and Intensive Care Units

Pain Management

The Department of Pain Management is designated as a role delineation level 6 service providing multidisciplinary assessment and treatment, pain management programs, procedural interventions and inpatient admission for infants, children and young people with acute (including procedural, cancer and burns) or chronic and intractable pain. The Department:

- Works in close collaboration with the Department of Anaesthesia in relation to acute and procedural pain management; conducts daily acute pain rounds by the Clinical Nurse Consultant or Nurse Practitioner and provides a nurse lead nitrous oxide sedation service.
- Manages complex and intractable pain through an out-patient multidisciplinary (medical, nursing, psychology, physiotherapy) consultative service, a day program (T.A.M.E. Your Pain), a telehealth service and an inpatient consultative service.
- Is part of the national benchmarking of the Electronic Persistent Pain Outcomes Collaborative (ePPOCC) and receives state-wide referrals.
- Works with other Local Health Districts and health professional in the transition of young people to adult pain management services.

Challenges and opportunities

The number of referrals to the Pain Management service has remained relatively static, however the increasing complexity of CHW surgical case load and the use of more complicated analgesic regimes for children is impacting to the demand for the Pain Management Service. The introduction of a multi-level orthopaedic surgical service, an increase in the number of spinal surgical cases, the introduction of the hypoplastic left heart surgical program and the increasing number of liver transplant recipients are the primary contributors to this increase in demand.

The service has experienced a significant increase in referrals for chronic pain management since 2011 (38%) and occasion of service since 2013 (58%), due, in part to the increasing recognition of the needs of the child with persisting post-operative pain and an increased understanding of the needs of the child and complex pain and the support needs of the carer/family.

Strategic response

1. Finalise and submit a business case to increase the Nurse Practitioner workforce to manage the complex pain management workload.
2. Timely and consistent access to appropriate facilities for the conduct of education and training programs and the conduct of the T.A.M.E your Pain day.

9.1 Oncology Service

Cancer is a major cause of burden of disease in Australia and the Australian Government has identified cancer as a national health priority.

In Australia, on average, each year more than 750 children aged 0 – 14 years are diagnosed with cancer and over half of these children are aged under 5 years. Australia has one of the highest rates of childhood cancer and between 2006 and 2014 childhood cancer incidence rates have increased by 11% in those aged 0 – 14 years[9]. Leukaemias are the most common childhood cancers (about one-third) followed by brain tumours and non-Hodgkins lymphoma.

The Cancer Centre for Children at CHW is a comprehensive cancer care service providing general and specialist cancer diagnostic, interventional and treatment services for children and adolescent residents of NSW and beyond. The services comprise:

- The Medical Oncology at a role delineation of Level 6; and,
- Radiation Oncology at a role delineation of Level 4. The service is networked with the radiation therapy facility located in the adjacent Westmead Hospital.

The delivery of highly complex treatment programs is underpinned by an Integrated Multi-disciplinary Model of Care (IMDC) which ensures continuity of care for children and their families. Service provision is undertaken by three teams – one Bone Marrow Transplant (BMT) team and two general oncology teams.

The Oncology Treatment Centre (OTC) currently operates during business hours only and undertakes day cancers treatments, assessment and initial treatment of children newly diagnosed with cancer and ongoing maintenance and review of patients. OTC includes outpatient clinic and consulting rooms, a 6 bed chemotherapy area, procedure room and recovery area. In 2016/17 the OTC delivered 22,000 outpatient occasions of service.

CHW inpatient capacity comprises a 20 bed oncology ward (Camperdown Ward). Demand for inpatient beds, particularly for isolation requirements, resulting in admitted patients being treated as outliers across the hospital. On any day the majority of patients accommodated in the Infectious Diseases Ward (Variety Ward) are oncology service outliers.

Outreach services are provided through the Oncology Outreach Program. The Program is organised on a regional basis (metropolitan and rural) with Clinical Nurse Consultants delivering on-going support for children and their families (including back to school support) and support to hospital and community based health professionals.

Clinical Research and clinical trials is a fundamental component of service delivery to ensure a high standard of clinical care and improved survival outcomes. Translational research, takes the wealth of laboratory research findings to the patient's bedside into clinical application to improve the child's outcomes and contribute to the long term survival rates. The majority of patients treated by the Service are enrolled in clinical trials and the Service is an active collaborator with other national and international centres in the conduct of paediatric clinical trials.

Activity - admitted

The analysis of cancer-related was undertaken. In 2016/17 there were 3,182 cancer-related inpatient separations and 13,769 bed days. Over the five-year period 2012/13 to 2016/17 separations have increased by 18% and bed days by 36%.

Table 44 – Cancer related inpatient activity 2012/13& 2016/17

Cancer Flag 2011		2012/13	2016/17	Change (%)
Separations	DO	1303	1704	31%
	O'night	1393	1478	6%
	Total	2696	3182	18%
Bed days	DO	1303	1704	31%
	O'night	11591	12065	4%
	Total	12894	13769	7%

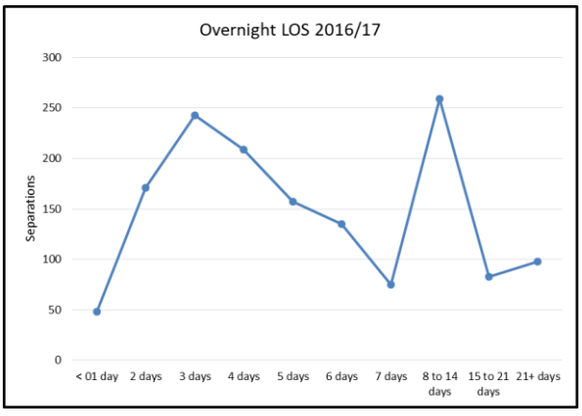
Source: *MoH CaSPA Flowinfo V17 (Excl entirely within ED) Cancer Flag 2011*

Children living in WSLHD account for the highest number of patients with an overnight stay or longer, followed by those living in SWSLHD and NSLHD. In 2016/17 there were 36 overseas resident patients with an overnight stay compared with 75 in 2012/13.

The average length of stay for overnight stays is relatively stable at 8.5 days. In 2016/17 30% of patients (440) had a length of stay of 9 days or more.

[9] Childhood cancer statistics https://cancerqld.org.au/news/childhood-cancer-statistics-available-online-first-time/

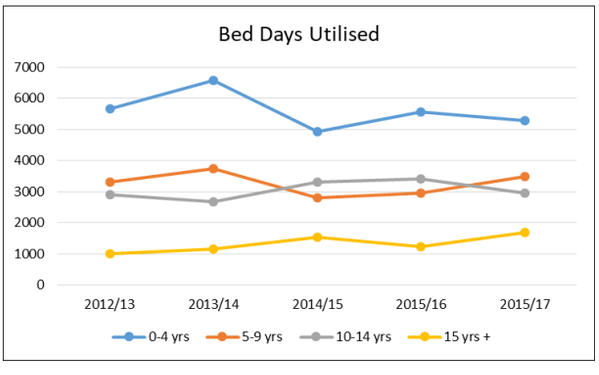
Figure 11 – Length of Stay – overnight separations 2016/17



Source: *MoH CaSPA Flowinfo V17 (Excl entirely within ED) Cancer Flag 2011*

Over 40% of the bed days utilised are for children in the 0 – 4 year age group and this proportion is fairly constant year on year. Bed days for patients aged 15 years and over has risen by 68% from 1,008 in 2012/13 to 1,694 in 2016/17

Figure 12 – Bed days utilised by age group



Activity projections

Overnight activity. Cancer related overnight activity has increased over the period 2012/13 to 2016/17. Overnight bed days have increased by 4% – an additional 474 bed days over the period. Over the period 2012/13 to 2016/17 overnight bed days for Oncology have increased at an annual growth rate of 1.2%. This compares with the hospital's acute non-cancer growth rate of 1.3% over the same period. Cancer-related bed days projected at 1.2% would see overnight bed days increase to 14,258 in 2031.

Day only activity. Cancer related day only activity has increased over the period 2012/13 to 2016/17. Day-only bed days have increased by 31% from 1,303 to 1,704 – an additional 401 bed days over the period. Over the period 2012/13 to 2016/17 day-only hours for Oncology have increased at an annual growth rate of 3.2%. This compares with the hospital's acute non-cancer growth rate of 5.2% over the same period. Day only bed days will increase to 4,510 in 2031.

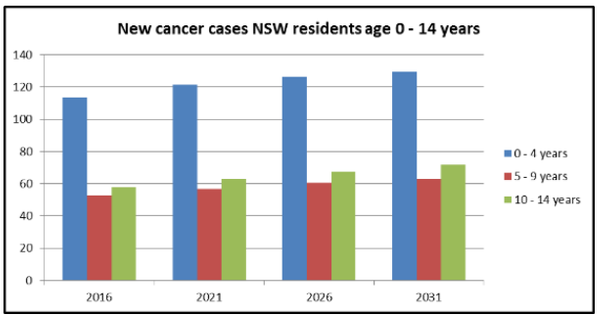
Challenges and opportunities

The growing cohort of children diagnosed with cancer. It was estimated that in 2017 719 Australian children aged 0 -14 years were newly diagnosed. Over 50% aged 0 – 4 years, 24% aged 5 – 9 years and 26% aged 10 – 14 years. The average number of newly diagnosed cases in 2017 was estimated as:

- 0 – 4 years 23.8/100,000 for boys and 20.4/100,000 for girls;
- 5 – 9 years 11.9/100,000 for boys and 9.6/100,000 for girls; and,
- 10 – 14 years 13.2/100,000 for boys and 11.8 for girls [10]

Based on the NSW population projections to 2031, it is estimated that annual number of new cases of cancer will increase from 224 in 2016 to 264 in 2031.

Figure 13 – Projected new cancer cases NSW residents aged 0 – 14 years



The challenge for the cancer services provided by the Network including CHW is that service demand will continue to increase to 2030 due primarily to three factors - population; survival rates of children and young people with cancer, increasing complexity in cancer care as a result of advances in clinical care and adoption of new technologies.

Increasing number and complexity of cancer survivors. Improvements in diagnosis and treatment have resulted in significant improvement in mortality rates and survival rates in many childhood cancers. However, the increasing survival of children particularly in the 0 to 5 year age group often requires complex and long term treatment. In addition childhood cancer survivors are predisposed to a range of long term physical and psychological effects including second cancers, growth and development and lung and cardiac problems.

[10] Australian Government – Cancer Australia – Children's Cancer

Children with specific genetic disorders are particularly prone to developing cancer (e.g. Downs Syndrome, Beckwith-Wiedeman, Denys-Drash, WAGR). These children present with complex pre-existing disabilities and are disproportionately represented within the cohort of children with cancer

Adolescents and young adults (AYA) with cancer aged 15 to 24 years have been identified as a distinct cohort of patients. Whilst bone tumours, leukaemia and brain tumours are common cancers in childhood as well as in the older age group lymphoma, testicular cancer, ovarian germ cell tumours, thyroid cancer and skin cancer (generally melanoma) are more common. The survival rate for the AYA age group with childhood cancers is markedly reduced compared with the young cohort.

Technological advances, genomics and personalised medicine. Advances in treatment regimens and the increasing complexity and intensity of therapy will generate an increased requirement for high dependency care and demands on the Oncology Service. The number of Bone Marrow Transplants and stem cell transplants performed will increase in response to the broadening spectrum of indications for treatment of malignant and non-malignant conditions and as the availability of donors grows.

The future of Cancer Care

Children and their families at the centre of care. Person-centred care involving patients and their families in every aspect of care. There is a necessity to better integrate all the aspects of the cancer-patient journey as a model of care, education, training and research and provide the physical environment to support the journey for patients and their families.

Advances in genomic technology are changing the face of paediatric cancer care. There is a growing recognition and acceptance that genomic heterogeneity inherent to many tumour/cancer types and is a key determinant of an individual's responsiveness to therapy.

Enrolment in clinical trials is a hallmark indicator in the provision of quality cancer care and as a means of identifying the most appropriate treatment strategies for patients and the high participation rate (85%) compared with adults (5%) has been identified as a major contributor to the survival rate of children with cancer.

Frontline treatment strategies are increasingly complex to allow modification of therapies to individualise care. The process of adapting to and incorporating changes strategies. These are often more medically and resource intensive strategies but deliver better outcomes. The process of adapting to and incorporating changes to patient care in paediatric cancer care has a substantial effect on the volume and complexity of services provided by the range of sub-speciality services including infectious diseases, critical care, cardiology, medical imaging, pathology and psychological medicine.

Shift to outpatient, community care and equitable access to services. Increasing the service focus towards community and home based care working together in partnership with Local Health Districts, patients and their families. Investigation of chemotherapy at home and expand the use of telehealth and alternative models of care.

Strategic response

1. Continue to deliver high-quality care and drive service improvement in paediatric cancer-care, education and research and drive improvements in the child's/family's experience.
2. Develop Cancer Genetics service.
3. Build and support collaboration between internal and external health professionals, patients and their families.
4. Strength the regional outreach and shared care program through improved access and expand the use of telehealth to support patient care, education and support to local providers.
5. Continue to manage the Long-Term Follow-up Program including transition to adult and community services.
6. Develop the Acute Review Clinic specifically to evaluate cancer patients that would generally present to the ED.
7. Adopt the concept of the Paediatric Comprehensive Cancer Care Centre and improve the collocation of cancer-treatment, research and family/carer support services in the same space and comprise:
   - An expanded Inpatient Unit (IPU) to provide sufficient capacity to accommodate current and future activity;
   - Ambulatory care zone – diagnosis and initiation of treatment;
   - Satellite pharmacy ;
   - Acute Review Clinic zone;
   - Parent/carer zone and welcome lobby;
   - Workforce accommodation (clinical, non-clinical support staff and researchers)
8. Reduce inappropriate variation in access to and delivery of care.

Table 45 – Cancer Related inpatient activity summary 2012/13 to 2016/17

Cancer Flag 2011		2012/13	2013/14	2014/15	2015/16	2016/17	Change	
							(N)	(%)
Separations	Day only	1303	1549	1369	1461	1704	401	31%
	Overnight	1393	1382	1409	1420	1478	85	7%
	total	2,696	2,931	2,778	2,881	3,182	486	18%
	% Day only	48%	53%	49%	51	54%		
Bed days	Day only	1303	1549	1369	1461	1704	401	31%
	Overnight	11591	12593	11232	11711	12065	474	4%
	Total	12,894	14,142	12,601	13,172	13,769	875	7%
	ALOS (excl DO)	8.3 days	9.1 days	8.0 days	8.2 days	8.2 days		

Source: *MoH CaSPA Flowinfo V17 (Excl entirely within ED) Cancer Flag 2011*

Table 46 – Cancer related inpatient activity by SRG 2012/13 to 2016/17

SRG V50	12/13	13/14	14/15	15/16	16/17	% change	12/13	13/14	14/15	15/16	16/17	% Change
	SEPARATIONS						BED DAYS					
17 – Haematology	791	873	886	922	1032	30%	5599	6648	5801	5953	6239	11%
46 - Neurosurgery	87	92	99	91	117	34%	1211	1134	1138	1324	1234	2%
27 – Non Subspecialty Med	272	277	267	337	364	34%	1112	890	886	1115	1127	1%
49 - Orthopaedics	158	257	302	309	279	77%	713	1064	1206	1133	1108	55%
21 – Neurology	286	218	252	216	243	-15%	731	565	614	558	682	-7%
15 – Gastroenterology	93	55	77	42	70	-25%	396	285	204	127	402	2%
20 - Chemotherapy	121	189	128	170	275	127%	121	189	128	170	275	127%
63 - Tracheostomy	8	10	6	7	7	-12%	495	455	225	368	255	-48%
Other	880	960	761	787	795	-10%	2516	2912	2399	2424	2447	-3%
Total	2696	2931	2778	2881	3182	10%	12894	14142	12601	13172	13769	7%

Source: *MoH CaSPA Flowinfo V17 (Excl entirely within ED) Cancer Flag 2011*

Table 47 – Cancer related Inpatient activity by Site 2012/13 and 2016/17

Site	2012/13	2016/17	% Change	2012/13	2016/17	% Change
	SEPARATIONS			BED DAYS		
13-Primary Site - Lymphohaematopoeitic	1000	1360	36%	5355	5758	8%
F-Other Benign neoplasms	389	372	-4%	987	706	-28%
11-Primary Site - Neurological	362	325	-10%	1654	1492	-10%
06-Primary Site - Tumours of Bone & oth connective tissue	147	307	109%	812	1432	76%
10-Primary Site - Eye	156	186	19%	271	236	-13%
08-Primary Site - Urogenital	168	142	-15%	385	519	35%
D2-Neoplasms of uncertain or unknown behaviour	42	123	193%	157	470	199%
12-Primary Site - Thyroid and other endocrine	149	88	-42%	972	441	-52%
14-Primary Site – Myelodysplasia & chronic myeloproliferative dis	85	59	-31%	583	735	26%
03-Primary Site – Upper Gastrointestinal	49	47	-4%	244	304	25%
Other	149	173	16%	1474	1676	13%
Total	2696	3182	18%	12894	13769	7%

Source: *MoH CaSPA Flowinfo v17 Excl ED only Cancer Flag 2011*

Table 48 – Cancer related activity projections and bed requirements to 2031

Cancer Flag 2011		2016/17	2020/21	2025/26	2030/31
		ACTUAL	PROJECTED		
Bed days	Day only	1,704	2,250	3,186	4,510
	Day-only hour	6,907	8,864	10,376	12,146
	Overnight	12,065	12,655	13,432	14,258
Built Beds	Day only	5	7	8	10
	Overnight @ 80% occupancy	41	43	46	48
	Total	46	50	54	58

9.2 Bone Marrow Transplant (BMT)

Bone Marrow Transplant accounts for a significant proportion of the Cancer Service inpatient activity. BMT is a potentially curative therapy for many child hood cancers including leukaemia and tumours such as Ewings sarcoma, neuroblastoma, osteosarcoma and other malignant brain tumours.

In addition to treatment for cancer, bone marrow transplantation is increasing being performed for non-cancerous (benign) diseases.

Inpatient activity analysis is based on the following AR-DRGs V80:

- A07A – Allogenic Bone Marrow Transplant, Age <+16 yrs or major complexity
- A08A – Autologous Bone Marrow Transplant, Major Complexity
- A08B – Autologous Bone Marrow Transplant, Minor Complexity

Table 49 – BMT Inpatient activity 2012/13 & 2016/17

	Age Group	2012/13	2016/17	Change (%)
Seps	0 – 4	16	23	44%
	5 – 9	11	9	-18%
	10 – 14	8	8	0%
	15+	5	2	-60%
	Total	40	42	5%
Bed days	0 – 4	764	1202	57%
	5 – 9	283	603	113%
	10 – 14	273	370	36%
	15+	54	117	119%
	Total	1374	2293	67%
ALOS (days)		34	55	

Source: *MoH CaSPA Flowinfo v17 (Excl entirely within ED)*

- Over the 5-year period 2012/13 to 2016/17 there were 218 separations for BMT:
- Bed days utilised have increased by 67% from 1,374 in 2012/13 to 2,293 in 2016/17.
- The average length stay has increased significantly and in 2016/17 there was an average of 6 patients per day. There were 4,171 hours in ICU for BMT patients in 2016/17.
- In 2016/17 over half of the separations and bed days utilised were patients are aged 5 years and under
- Whilst the majority of BMTs were undertaken for cancer-related conditions, there is an increasing, although small numbers of BMT performed for conditions such as severe aplastic anaemia, immuno-deficiencies and rare genetic diseases. In 2016/17 17% of BMT separations were children with a non-cancer diagnosis.

9.3 Pharmacy

The Pharmacy Department is designated as a role delineation level 6 service providing a range of pharmaceutical services for children dependant on the hospital's emergency, inpatient and non-inpatient casemix.

The core pharmacy services include medication dispensing; provision of a pharmacy intravenous drug admixture service (PIVAS) where specialised solutions are prepared by skilled and validated operators in a NATA certified clean-room environment.

Pharmacy Department has an established non-sterile compounding service for oral and topical medication which cannot be sourced commercially in dose forms suitable for paediatric administration and manufactures extemporaneous preparations where no commercial products are available.

The Department provides a Drug Information Service including external pharmacists and health care professionals. Involvement in research and clinical trials is the hallmark of the CHW Pharmacy Department including the use of investigational drugs in hospital research projects through the support of a Clinical Trials pharmacist.

Challenges and opportunities

The growth in Pharmacy Services is driven by the hospital's increasing inpatient and non-impatient activity, increasing complexity of medication management and the legislative and associated compliance requirements.

The number of drug protocols is increasing and medication management issues are becoming more complex. The Antibiotic Stewardship program and the management of antimicrobials are very resource intensive but critical in ensuring quality prescribing s and reducing unnecessary expenditure by the Network.

The complexity of prescribing in paediatrics raises new challenges in the area of medication management with the evolution of Pharmacy Informatics and the necessity for skill acquisition and available resources.

The changing profile of the paediatric population accessing services at CHW is an emerging issue for the provision of pharmacy services. Many children and young adults with chronic conditions and/or have profound and multiple disabilities have increased medication needs. In addition there is a growing cohort of infants and children with intestinal failure and require parenteral nutrition to provide all or part of the child's nutritional requirements. In 2016/17 the Pharmacy Department was providing 22 patients on parenteral nutrition in the community and with 1,300 courier deliveries.

Pharmacy Informatics is a critical and significant driver in transforming the delivery of hospital pharmacy services. Improvements medication management and appropriate controls in the medication-use process can be achieved through the use of automation and integration of pharmacy systems and clinical systems to improve patient outcomes by reducing medication errors and streamlining the medication-related process.

The use genomic information is emerging as a tremendous innovation in the diagnosis, treatment and development of new therapies specifically designed for the individual patient. The adoption of personalised medicine will have implications for the CHW Pharmacy Department as new medications are developed and drug regimens increasingly become more tailored to the individual patient. The important benefits will be for those children with a rare disorder or cancer.

The role of the pharmacist is integral to the provision of high quality patient care and involvement in the multi-disciplinary team.

Strategic Response

1. Redefine and implement a sustainable pharmacy service model that integrates the operations in the CASB, CHW Stage 2 and main pharmacy.
2. Develop a "hub and spoke" model for the provision of pharmacy services to support patient streams closer to the patient care environments – CASB, CHW ambulatory care zone and comprehensive cancer centre.
3. Progress the introduction of automated dispensing and mechanical distribution system in all areas.
4. Support KR Clinical Research Centre Clinical Trials Pharmacy
5. Explore innovative ways of medication management for children, particularly those with complex and/or chronic conditions with increased need for medications.
6. Incorporate information technology to improve service provision and the business processes for the Pharmacy Services
7. Further develop the Pharmacy Service Workforce to provide contemporary models of service delivery and to attract and retain a skilled workforce.

9.4 Challenges and opportunities for the Medical Program

The increase and sustained inpatient activity is the major challenge for the medical program. With over 70% of the hospital's separations per year and 55% of bed days, medical activity has grown over the five year period (separations by 14% and bed days by 8%).

The highest growth is in respiratory medicine with babies and children with a chronic respiratory conditions contributing to the demand on services and the impact on bed availability for other medical clinical services.

An emergent issue is the impact of multi-resistant organisms which impacts significantly on the at-risk patient and susceptible populations including children with cystic fibrosis, are post-transplant or immunosuppressed and neonates or those with chronic conditions.

The research currently progressing phage therapy as a viable treatment for antibiotic resistant infections is new and has the potential to radically improve the outcomes for patients into the future.

The lack of isolation capacity in ward is impacting on service delivery with an impact on the available bed stock due to use of double rooms to accommodate a single patient particularly during winter months

The changing caseload and acuity of patient population particularly those transferred from NICU and PICU and then having ongoing management by the sub-specialties in the medical program is contributing significantly to the demand for services.

The continuing and long term provision of care for toddlers and children requiring assisted respiratory ventilation is an evolving issue. There is an increase in children with interstitial lung disease and there is a sustained and growing demand for sleep studies.

Managing the increase in gastroenterology activity including the diagnosis and management of coeliac disease, inflammatory bowel disease (IBD), oesophagitis, short gut disease and disability associated with dysphagia is an issue. There is an unmet demand in terms of access to operating room facilities for gastroscopy.

The impact of the next generation of complex and high-cost therapies, including cell and gene therapy, on the delivery of clinical care for medical patients particularly those children with rare conditions and requiring complex before, during and after therapy.

Strategic response

1. Standardise the short – stay streaming model of care for medical patients consistent with the philosophy of family-centred care.
2. Develop a model of care and business case for the establishment an Inflammatory Bowel Disease (IBD) clinic.
3. Increase access to the operating room suite to manage the current and future demand for gastroscopies.
4. Participation in and the expansion of the HITH program.
5. Explore home tele-monitoring with the aim of developing a sustainable model for the management of chronic and complex conditions and empowering patients and their families.
6. Continue working with WSLHD and SWSLHD to enhance the provision of paediatric services within their Districts particularly in relation to Blacktown, Rouse Hill and Campbelltown.
7. Streamline pathways to LHDs and NGOs to ensure a consistent and appropriate process for facilitating the paediatric patient's journey through from hospital-based care to community-based care in both directions in response to the child's and family's needs.S
8. Participation in the adoption of personalised medicine including cell and gene therapy into clinical care delivery for suitable patients.

10. SURGERY & ANAESTHESIA PROGRAM

Paediatric Surgery at CHW is a role delineation Level 6 service. The CHW Surgical Program comprises:

- Ear, Nose and Throat (ENT)
- Dental
- General Surgery
- Gynaecology
- Neurosurgery
- Ophthalmology
- Organ transplantation
- Orthopaedics
- Plastic and Reconstructive Surgery
- Trauma
- Urology

Models of care

The CHW has an integrated surgical model of care which supports all children presenting for a surgical procedure to be provided with timely, high quality and child-family centred care.

Children presenting to the emergency department are assessed by the specialist emergency clinical team and referred to the relevant surgical sub speciality. Patients are either transferred to the Operating Suite for emergency surgical intervention or referred to the review clinics conducted by the specialist surgical teams and discharged or for non-urgent surgical intervention.

Planned surgical patients are admitted as day-only or day-of surgery through Middleton Ward (Day Surgery Unit). Following pre-procedural check children are transferred to the Operating Theatre Suite. Parents/carers accompany children through to induction of anaesthesia. Post procedure:

- Day-only patients are transferred back to Middleton Ward for 1st stage recovery. Parents/carers are generally with the child upon waking. Patients are discharged when fully recovered.
- Patients admitted for an overnight or longer stay are either transferred to general recovery for 1st stage and then transferred to a general ward or where intensive care management post operatively is required transferred to NICU or PICU

Admitted activity

- **Total Surgical/Procedural activity** has increased over the five year period. Separations have increased by 5% from 9,573 to 10,070 – an additional 498 separations. Bed days utilised increased by 6% from 42,472 to 45,099 – an additional 2627 bed days. The average length of stay in 2016/17 was 4.5 days compared with 4.4 days in 2012/13.
- **Day only separations** accounted for 43% of separations in 2016/17 and the proportion has been relatively stable over the period. Day-only separations have increased by 5% (198). The majority of day-only activity is planned (89%) and this proportion has been relatively constant over the period. Planned day-only activity has increased by 6% (223) over the period.
- **Overnight activity** has increased over the period. Separations have increased by6% (300) and bed days by 6% (2429). The average length of stay for overnight separations (excluding day-only) was 7.1 days in 2016/17. The daily average of patients has increased from 116 to 123.
- **Specialist Paediatric activity** accounted for 82% of surgical/procedural separations and 94% of bed days in 2016/17. The proportion of specialist paediatric activity is lowest for residents of WSLHD (71% of separations) compared with Sydney (95%, WLHD (99%) and HNELHD (99%).
- **Short stay activity (length of stay of 48 hours or less)** accounted for 65% of surgical/procedural separations and 15% of bed days in 2016/17. Short stay separations have increased by 5% (333) over the period. SRG 49 - Orthopaedics has the highest volume of activity (1,359 separations) followed by SRG 48 – ENT & Head and Neck (709).
- **Long stay activity (length of stay greater than 49 hours)** accounted for 35% of separations and 84% of bed days. Over the five year period long stay activity had increased by 5% (165) and bed days by 6% (2,159). The average length of stay for longer stays has been relatively constant at 11.0 days. .

Table 50 – Surgical/Procedural activity by urgency of admission

		12/13	13/14	14/15	15/16	16/17	12/13	13/14	14/15	15/17	16/17
		SEPARATIONS					BED DAYS				
Day only	Emergency	476	458	545	477	463	476	458	545	477	463
	Other	25	23	11	10	13	25	23	11	10	13
	Planned	3650	3882	3698	3785	3873	3650	3882	3698	3785	3873
	Total	**4151**	**4363**	**4254**	**4272**	**4349**	**4151**	**4363**	**4254**	**4272**	**4349**
Overnight	Emergency	1798	1942	2092	2058	2085	12979	14058	15296	14867	13308
	Other	677	625	541	550	536	12418	12271	12000	14011	13326
	Planned	2948	3006	3079	3027	3075	12924	15062	14281	14307	14116
	Total	**2948**	**3006**	**3079**	**3027**	**2075**	**38321**	**41391**	**41577**	**43185**	**40750**
Total	Emergency	2,274	2,400	2,637	2,534	2,546	13,455	14,516	15,841	15,281	13,737
	Other	701	647	551	560	576	12,430	12,280	11,968	14,021	13,339
	Planned	6,598	6,888	6,777	6,812	6,948	16,574	18,944	17,979	18,092	17,989
	Total	**9,574**	**9,935**	**9,965**	**9,906**	**10,070**	**42,459**	**45,740**	**45,788**	**47,394**	**45,065**

Source: *MoH CaSPA FlowInfo V17.0 Acute Surgical/Procedural Flag (excl entirely within ED) – Urgency of admission*

Table 51 – Surgical/Procedural activity – Specialist Paediatric Flag

		12/13	13/14	14/15	15/16	16/17	12/13	13/14	14/15	15/17	16/17
		SEPARATIONS					BED DAYS				
Non Specialist Paediatric	Emergency	919	834	904	817	851	2123	2120	2274	1780	1775
	Other	6	4	4	7	4	14	11	11	16	14
	Planned	1137	1016	898	923	978	1347	1191	1053	1097	1113
	Total	**2062**	**1854**	**1806**	**1747**	**1833**	**3484**	**3322**	**3338**	**2893**	**2902**
Specialist Paediatric	Emergency	1355	1566	1733	1718	1679	11332	12396	13567	13564	11996
	Other	696	644	548	553	572	12429	12283	12000	14005	13325
	Planned	5461	5872	5879	5889	5970	15227	17753	16926	16995	16876
	Total	**7512**	**8082**	**8160**	**8160**	**8237**	**38988**	**42432**	**42493**	**44564**	**42197**
Total	Emergency	2,274	2,400	2,637	2,534	2,546	13,455	14,516	15,841	15,281	13,737
	Other	701	647	551	560	576	12,430	12,280	11,968	14,021	13,339
	Planned	6,598	6,888	6,777	6,812	6,948	16,574	18,944	17,979	18,092	17,989
	Total	**9,574**	**9,935**	**9,965**	**9,906**	**10,070**	**42,459**	**45,740**	**45,788**	**47,394**	**45,065**

Source: *MoH CaSPA FlowInfo V17.0 Acute Surgical/Procedural Flag (excl entirely within ED) –Specialist Paediatric Flag*

Table 52 – Surgical/Procedural activity by Area of Residence 2016/17

	SEPARATIONS									BED DAYS								
	SPECIALIST PAEDS			NON SPECIALIST PAEDS			TOTAL			SPECIALIST PAEDS			NON SPECIALIST PAEDS			TOTAL		
	DO	ON	Tot	DO	ON	Tot	DO	ON	Tot	DO	ON	Tot	DO	ON	Tot	DO	ON	Tot
WS	997	1404	2401	425	550	975	1422	1954	3376	997	11868	12865	425	1115	1540	1422	12983	14405
SWS	755	871	1626	157	194	351	912	1065	1977	755	6580	7335	157	436	593	912	7016	7928
NS	342	389	731	51	81	132	393	470	863	342	2401	2743	51	159	210	393	2560	2953
NBM	399	404	803	78	62	140	477	466	943	399	3181	3580	78	107	185	477	3288	3765
SYD	190	261	451	52	51	103	242	312	554	190	2665	2855	52	96	148	242	2761	3003
CC	163	186	349	19	29	48	182	215	397	163	1699	1862	19	60	79	182	1859	1941
OtH	2846	3515	6361	782	967	1749	3628	4482	8110	2846	28394	31240	782	1973	2755	3628	30467	33995
	3538	**4701**	**8239**	**811**	**1022**	**1833**	**4349**	**5723**	**10070**	**3538**	**38659**	**42197**	**811**	**2091**	**2902**	**4349**	**40750**	**45099**

Source: *MoH CaSPA FlowInfo V17.0 Surgical/ProceduralFlag*

Table 53 – Surgical/Procedural activity by LOS 2012/13 to 2016/17

	12/13	13/14	14/15	15/16	16/17	% Δ	12/13	13/14	14/15	15/16	16/17	% Δ
	SEPARATIONS						BED DAYS					
48 hrs or less	6336	6473	6480	6576	6669	5%	6648	6856	6863	6998	7116	7%
49 hrs plus	3237	3462	3485	3330	3401	6%	35811	38884	38925	40396	37949	6%
Tot	9573	9935	9965	9906	10070	5%	42459	45740	45788	47394	45065	6%

Source: *MoH CaSPA FlowInfo V17.0 Surgical/Procedural (excl entirely within ED, SRG 80 – Drug and Alcohol, SRG 81 – Psychiatry - Acute)*

Non Subspecialty Surgery

SRG 54 - Non-subspecialty surgery activity accounted for 1,861 separations and 4,754 bed days in 2016/17. The casemix includes general surgery, injuries, inguinal and femoral hernia procedures, appendicectomy and other injuries.

Table 54 – SRG 54 - Non subspecialty surgery 2012/13 & 2016/17

INPATIENT ACTIVITY		2012/13	2016/17	Change (%)
Separations	DO	574	624	9%
	O'night	1196	1237	3%
	Total	1770	1861	5%
Bed days	DO	574	624	9%
	O'rnight	4237	4130	-3%
	Total	4811	4754	-1%

Source: *MoH CaSPA FlowInfo V17.0 (excl entirely within ED)*

Over the five year period 2012/13 to 2016/17 separations increased by 5% from 1,770 to 1,861 and bed days declined by 1% from 4,811 to 4,754. In 2015/17:

- 66% were day-only and this has decreased from 68% (excludes ED SSU activity).
- The average length of stay for overnight stays was 3.3 days compared with 3.5 days in 2012/13.
- 63% (1,168) were unplanned/emergency compared with 57% (1,016) in 2012/13.
- 46% (859) of separations were classified as specialist paediatric compared with 54% (956) in 2012/13.

Orthopaedics

Orthopaedics is designated as role delineation Level 6 service providing a full range of surgical and non-surgical orthopaedic procedures. Clinical services include general and trauma orthopaedics, spina bifida, scoliosis, cerebral palsy and neuromuscular disorders, limb lengthening and deformity correction, congenital hand and hand trauma.

The NSW Motion Analysis Service (Gait Laboratory) provides assessment for children with neuromuscular disorders, assisting with interventional planning.

In 2016/17 SRG 49 - Orthopaedics accounted for 10% of total CHW inpatient separations and 10% of total bed days. Over the five-year period 2012/13 to 2016/17 separations have increased by 4% from 2,967 to 3,091 and bed days have declined by 4% from 8,522 to 8,160.

Table 55 – SRG 49 – Orthopaedics 2012/13 & 2016/17

INPATIENT ACTIVITY		2012/13	2016/17	Change (%)
Separations	DO	1183	1417	20%
	O'night	1786	1674	-6%
	Total	2967	3091	4%
Bed days	DO	1183	1417	20%
	O'night	7339	6743	-8%
	Total	8522	8160	-4%

Source: *MoH CaSPA FlowInfo V17.0 (excl entirely within ED)*

In 2016/17 46% of orthopaedic separations (1,417) were day-only and this has increased from 40% in 2012/13 (excludes ED SSU activity):

- 30% of separations were aged under 5 years and 43% were aged 10 years and over.
- The average length of stay for overnight stays was 4.0 days compared with 4.1 days in 2012/13.
- 60% (1,861) of patients were planned compared with 52% in 2012/13. The number of planned separations has increased by 21% from 1,533 in 2012/13 to 1,861 in 2012/13.

In addition to the provision of inpatient care, the Orthopaedic Department manages a significant caseload on an outpatient basis. In 2016/17 there were over 17,000 Non-Admitted Patient (NAP) service events for the Orthopaedic clinic.

Challenges and opportunities

There are over 14,000 orthopaedic inpatient separations for children aged to 15 years to hospitals in NSW and one-third are admitted to SCHN hospitals. The proportion is higher (47%) of higher for children aged less than 5 years. In 2016/17 61% of CHW orthopaedic separations were classified as specialist paediatric and these separations have increased by 7% since 2012/13.

Whilst trauma is an issue for all paediatric age groups presenting to CHW, non trauma varies with age. Common conditions in infants include development dysplasia of the hip and club foot. The incidence of cerebral palsy is increasing. Limb deficiency, although rare, it is an important part of the orthopaedic service.

In older children, hip conditions are becoming more prevalent. An increasing number of adolescents are diagnosed with slipped capital femoral epiphysis (SCFE) which is associated with obesity. Generally SCFE is diagnosed late exposing the young person to require larger interventions to reconstruct the hip. Adolescents present with a variety of knee conditions some related to sports.

SCHN provides the paediatric spinal deformity services for NSW. Adolescent Idiopathic Scoliosis is the most common spinal deformity seen. Some are likely to require surgery, however bracing performed by a skilled and experienced orthotists working with the surgeon is an effective treatment.

Surgical resources are heavily utilised and may need expanding.

The sustained year on year demand for both orthopaedic outpatient and ambulatory services has resulted in significant strain on the available physical space. The available clinic and patient waiting space is limited with overcrowding of public spaces with lack of privacy as well as poorly configured to accommodate current and future demand.

There is a requirement to increase the number of inpatient beds to meet current and future demand.

Burn Service

The CHW Burn Service is the tertiary referral centre for all major paediatric burn injury patients in NSW providing initial assessment and management of children with a burn injury. The CHW Inpatient Unit and the Burns and Plastics Treatment Centre have strong relationships with the state adult Burns Services at Concord and Royal North short Hospitals as part of the Agency for Clinical Innovation (ACI) Statewide Burn Injury Service Network.

In 2016/17 there were approximately 5,573 Emergency Department presentations to NSW hospitals of children aged 15 years and under with a burn injury. The youngest age group 0 -4 years has the highest rate of burn injury in any age group.

The causes, assessment and management of burn injury in children are different to burn injury in adults and the CHW Burn Service provides high quality and family-centred care within a multi-disciplinary approach and collaborates with supporting services including intensive care, surgery, pain management, reconstruction and rehabilitation.

Major burns in children a relatively uncommon and unpredictable occurrence and often patients require a stay in the Intensive Care Unit with multiple admissions for on-going treatment for surgical and follow-up care. The majority of patients, however, are seen/consulted and managed through the two models of care:

- The Burns and Plastics Treatment Centre (BPTC). The only Nurse Practitioner led multi-disciplinary specialist procedural clinic for the management of paediatric burn injury. The BPTC is collocated with the inpatient unit.
- Kidburns Telehealth service.

The models of care provide holistic, timely and efficient access to services for patients attending CHW and support greater collaboration with LHDs to provide care closer to home. The implementation of these models has resulted in reducing the length of stay of children with a burn injury and increased the use of paediatric ambulatory care clinics in LHDs.

In addition to the provision of clinical care the Burns Service is engaged in the conduct of professional and community education including the Emergency Management of Severe Burns conducted by the Australian and New Zealand Burn Association. The Children's Hospital Burn Research Institute has developed clinical and laboratory based burns research on the foundation of the Hospital's clinical track record.

In 2016/17 CHW reported 432 inpatient separations and 995 bed days for burn injury and over 500 presentations to the Emergency Department.

Table 56 – Burn Service inpatient activity summary 2012/13 to 2016/17

Category	Stay Type	2012/13	2016/17
Inpatient**	Separations	419	432
	Bed days	1161	995
Emergency#	Presentations	456	516
Service Events++	BPTC	1,193	1,126

*** MoH CaSPA FlowInfo V17.0 (excl entirely within ED) AR-DRGs Y01Z to Y62B #MoH Emergency Department AA 2017 ++ SCHN HIE*

Challenges and opportunities

The nature and un-predictability of a child with a major burn generally requires admission to a Paediatric Intensive Care Unit, often for extended periods of time. The nature of the emergency and initial patient treatment is dependent on critical care. Lack of access to a PICU bed is an important issue for the CHW Burn Service.

Surgical intervention including burn excision and grafting is frequently indicated for the management of burn injury and have significant impact on the final outcomes for the patient. Outcomes of children with a burn injury have improved significantly over the past decade. Advances include skin substitutes including epithelia autograft and advances in clinical practice and technologies have enabled patients to be managed on an ambulatory basis.

Timely access to the operating theatre is critical particularly in terms of serial surgical interventions are required. The provision of a dedicated operating room collocated with the Burn Care facility as the preferred model facilitates effective and efficient burn care.

Whilst the ambulatory model of burn management reduces the length of stay it does not reduce the time to heal or the need for often intensive intervention, treatment and rehabilitation by the multidisciplinary team.

The increased use of dermal substitutes for deep and full thickness burns require application in the operating theatre environment and the increasing use of LASER treatment for burn scar management has resulted in a requirement for additional operating theatre time and lists.

Sustaining an appropriately skilled workforce and succession planning are particular issues for any burn service. In paediatrics the multidisciplinary team is large and highly specialised compared with adult services and includes child life therapists and school teachers in the team.

The high cost and often lengthy duration for treatment of burn patients. A significant proportion of children will require years of scar management often well into adulthood. This includes emotional recovery of both the child and the family.

The lack of knowledge and skill in the management of children with a burn injury in the community impacts on the patient outcomes particularly in relation to burn dressing application, pain management and correct fitting of compression garments.

Strategic response

1. Further development of a comprehensive model of care for the child with a burn injury, particularly for the cohort of patients with a severe burn injury in consultation with ACI and research.
2. Collocate the ambulatory and procedural burn treatment facility in proximity to the operating theatre suite and burn inpatient beds to maintain the optimal model of care for the management of paediatric patients with a burn injury and support the principle of bring services to the patient/family.
3. Access to the operating theatre environment for complex burn surgical management and for the ongoing surgical management of grafting and reconstructive surgery.
4. Development of a succession planning strategy for Burn Service workforce including medical, nursing and allied health professions.
5. Creation of a step-down rehabilitation services for paediatric burns patients (similar to the facility at Ryde Rehabilitation for adults).
6. Expand the Kidburns Telehealth Program.

Plastics & Reconstructive Surgery

Plastics and Reconstructive Surgery is designated as a role delineation Level 6 service providing consultative, surgical and non-surgical management of a wide variety of deformities in children such as birth defects and deformities due to trauma, cancer and disease. This also includes soft tissue trauma, congenital abnormalities of a diverse range e.g. cleft, naevi, vascular anomalies, microtia, craniofacial surgery, burns and hand surgery. The Service works in the multidisciplinary team approach and in collaboration with other clinical teams in the hospital.

The Plastic and Reconstructive SRG provides shows that over the five-year period separations have increased by 6% from 1,050 to 1,115 and bed days increased by 1% from 1,835 to 1,857.

It should be noted however that a portion of patients in this SRG were admitted by other clinical teams including general surgery. Conversely patients admitted by the Plastic Surgery team are included in other SRGs including Non-subspecialty Surgery and ENT, Head and Neck.

Table 57 – SRG 51 - Plastic & Reconstructive Surgery 2012/13 & 2016/17

INPATIENT ACTIVITY		2012/13	2016/17	Change (%)
Separations	DO	589	705	20%
	O'night	461	410	-11%
	Total	1050	1115	6%
Bed days	DO	589	705	20%
	O'night	1246	1152	-8%
	Total	1835	1857	1%

Source: *MoH CaSPA FlowInfo V17.0 (excl entirely within ED)*

In 2016/17 63% of separations were day-only and the average length of stay for overnight stays was 2.8 days. 30% (334) of separations were unplanned / emergency and 83% (929) of separations were classified as specialist paediatric. Within Plastics and Reconstructive Surgery SRG there are four ESRGs:

- Other plastic & reconstructive surgery (ESRG 519) had the highest number of separations (564) and bed days (868)
- Skin, subcutaneous tissue & breast procedures (512) had 284 separations and 347 bed days
- Macrovascular tissue transfer/skin grafts (ESRG 511) had 225 separations and 528 bed days
- Maxillo-facial surgery (ESRG 513) had 42 separations and 121 bed days.

Challenges and opportunities

The Plastics and Reconstructive Surgery caseload is increasing as more patients present to CHW for specialist care including trauma, correction of deformities and patients with craniofacial conditions.

The cohort of patients with complex conditions and requiring on-going surgical intervention and therapies is growing and a significant proportion of children will require treatment into adult hood. There is a requirement to provide appropriate coordination of care.

Maintain a skilled workforce is an important issue for this service. Attracting and retaining consultants is a risk in parallel allied health including speech pathology.

Strategic response

1. Development of a workforce plan for medical, nursing and allied health staff and active succession planning for Plastics and Reconstructive Surgery Service.
2. Improved administrative and nurse co-ordination support for patients with complex needs

Ear, Nose and Throat

The Department of ENT Surgery is designated as a role delineation Level 6 service a providing surgical and non-surgical management of children with a wide range of conditions including complex airway surgery for babies and young children.

Table 58 – SRG 48 – ENT & Head and Neck

INPATIENT ACTIVITY		2012/13	2016/17	Change (%)
Separations	DO	712	622	↓13%
	O'night	747	612	↓18%
	Total	1459	1234	↓15%
Bed days	DO	712	622	↓13%
	O'night	1428	1487	↑4%
	Total	2140	2109	↓1%

Source: *MoH CaSPA FlowInfo V17.0 (excl entirely within ED)*

The data indicates that CHW inpatient ENT, Head and Neck has declined over the period 2012/13 to 2016/17 - Separations have declined from 1,459 to 1,234 (13%) and bed days from 2,140 to 2,109.

In 2016/17 there were 11,000 inpatient separations in the private sector for children 15 years and under for tonsillectomy & adenoidectomy and Myringotomy w tube insertion.

In 2016/17 50% of CHW separations were day-only and the average length of stay for overnight stays was 2.4 days compared with 1.9 days in 2012/13. Over half of patients are classified as specialist paediatric and only 17% of patients were unplanned/emergency. 68% of separations were surgical.

Within the ENT and Head and Neck SRG there are five ESRGs:

- Other procedural ENT 9ESRG 489) had the 539 separations and 1,014 bed days.
- Non-procedural ENT (ESRG 483) had 98 separations and 660 bed days
- Myringotomy w tube insertion had 138 separations and 171 bed days
- Tonsillectomy and adenoidectomy (ESRG 481) had 129 separations and 166 bed days
- Head and Neck Surgery (ESRG 484) had 30 separations and 98 bed days.

Challenges and opportunities

The ENT Department by strict triaging accepts only those children requiring tertiary paediatric care and those who are residents in the CHW local catchment. There is a significant unmet demand for the ENT service. Some thirty requests for clinic appointments are declined each week. The wait list for an ENT clinic appointment is over 6 months and for most surgeries the wait is over 12 months.

As a consequence patients managed by the service are more complex and require more intensive medical management. In addition, the casemix of patients is changing. ENT surgery for infant airway reconstruction is increasing. Obstructive Sleep Apnoea is most appropriately managed with surgical intervention and post-operative monitoring in the PICU for at least the first night post tonsillectomy. Access to PICU beds is an issue for the service.

Availability of appropriate accommodation for clinical and non-clinical workforce has been a long standing issue for the Department. There is an urgent need for this issue to be addressed.

Strategic response

1. Improved access to intensive care for ENT patients
2. Recruitment of an ENT Clinical Nurse Specialist
3. Provision of clinical and non-clinical space for the ENT Department as part of facility planning for the hospital

Ophthalmology

The Ophthalmology Service is designated as a role delineation level 6 service providing ophthalmology and orthoptic services and the management of a range of complex and non-complex conditions.

The Ophthalmology multi-disciplinary team includes medical (ophthalmologists and registrars), orthoptists, Clinical Nurse Consultant and Administrative staff. Services comprise:

- Ophthalmology OPD and surgical and consultative services; and
- Orthoptics for assessment of vision, visual fields, binocular vision, eye movement, OCT and electrophysiology.

Current activity profile

In 2016/17 there were 1320 Emergency Department presentations with an ophthalmic related diagnosis (ICD 10-AM Chapters 7 & 19). Over the five year period ED presentations have increased by 25% from 1060 in 2012/13. Generally over 80% of children presenting to the ED are treated and discharged.

The majority of CHW ophthalmic-related admitted activity is categorised as specialist paediatric – 93% of total separations, 83% of medical separations and 98% of surgical separations. Ophthalmic admitted activity has increased over the five year period 2012/13 to 2016/17 - separations have grown by 10% from 810 to 890 and bed days by 3% from 1,162 to 1,197.

Table 59 – SRG 50 – Ophthalmology-2012/13 & 2016/17

INPATIENT ACTIVITY		2012/13	2016/17	Change (%)
Separations	DO	626	708	13%
	O'night	184	182	-1%
	Total	810	890	10%
Bed days	DO	626	708	13%
	O'night	536	489	↓9%
	Total	1162	1197	↑3%

Source: *MoH CaSPA FlowInfo V17.0 (excl entirely within ED)*

60% of patients are aged 0 – 4 years, 26% aged 5 – 9 years, 11% were aged 10 to 14 years and 4% aged 15 years plus. Children living in WS and SWS Local Health Districts account for the highest number of separations (410 of 890 separations in 2016/17).

Surgical activity accounts for some 60% of ophthalmic-related inpatient separations with the majority of procedures being planned and performed as a day-only admission (408 separations in 2016/17 compared with 382 in 2012/13) with strabismus, lens and lacrimal duct procedures comprising the largest number of cases.

Ambulatory Ophthalmology Services are located in a dedicated venue accommodating the Eye Clinic and the Orthoptic Service. In 2016/17 there were 6,279 non admitted patient service events reported for the services.

Table 60 – Ophthalmic related Non Admitted Patient (NAP) Activity

Tier2Name	Service Unit Name	2012/13	2016/17	Change (%)
Ophthal	Eye STEPS	461	529	15%
	Ophthal	3299	3080	-7%
	Total	3760	3609	-4%
Orthoptics	Orthoptics Clinic	843	2670	Sig %
Service Events		4603	6279	36%

Challenges and opportunities

The demand for ophthalmology and orthoptic services is increasing with a lack of paediatric ophthalmic services in the community and LHDs. The complexity of cases being treated by the Ophthalmology services has increased significantly due to effective triaging of referrals and improvement in management of complex conditions.

Ophthalmology is increasingly dependent on high quality imaging wide field or OCT to management patients. There is a requirement for functional visual field studies. Visual field and visual electrophysiology requires dedicated time and an aim of completing these test of the same day as the clinical appointment, particularly for visual field and for the VEP service for optic pathways gliomas and craniofacial anomalies. Existing equipment and current level do not enable this development.

In addition to public hospitals, there is a proportion of paediatric ophthalmology inpatient activity being undertaken in the private sector. There were 801 private sector separations in 2016/17 and a casemix including strabismus procedures (338), other eye procedures, minor complexity (151) and lacrimal procedures (116).

Strategic response

1. A focus on tertiary level services for ocular oncology, complex uveitis craniofacial, congenital cataract, optic pathway glioma, inherited conditions and extremely premature babies.
2. Funding for replacement of ophthalmology equipment
3. Enhance the electrophysiology service and provision of slit lamp imaging to facilitate transition to electronic medical record.

10.1 Peri-operative Service

The Operating Suite comprises ten (10) rooms - nine (9) operating rooms and one (1) procedure room. With the exception of the procedure room each operating rooms has a collocated anaesthetic induction bay. The Operating Suite complex is collocated with Post Anaesthetic facilities (Middleton Ward Day Surgery Unit and Todman general recovery) comprising a total of 29 recovery spaces.

Models of care and current activity

Surgical procedures are undertaken in CHW Operating Suite as an emergency or planned procedure. Operating Theatre sessions are scheduled from Monday to Friday with emergency services provided over hours. The following summarises OR activity over the five year period 2012/13 to 2018/19.

In 2016/17 the specialties of general surgery, orthopaedics and plastics accounted for 6,486 cases (45%) of the Peri-operative service activity. The specialties of Imaging, Cardiac Catheter and interventional accounted for 2,253 cases, 16% of total activity.

Challenges and opportunities

The major challenges confronting the Peri-operative service are related to:

The size and configuration of the Surgical Service. There is an urgent need for the expansion and reconfiguration of the CHW Surgical suite. The operating theatre suite is over 20 years old and the size and configuration of the operating rooms no longer support the increasing number and complexity of surgical procedures.

The growth of bed days (particularly in the context of unchanged separation numbers) and average anaesthetic times per theatre attendance support the analysis of growing complexity in the surgical caseload at CHW.

Surgical activity measured by separations and theatre attendances has remained flat or is decreasing. During this time period, the number of operating theatres remains unchanged and there have been small improvements in overall theatre utilisation. Additionally, there have been a number of strategies used to redistribute surgery to the private sector or local hospitals. This indicates that surgical activity within the current model is maximised and the lack of growth in separations and theatre attendances does not fully illustrate the growing demand of surgery in CHW.

Ability to adopt demand management strategies. Development of a "hub and spoke" model for General Surgery to conduct non-tertiary surgery in "spokes" closer to home for patients. This model involves a CHW surgeon operating in a local hospital, and the supported development of paediatric anaesthesia for that hospital. As the number and maturity of the "spokes" develop, it is expected that the number of planned, non-tertiary and primarily day only general surgery will reduce or experience slower growth rates at CHW.

Private sector involvement for non-tertiary, day-only surgery. In 2015/16, there were 41 documented cases of children who had their surgery conducted a private facility after being referred to CHW. All of this work has been day only and currently focussed on the specialties of General Surgery, Ophthalmology, Orthopaedics and Plastics. In 2016/17, the number is expected to be significantly higher and again will have a negative impact on the overall growth of the specialties involved at CHW.

Outpatient clinic referral acceptance. A number of surgical outpatient clinics including ENT and Ophthalmology only accept referrals from local General Practitioners as part of a demand management strategy. This represents an aspect of unmet demand for surgical services at CHW. In 2015/16, 643 ENT outpatient referrals (or 51% of all ENT referrals) were declined due to being out of area or appearing to be a non-tertiary referral.

Other major impacts on demand for surgical services includes population growth, particularly in the 0-4 year age group and in the CHW catchment, and these will continue to be the primary driver of demand for surgical services provided by CHW.

Other factors contributing to demand include

- Flow-on effect of the projected increase in Emergency Department presentations and emergency surgical admissions
- Increase in the volume of surgical activity arising from the increase in critically ill neonates admitted to the neonatal ICU and requiring complex surgery particularly cardiac related procedures.
- Ongoing role of CHW as a state-wide role for the management of paediatric burn injury
- Ongoing state-wide role of CHW for trauma, burns, and spinal care, all of which have significant impacts on surgical bed days.
- Ongoing role of CHW as a NFC for liver transplant.
- Ongoing role of CHW for cardiac surgery

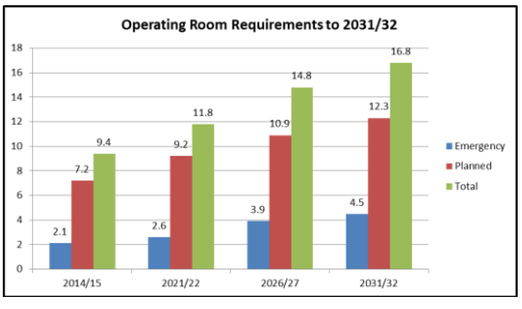
Strategic response

The methodology used for the operating theatre projections uses the following formula:

OTs required =Total projected minutes for all surgery
Total projected minutes available per theatre

The method produces a base case projection of planned and emergency theatres, which is then modified in line with clinical consultation. In terms of planned activity, all of these modalities run 8 hours per day, Monday to Friday. Whilst emergency activity can occur at any time, 96% of emergency surgery occurs between 8am-6pm.

Figure 14 – Operating Room requirements to 2032



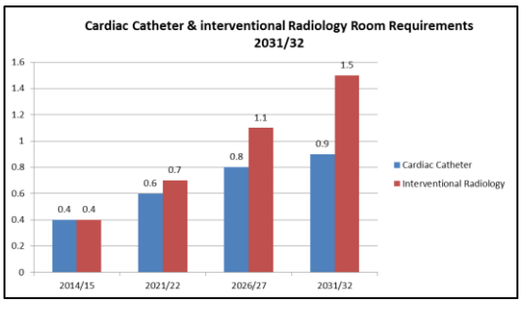
The projected growth in operating rooms is largely driven by what has been identified in the demand drivers specifically to the:

- Increasing proportion of emergency surgery.
- Increasing theatre times per case associated with growing surgical and anaesthetic complexity.

In addition, there has been a minor attempt to address the unmet planned surgical demand within these projections.

A similar method was used to project catheter lab and interventional radiology. Interventional radiology in particular has shown significant growth in cases and lab time, with expected ongoing extraordinary growth due to the preference for non-invasive methods of surgery where applicable.

Figure 21 – Cardiac Cath and IR projections



10.2 Anaesthetics

The Anaesthesia Department is a role delineation Level 6 service providing a comprehensive service for neonatal and paediatric patients undergoing general, complex major and high specialised surgical procedures including cardiothoracic surgery, neurosurgery, organ transplantation and major trauma. The Department manages patients at the highest level of surgical risk

- Providing anaesthetic services for patient in the Medical Imaging Department for CT scans and MRI scans, in the Cardiac and Neurovascular Suite for diagnostic and interventional procedures and in the Oncology Treatment Centre.
- Providing a Malignant Hyperthermia Diagnostic Service (one of only three in Australia) supported with limited funding (2 sessions per week). The Malignant Hyperthermia testing facility (comprising a patient management system, database, phone consultation service, wet lab and research office space) is accommodated within the Department.
- Providing consultant cover for the acute pain management service and support and advice to various clinical services within the hospital.
- Providing Registrar or Fellow cover for out-or-hours pain management, resuscitation, difficult venous access on inpatient wards and Fellow cover (full time, Monday to Friday) for procedural sedation of children requiring treatment for burn injury.
- Providing leadership and support to hospitals and clinician in other Local Health Districts with regard to paediatric anaesthetic and pain management.

Service delivery model

The service delivery model for procedural activity on a weekly basis includes:

- Approximately 112 anaesthesia sessions (Monday to Friday). The majority (approximately 80%) are allocated to individual surgeons. Approximately ninety of all scheduled sessions are provided within the Operating Room Suite and twenty in remote locations.
- Eleven (11) sessions allocated to emergency bookings.
- Three (3) sessions allocated to a "late booking service" for general surgery (ESS) and orthopaedics (OTL).
- Similarly, four (4) sessions to the burn service and two (2) to the oncology service.

The breakdown of allocation (averaged over a four week cycle) is summarised as follows.

Emergency Operating Room access is provided out-of-hours. Pre-admission clinics are staffed for four (4) sessions per week. The majority of the non-operating room activity is the result of the increasing MRI procedures, interventional radiology and cardiac catheter procedures being performed and requiring a general anaesthetic or sedation.

Table 61 – CHW Anaesthesia sessions - summary

Specialty	Sessions per week	Specialty	Sessions per week	Specialty	Sessions per week
Emergency	10.75	Orthopaedic T List	3	Interventional Radiology	4
General	17.25	Emergency Surgical Service	3	Cardiac Catheter	4
Neurosurgery	3.5	Oncology	2	Medical Imaging - MRI	5.5
Cardiac	10	Burns	3.75	Medical Imaging - CT	0.25
Spinal	4.75	Laser	1.25	Bronchoscopy	0.25
Orthopaedics	10.75	ENT	8.25	Gastroenterology	1.5
Plastics	4	Ophthalmology	3.5	Wait list	0.25
Dental	1.5	Craniofacial	1.75	Gynaecology	0.5
Urology	2	CVAD	0.75	Post Acute Care	4

Table 62 – Anaesthesia activity undertaken outside of the OR

Location	2012/13	2014/15	2016/17	Location	2012/13	2014/15	2016/17
Cardiac Catheter	248	290	268	Neurovascular	454	0	0
Medical Imaging – CT	306	272	341	Oncology TC	0	0	523
Interventional Radiology	0	529	439	Total	2,220	1,223	2,870
Medical Imaging – MRI	1,212	1232	1,299				

Challenges and opportunities

Total anaesthetic activity continues to grow with a sustained growth in service demand as a consequence of:

- The increase in cardiac surgery cases, particularly in critically ill neonates in whom corrective surgery is being performed earlier.
- The proposed expansion of the cardiac surgery program to include heart transplantation which will have a significant impact on the Department.
- An increase in the number of indications for MRI requiring a general anaesthesia.
- The increasing complexity of surgical cases including complex spinal surgery and multi-level orthopaedic surgery in toddlers and older children.
- The growth in the number of liver transplants being performed.
- Increasing complexity of the interventional radiology procedure requiring
- Vascular access service including the servicing of HITH cases and supporting PICU and NICU.
- Research into new therapies including protocol-driven access to anaesthesia, for example access to GA/MRI scanning for new therapies for spinal muscular atrophy and achrondroplasia and for pre-cardiac surgery assessment.

The constraints of the hospital physical environment are particular challenges in clinical management of neonates and children requiring anaesthetic support and the functioning of the Anaesthesia Department

- The Peri-operative suite is utilised beyond maximum capacity. The Operating Rooms are now below Australian standards.
- There is no capacity for cross-modality (hybrid) intervention within the Suite resulting in the need for infants and children being transported whilst anaesthetised along public corridors between the OR and Medical Imaging for interventions.
- Neither the NICU nor PICU have bed spaces large enough to allow bed-side surgical intervention. Critically ill babies and children are transported to the OR Suite when bed-site care is appropriate.
- The remote Interventional Imaging/Cardiac Catheter Suite does not have a post-anaesthetic recovery area resulting in in-efficient patient transfers that disrupt the flow of operative lists.
- The Department's physical environment is undersized, poorly configured and chronically over-capacity for the clinical workforce. This situation has made recruiting and retaining full-time paediatric anaesthetists extremely difficult with a significant impact on staff morale.

The commissioning of CHW Stage 1 in the CASB and impact on the Department providing services of paediatric patients in the additional operating theatres, Emergency Department and Medical Imaging facilities in the building together with service provision in the existing CHW operating rooms, Medical Imaging , Catheter and Interventional Suite.

Strategic response

1. For anaesthetics the models of care for the future will be characterised by recognition of the increased out of Operating Theatres workload which is appropriately measured and staffed.
2. The development of the Peri-Operative Model of Care for paediatric surgical and procedural services in the CASB will include the provision of anaesthetic services by CHW.
3. Anaesthesia service requirements will be incorporated in the development of models of care for the day-to-day operations of the paediatric services in the CASB as part of the transitioning and commissioning process this includes resuscitation, pain management and trauma management
4. The workforce requirement s for Anaesthesia Department to provide services in the CASB will be addressed as part of the transitioning and commissioning process for Peri-Operative Service workforce planning.

10.3 Organ transplant

CHW accommodates a significant and growing organ transplantation program including kidney and liver transplants.

Over the fifteen year period 2001/02 to 2016/17 CHW performed 340 organ transplants – 210 liver transplants and 130 kidney transplants. The annual number performed ranged between 11 and 28.

Liver Transplant

Liver disease in children is a challenging and complex disease which impacts significantly on their lives children and on their families. Clinical indications, risk assessment and surgical technique for liver transplant in children is different to adults.

In young children biliary atresia is the most common condition leading to transplantation. When diagnosed at birth the treatment of choice is Kasai portoenterostomy. Acute liver failure, metabolic conditions, choleangitis and intractable pruritis, hepatoblastoma, liver tumours and re-transplantation are other indications for transplant.

The Australian Nationally Funded Centres (NFC) Program for paediatric liver transplantation comprises three centres – Sydney Children's Hospitals Network (Westmead NSW), Royal Children's Hospital (Victoria) and Queensland Children's Hospital (Queensland).

Over the five-year period 2012/13 to 2016/17 CHW reported a total of 88 liver transplants. The bed days utilised ranged from 542 bed days in 2014/15 to 803 days in 2012/13.

Of the 88 separations:

- 56 (64%) were aged 0 to 4 years, 20 were aged 5 to 9 years, 11 were aged 10 to 14 years and 1 aged 15 years and over
- 26 patients (30%) were interstate residents, 13 were residents of WSLHD, 9 from SWSLHD and 8 from HNELHD.

Kidney Transplant

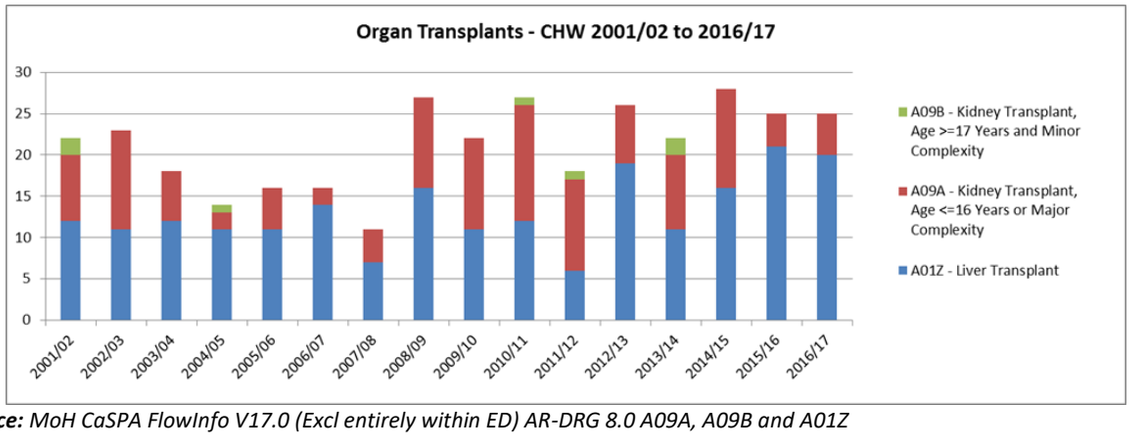
Kidney failure is relatively uncommon condition in children and the causes that lead to chronic renal disease are different to those in adults. . Most commonly kidney failure is caused by a hereditary condition, nephrotic syndrome and polycystic kidneys, reflux nephropathy or glomerulosclerosis. Treatment options for renal failure include haemodialysis, peritoneal dialysis and transplantation.

Kidney transplantation has become the treatment of choice for children. Over the five year period 2012/13 to 2016/17 a total of 39 kidney transplants were performed at CHW and bed days utilised ranged from 36 days in 2015/16 to 112 in 2014/15.

Of the 39 separations:

- 13 (33%) were aged 0 – 4 years,9 were aged 5 to 9 years, 9 were aged 10 to 14 years and 8 were aged 15 years and over.
- 16 patients were residents of SWSLHD and WSLHD and 4 were interstate residents.

Figure 15 – Organ transplants 2001/02 to 2016/17



Source: *MoH CaSPA FlowInfo V17.0 (Excl entirely within ED) AR-DRG 8.0 A09A, A09B and A01Z*

Table 63 – Organ transplant patients by age 2001/01 to 2016/17

Age	2001/02	2002/03	2003/04	2004/05	2005/06	2006/07	2007/08	2008/09	2009/10	2010/11	2011/12	2012/13	2013/14	2014/15	2015/16	2016/17
0-4	6	12	9	8	7	13	6	13	10	13	5	16	8	18	12	15
5-9	6	3	3	4	4	0	3	3	8	3	8	6	5	6	7	5
10-14	5	4	4	0	4	2	2	10	1	8	1	3	3	4	5	5
15-19	5	4	2	2	1	1	0	1	3	3	4	1	6	0	1	1
Total	23	23	18	14	16	16	11	27	22	27	18	26	22	28	25	26

Table 64 – Liver transplants 2012/13 to 2016/17

INPATIENT ACTIVITY	2012/13	2013/14	2014/15	2015/16	2016/17	Total
Separations	19	11	16	21	21	88
Bed days	803	690	542	790	796	3621
Average length of Stay	42.2 days	62.7 days	33.9 days	37.6 days	37.9 days	

Source: *MoH CaSPA FlowInfo V17.0 (Excl entirely within ED) AR-DRG 8.0 A01Z – Liver transplant*

Table 65 – Kidney transplants 2012/13 to 2016/17

INPATIENT ACTIVITY	2012/13	2013/14	2014/15	2015/16	2016/17	Total
Separations	7	11	12	4	5	39
Bed days	93	94	112	35	39	373
Average length of Stay	13 days	8.5 days	9.3 days	8.8 days	7.8 days	

Source: *MoH CaSPA FlowInfo V17.0 (Excl entirely within ED) AR-DRG 8.0 A09A and A0B Kidney Transplant*

Challenges and opportunities

The cohort of children who are the recipients of organ transplantation and being managed by the relevant specialist services is growing annually. Children are being transplanted a lot younger and even in the newborn period for liver transplant

Long term survival after organ transplant implies life-long aftercare in an interdisciplinary team.

Children who are organ recipients have a longer life expectancy as compared with adults, have a longer period of a cumulative effect of immunosuppressive drugs and therefore impact on growth, risk of infection and cancer and quality of life.

Organ transplantation in children and adolescents can have significant psycho-social implication for the child and their families including parental anxiety and family instability. Young patients are particularly dependent on caregivers for all aspects of ongoing care including administration of complex medication regimens.

Adolescents transitioning to adulthood is a major issue for organ recipients and for the multidisciplinary team. Adolescents are prone to risk-taking, may engage in non-adherence to immunosuppression medications, have a pre-occupation with body image or have undiagnosed anxiety or depression.

The increase in organ donation has been a significant advance in ensuring that more children have access to transplantation. The availability of multiple organs for transplant and concurrent transplantation for more than one recipient increases demand on the hospital's surgical service, the transplant team and intensive care services.

Strategic response

1. Explore the feasibility of establishing a Paediatric Centre of Excellence for Organ Transplantation to better coordinate liver and kidney transplant services and support education and research.

2. Undertake detailed planning to expand the organ transplantation service to include heart transplantation.

10.4 Challenges and opportunities for the Surgical Program

Responding to the increased demand relate to population growth particularly in the 0 to 4 year old age group and the hospital's role as the provider for non-specialist paediatric surgery to the local catchment whose paediatric population is projected to significantly increase.

A significant issue for the CHW surgical program is the increasing volume of highly specialised and complex surgery for a growing cohort of neonates and children surviving critical illness and requiring long term surgical interventions or follow-up.

The CHW Cardiac Service has indicated an intention to expand its surgical program to include cardiac transplantation. This development will increase the complexity of the procedures being performed in the operating suite and will require robust clinical service and workforce planning moving forward.

Over the past five years CHW has seen a significant increase in the number of children receiving kidney and liver transplants as a result of an increase in organ donation. The availability of multiple organs for transplant and concurrent transplantation for more than one recipient frequently requires urgent and concurrent access to two large operating rooms and transplant teams. This has implications for the service delivery in terms necessity to delay or reschedule surgical cases and impact on workforce availability.

The projected increase in Emergency Department presentations includes emergency surgical admissions. A strategy has been developed to reorganise the operating room scheduling to facilitate more timely patient access for emergency surgery. In addition the establishment of the Acute Review Clinic (ARC) has enabled children to be presenting the emergency department to be reviewed the following day and surgery conducted as a planned procedure or the patient referred to other services for followup.

The demand for surgical beds fluctuates significantly across the week. 75% of surgical activity is planned and whilst access to inpatient beds is more predictable, the demand for surgical beds over seven days is less predictable.

Projections of surgical / procedural activity indicate that in 2030/31 9,749 separations will have a length of stay of 2 nights or less with a growth of 46% since 2016/17. Bed days are projected to increase by 20% over the period.

Table 66 – Short Stay Episodes Projected

	EPISODES				
	16/17	20/21	25/26	30/31	%Δ
	Actual	Projected			
DO	4,348	5,328	5,869	6,535	50%
ON	2,317	2,320	2,983	3,214	39%
Total	6,665	7,648	8,852	9,749	46%

Source: *MoH CaSPA FlowInfo V17.0*
Surgical/Procedural (excl entirely within ED)

Table 67 – Short Stay Bed days Projected

	BED DAYS				
	16/17	20/21	25/26	30/31	%Δ
	Actual	Projected			
DO	4,348	5,238	5,869	6,535	50%
ON	2,767	3,082	3,305	3,608	17%
Total	7,114	8,410	9,172	10,143	20%

As part of the planning process for the future configuration of the peri-operative service and implementation of the new model of care for paediatric surgery as part of the commissioning of the CASB, the establishment of a Short Stay Surgical Unit (SSSU) in CHW Stage is considered integral to improving the surgical experience for the child and family.

Strategic Response

1. Embedding and expansion of the paediatric surgical model of care developed and implemented as part of the introduction of paediatric surgery in the CHW Stage 1 expansion in the CASB in particular the short-stay surgical streaming model.
2. Increase access to the operating room suite to manage the current and future demand for gastroscopies
3. Participation in the expansion of the HITH program as a demand management strategy
4. Enhancement of partnerships with other LHDs to provide non-specialist paediatric surgery locally, particularly in metropolitan Sydney, as a hub-and-spoke model.

11. DIAGNOSTIC PROGRAM

The Diagnostics Program comprises the clinical services of:

- Medical Imaging
- Nuclear Medicine
- Interventional Radiology
- Pathology
- Genetics

In 2016/17 the Diagnostics Program report 13,228 Non-admitted Patient (NAP) Service Events.

Table 68 – Diagnostics Program Service events 2016/17

Division - Clinic	Department - Clinic	Number
Diagnostics - Imaging	Medical Imaging	20
Diagnostics - Pathology	Allergy & Immunology	4430
	Clinical Genetics	807
	Haematology	1885
	Infectious Diseases & Microbiology	84
	Institute of Endocrinology and Diabetes	5446
	Western Sydney Genetics Program Admin	556
Total		**13,228**

Source: *SCHN MSAU Modality In-person and In-person Group Only*

11.1 Medical Imaging

The Medical Imaging Department is a role delineation level 6 service providing diagnostic and interventional services and encompasses general radiology, computed tomography (CT), magnetic resonance imaging (MRI), ultrasound and fluoroscopy. In addition to the provision of medical imaging to CHW patients the Department:

- Performs radiological examinations, particularly MRI, for neonates admitted in the Westmead Hospital Neonatal Intensive Care Unit;
- Provides consultative support to other LHDs with regard to paediatric imaging including specialist interpretation of medical imaging scans; and,
- Accepts referrals from general practitioners and paediatricians across the State.

The current Medical Imaging modalities portfolio comprises:

- **CT Scanner** – Siemens Force CT x 1
- **MRI Scanner** – Siemens 3.0 T x 1, Toshiba 1.5 T x 1
- **General X-Ray** – Fixed x 3, mobile x 4
- **Ultrasound** – Fixed x 3, Mobile x 1
- **Dental OPG** x 1

Models of care and current activity

The Medical Imaging Department operates a diagnostic and interventional imaging service within a specialty and subspecialty framework. Specialties include musculoskeletal, chest and neurosurgery/neurology.

Most paediatric imaging is centred on general radiography and ultrasound and the largest proportion of activity is from inpatient wards/intensive care unit.

A proportion of children undergoing an imaging procedure require sedation or a general anaesthetic particularly for critically ill patients, where procedures are complex, for young children or patients having repeat or serial scans. The Department of Anaesthesia supports the service and anaesthetic induction and first stage recovery facilities are collocated with the CT and MRI zones of the Department.

To support service delivery to children undergoing an MRI scan the Child Life Therapy Department has developed and established an education program using a mock MRI scanner. This program conducted over several years has been successful in significantly reducing the number of general anaesthetics for MRI procedures.

The Medical Imaging Service is integral to the provision of diagnostic, medical and surgical services. The demand for imaging and prompt reporting has increased over the five year period 2012/13 to 2016/17. Medical imaging activity has increased by 5% and X-Ray procedures account for two-thirds of total activity with an increase of 12%.

The average number of medical imaging procedures has increased from 4,987 per month in 2012/13 to 5,212 in 2016/17. The reduction in activity in December – January reflects the decline in planned hospital activity over the holiday.

Demand for medical imaging services, particularly chest X-Rays, peaks in June and July and associated with seasonal outbreaks of respiratory conditions particularly in babies and toddlers.

Challenges and opportunities

The increasing demand on Medical Imaging Services is the major challenge as a consequence of the increase in Emergency Department presentations and inpatient admissions and as models of care change.

To manage future demand there is a need to procurement of new and medical imaging equipment including EOS, PET/MRI, baby CT-Scanner and Ultrasound.

Private medical imaging services are reluctant to cater for challenging behaviours (eg autism) and increasing workload for CHW including increasing number of children having procedures under general anaesthesia.

The existing dislocation of the 1.5T MRI from the 3.0 MRI Suite and the remainder of the Medical Imaging Department creates inefficiencies and should be rectified

There is a need to upgrade and replace medical imaging technology such as general and mobile x-ray equipment and digital radiography.

Respiratory Medicine and Orthopaedics account for a significant proportion of the hospital's activity and are the primary contributors to the volume of Medical Imaging activity. The increase in Orthopaedic related activity has impacted on the Department's infrastructure with waiting area overcrowding and overflow into the adjacent corridors.

Medical imaging activity projections, undertaken as part of the planning process of the CHW Stage 1, indicated a 33% increase in total activity to 2021/22 and a further 50% to 2031/32.

To support the paediatric services in the CASB and provide an integrated service delivery model for patients and their families, medical imaging and pharmacy services has been incorporated in the design of level 2. Medical imaging services will be provided in a shared facility catering for paediatric and adult patients.

Critically ill neonates accommodated in the NICU and require an MRI are transferred to the Medical Imaging Department. Indications for neonatal MRI is expanding, the increase in the number of neonates admitted to the NICU and the increasing acuity of patients are contributing to the increased demand for MRI scans. The development of the neonatal MRI system and adoption by

Strategic response

1. The CASB shared Medical Imaging to incorporate imaging modalities to for the provision of paediatric services to 2031:
    - 2 x general X-Ray (1 room fully fitted out)
    - 2 x ultrasound (1 room fully fitted outed)
    - 1 x OPG
    - 1 x MRI (warm shell only)
2. Development of a model of care for the provision of services in the CASB shared Medical Imaging facility and integration with the existing services in the CHW Medical Imaging Department.
3. Development a Medical Imaging workforce plan to support the model of care in the CASB including requirements for the paediatric medical imaging support in the hybrid operating rooms for paediatric surgery.
4. Plan for the acquisition of new imaging technology (ie PET).
5. Progress the concept of the Medical Imaging Day-Stay model of care and incorporate into planning for the redevelopment of the CHW Medical Imaging facility.
6. Procurement and installation of a neonatal MRI System in NICU.

Table 69 – Medical Imaging Activity by Modality 2012/13 to 2016/17

	2012/13	2013/14	2014/15	2015/16	2016/17	% Change
X-Ray	37,679	40,778	40,081	42,895	42,069	12%
Ultrasound	8,885	9,578	9,523	9,825	9,877	11%
MRI	3,948	4,262	4,222	4,077	3,933	0%
CT	2,479	2,568	2,546	2,299	2,585	4%
Fluoroscopy	3,397	3,299	3,287	3,087	3,146	-7%
X-Ray – Angiogram	616	708	693	750	624	1%
MRA	262	407	370	321	313	19%
Total	57,266	61,600	60,722	63,254	62,547	5%

Source: *CHW RIS/PACS*

Table 70 – Medical Imaging activity projections

MODALITY	2014/15	2016/17	2021/22	2026/27	2031/32
	ACTUAL	**PROJECTED**			
X-Ray	40,081	44,189	56,389	71,980	91,866
Ultrasound	9,523	10,300	12,532	15,247	18,550
MRI	4,222	4,784	5,545	6,429	7,453
CT	2,546	2,597	2,730	2,869	3,015
Fluoroscopy	3,287	3,353	3,524	3,704	3,893
X-Ray – Angiogram	693	769	1,000	1,299	1,697
MRA	370	408	450	497	549
Total	60,722	66,400	82,170	102,025	127,023

Table 71 – Medical Imaging activity projections for CASB Westmead redevelopment

MODALITY	2014/15	2016/17	2021/22	2026/27	2031/32
	ACTUAL	**PROJECTED**			
X-Ray	7,588	7,863	8,682	9,585	10,583
Ultrasound	713	786	1,003	1,280	1,634
MRI	115	122	141	164	190
CT	262	273	301	332	367
Fluoroscopy	107	104	109	115	121
X-Ray – Angiogram	13	14	15	16	18
MRA	11	13	21	35	56
Total	8,804	9,175	10,272	11,527	12,969

11.2 Interventional Radiology

CHW Radiology and Interventional Radiology Services are designated as role delineation level 6 services.

The CHW Interventional Radiology Procedure Room is collocated with the Cardiac Catheter Procedure Room in a shared dedicated Suite and including one anaesthetic induction room shared by both services.

Model of care

Interventional radiology encompasses a range of minimally invasive procedures performed using imaging procedures for diagnostic or treatment purposes. The preference for interventional radiology in the paediatric setting is that it reduces the need for open surgery when a procedure can be performed with a minimally invasive percutaneous image-guided therapy. The importance of interventional radiology/interventional neuro radiology (IR/INR)in the provision paediatric care is evolving and increasingly being used for the delivery of safe and effective care for infants and children by reducing risks, length of hospital stay and

Interventional Radiology Services are provided on a 24/7 basis. Patients requiring a planned procedure are generally admitted through the Day-Surgery Unit (Middleton Ward) as a day-only case and transferred to the Suite. Emergency procedures are performed as required with patient transferred from inpatient units or intensive care units.

Activity

In accordance with the MoH requirements for the development of Clinical Service Plans the MoH planning tools are used as data sources and for the development of activity projections.

An alternative approach has been used for the analysis of activity for Interventional radiology because of the unique patient population requiring interventional radiology procedures. Data has been sourced from the Medical Imaging Department for the three year period 2014/15 to 2016/17

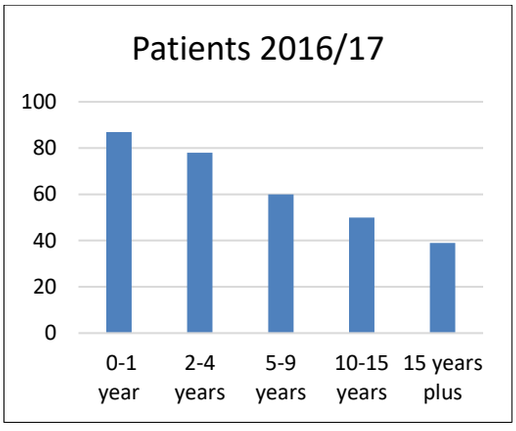
Table 72 – Interventional radiology activity 2014/15 to 2016/17

	2014/15	2015/16	2016/17
Patient numbers	420	408	315
Individual patients	321	306	245
Procedure performed	477	466	364
Admitting Medical Officers (AMO)	85	99	88
General Anaesthesia	391	384	284

Over the period 2014/15 to 2016/17 1,143 patients had an interventional radiology procedure performed. The majority of patients have one procedure performed and over the period a total of 1,307 procedures were performed.

In 2016/17 27% of patients having a procedure were aged one year or less and 53% were aged 5 years or less.

Figure 16 – Interventional Radiology patients 2016/17



Source: *CHW Medical Imaging*

The majority of patients requiring interventional radiology procedures are referred from Gastroenterology, Oncology, Radiology, Surgery and Medicine.

Table 73 – Admitting Medical Officer – Clinical Specialty

AMO Clinical Specialty	14/15	15/16	16/17
Cardiology	11	16	9
Cardiothoracic Surgery	5	23	22
Gastroenterology	42	62	40
Medicine	9	36	31
Neonatology	19	16	7
Neurology	9	7	3
Neurosurgery	13	14	2
Oncology	76	35	41
Orthopaedics	6	8	11
Other	23	23	10
Radiology	123	85	22
Renal	14	7	9
Respiratory	17	21	26
Surgery	36	43	57
Total	420	408	315

Source: *CHW Medical Imaging*

Commonly performed IR procedures include:

- Insertion of central venous lines
- Gastrointestinal - gastrostomy, oesophageal dilatation, insertion of transgastric jejunal tubes
- Aspiration and drainage of fluid collections – abdominal, thorax (lung abscess and empyema)
- Nephrostomy and urological intervention
- Imaging guided biopsy - major solid abdominal organs (liver, kidney and spleen)
- Airway intervention. Airway balloon dilatation and stent insertion
- Arterial embolisation and treatment of vascular malformation.

The CHW Interventional neuro-radiology (INR) service is highly developed and performs specialised procedures for infants and children including:

- Head and neck vascular malformation
- Cerebral arterial diseases – arteriovenous malformations
- Cerebral venous disease – intracranial hypertension and venous sinus stenosis
- Arterial trauma such as dissection or traumatic aneurysm.

Challenges and opportunities

The primary issues for the IR/INR service is the sustained growth in demand for procedures performed, the growing cohort of children with complex conditions requiring ongoing interventions including post organ transplant.

The IR/INR workforce is high specialised and small and with the growth in demand the waiting time for cases is increasing and procedures are required to be performed after-hours on the emergency list.

The requirement for training, maintaining competences and succession planning to ensure quality patient care into the future is a challenge for the service.

The collocation of the IR/INR service and Cardiac Catheter lab within a Suite has had advantages, however the size and configuration of the Suite in consistent with current standards.

The majority of patients undergoing a interventional radiology procedure require a general anaesthetic. The anaesthesia induction area is small and shared both the cardiac catheter lab and interventional procedure room. The dislocation of the suite from the main operating room suite and intensive care units poses an increasing issue in relation to the transport of critically ill or anaesthesia patients through the building.

Updating and replacement of equipment is an ongoing requirement.

Strategic response

1. The Master Plan Reported has identified the requirement to increase CHW operating and interventional capacity to support future growth projections.
2. In 2020 CHW will have access to the interventional operating suite in the CASB for paediatric procedures. The existing interventional suite located in the CHW building will continue to operate.
3. The construction of CHW Stage 2 is planned to include interventional procedure rooms within the relocated and expanded Operating Theatre Suite.
4. The provision of interventional radiology procedures for babies and children requires highly specialised skills with the necessity to ensure that these are maintained through professional development and succession planning.

11.3 Nuclear Medicine

The Department of Nuclear Medicine is designated as a role delineation Level 6 service providing a comprehensive paediatric nuclear medicine service for admitted and non-admitted patients.
Department Services include:

- Using radiopharmaceutical, both *in vivo* and *in vitro* for diagnostic, therapeutic and investigative purposes;
- The measurement and interpretation of bone mineral density;
- Provision of medical and technical advice and support in the diagnostic and therapeutic application of radiopharmaceuticals and radioisotopes in children;
- Incorporating Nuclear Medicine Images with other modalities such as CT and MRI to improve diagnostic sensitivity;
- Conduct of research into application of Nuclear Medicine in paediatrics at a clinical and basic research level; and,
- Provision of in-service training on radiation substance handling (in collaboration with the Radiation Safety Officer).

Service delivery and activity

Nuclear Medicine at CHW is a core service and the only dedicated paediatric Nuclear Medicine facility in NSW. The Department has two gamma cameras. One camera is a triple headed gamma camera which has specific neuroimaging and tumor imaging capabilities. This includes ictal SPECT imaging for delineation of epileptogenic foci with a dedicated neurological unit and video EEG monitoring.

Using oncologic agents such as I123 MIBG (which seeks out neuroendocrine tumors), CHW is the only free-standing, hospital in NSW offering this nuclear scan.

The Department's NM activity is summarised in the following table.

Table 74 – Nuclear Medicine Activity by modality

	2013/14	2017/18	Change (%)
General Nuclear Medicine	2,479	1,940	-22%
Bone Mineral Density/ peripheral quantitative computed tomography (BMD/pQCT)	1,428	1,192	-17%
Positron Emission Tomography (PET)	441	488	11%
Total services	4,348	3,620	-17%

Nuclear Medicine (NM) is a well-established and valuable technology in the diagnosis and treatment of medical conditions in children. With its high sensitivity NM has the capacity to detect diseases at an early stage. As a major centre for the provision of high specialised tertiary and quaternary paediatric care NM is integral to the delivery of patient care by the majority of clinical specialities.

In oncology, NM has a key role to play in the diagnosis and treatment of many childhood cancers including pre and post bone marrow transplant. The hospital's Oncology Unit is a major user of the Department's services for planning of treatment, staging of surgery, monitoring response to treatment and long-term surveillance of a number of paediatric cancers. The most common scans are bone scans, gallium scans and MIBG. The demand for NM is projected to increase in response to the implementation of new and more effective treatment protocols and modalities, increase in clinical trials and importantly with the evolution of personalised medicine into paediatric cancer care and then long term follow-up of growing cohort of childhood cancer survivors moving through to into adolescence.

Bone scintigraphy is an increasing common NM procedure in paediatrics. It is used to assist in the identification of bone pain (particularly in those infants and children who are neuro- developmentally delayed or unable to communicate), bone and soft tissue lesions and tumours, sites for biopsy and evaluation of bones for fractures, locate the presence infection and arthritis and again in the long term surveillance of cancer patients.

In renal medicine NM scans are used to detect urinary tract obstruction in infants, assessment of the blood flow and function of the kidney and pyelonephritis and importantly in determining prognosis of children following kidney transplant.

In neurology and neurosurgery NM is used to investigate abnormalities in the brain including suspected abnormalities of blood flow, identification of epilepsy foci, evaluation of brain tumours and planning for highly specialised and complex surgical intervention including neuroblastoma and deep brain stimulation for epilepsy.

In gastroenterology, NM is important in the diagnosis and management of a number of conditions including in infants including oesophageal reflux, motility and evaluation of biliary atresia. As CHW is a nationally funded centre for liver transplant with a growing cohort of pre and post transplant patients, it is anticipated that the demand for NM will increase.

Challenges and opportunities

The ability to perform PET scans in a timely manner is a significant issue for the NM service moving forward. CHW patients access Westmead Hospital for PET scans and availability is limited to one day per week. This requires the relocation of Nuclear Medicine staff to Westmead Hospital and has implications for the NM

With the sustained development of new radiopharmaceuticals there is an interest in collaborating with Westmead Hospital's Nuclear Medicine radiopharmacy and take advantage of the opportunity to be involved in further developments.

Without improved and regular access to PET machine on a more regular basis it is difficult and PET scanning is a powerful diagnostic test that is having a major impact on the diagnosis and treatment of disease. It provides unique information that may assist in making a diagnosis, making decisions about treatment or providing a prognosis, that is, the likely outcome of any disease.

Therapy is a small part of CHW Nuclear Medicine to date with research becoming an increasing and significant part of the with a significant quantity of research is being undertaken within the BMD/pQCT service.

A PET machine (either PET/MRI or PET/CT) on our footprint – owned and run by SCHN would greatly enhance the service. There would be opportunities to consolidate some of the scans patients undergo into one sitting / one general anaesthetic – better use of resources. There are new radiopharacutical demand – MIBG and development of new radiopharmaceuticals. CHW could become a major paediatric centre for radionuclide therapies.

The use of PET/MRI scanners is very attractive as it combined the benefits of MR imaging with the assessment if cellular viability and metabolism with PET in one examination. In addition this technique allows important tumour research with the aim of developing a personalised biological profile of the tumour of the individual child and/or adolescent. [11]

Strategic response

Positron Emission Tomography (PET) has become a vital imaging tool for the management of cancer and the extent of its spread.

[11] Biassoni L & Easty M Paediatric Nuclear Medicine Imaging British Medical Bulletin, 2017, **123:**127-148

11.4 Endocrinology

The Endocrinology Service provides a comprehensive range of ambulatory, inpatient and consultative clinical services in Endocrinology, Diabetes, and bone and Mineral Metabolism through a multidisciplinary team approach. The majority of clinical activity is ambulatory or day-stay focused. Diabetes stabilisation and education is mainly provided through the Diabetes Day Care Service.

The Endocrine Testing Unit (located in the Medical Day-Unit) performs point of care measurement of glucose during dynamic and metabolic testing and is overseen by the main Endocrine Laboratory.

Admitted and non-admitted patient activity

- Endocrinology inpatient activity has declined over the five year 2012/13 to 2016/17. Separations have declined by 4% (-15) and bed days have declined by 24% (-286). 69% of inpatient activity is day-only.
- In 2016/17 the length of stay (excl day only) was 3.4 days compare with 4.5 days in 2012/13. 22% (166) were unplanned/Emergency compared with 22% (122) in 2012/13. 78% (413) of separations were classified as paediatric specialist compared with 85%(481) in 2012/13

Table 75 – SRG 14 – Endocrinology 2012/13 & 2016/17

	ESRG	12/13	16/17
Separations	Diabetes	215	244
	Other Endocrinology	349	284
	Total	**564**	**528**
Bed days	Diabetes	379	506
	Other Endocrinology	831	419
	Total	**1210**	**934**

Source: *MoH CaSPA Flowinfo V17.0 SRG 14 Endocrinology*

Endocrinology non-admitted activity accounted for 2,360 occasions of service in 2016/17.

Table 76 – Endocrinology non-admitted activity 2012/13 & 2016/17

Clinic	12/13	16/17
Diabetes Allied Health Services	890	1040
Diabetes Medical Services	1610	1230
Endocrinology Clinic	3257	2360
Turner Endocrine Testing Unit	n/a	359

#SCHN Health Information Unit

The Endocrine Laboratory and the Endocrine Testing Unit are components in delivering specialist services to children in paediatric Endocrinology, Diabetes and Bone Medicine.

The Endocrinology Service provides an endocrine testing and therapeutics service and a paediatric focused laboratory with advanced capability in paediatric hormone assays and mass spectrometry.

There is close functional integration between the endocrine laboratories, other laboratories, testing and therapeutics unit and clinical service considered essential to patient care. Increasingly the Service needs rapid access to advanced genetic diagnostics for acute and complex disease.

The Endocrine Laboratory performs 33 different tests, many of which are low volume with high sensitivity – 60% automated platform, 40% manual testing. The

11.5 Pathology

The Pathology Service is designated as a role delineation level 6 service providing a comprehensive range of complex clinical, laboratory, clinical consultative and business support services.

The Service performs testing of a complex technical nature to support specialist paediatric clinical services and operates as a reference laboratory and consultative service for health services across the State.

Pathology Services are provided through the laboratories and a collection centre for children and young adult and in some instances provides testing of adults. The Service contributes to the identification, diagnosis and treatment of conditions and plays a vital role across all clinical disciplines.

Table 77 – Pathology Services Activity Summary 2014/15to 2016/17

Service	14/15	15/16	16/17	Change (%)
Biochemical Genetics	22,625	26,994	41,645	84%
Biochemistry (includes Pharmacokinetics & Blood Gases	321,158	348,266	340,388	6%
Blood Bank	19,680	21,192	21,759	1%
Endocrinology	43,411	44,200	40,561	7%
Gastroenterology	109	98	77	7%
Haematology	313,462	328,045	323,396	3%
Histopathology	11,258	13,244	14,821	32%
Immunology	21,034	24,267	26,773	27%
Microbiology	46,703	49,381	48,904	5%
Molecular Path	14,460	15,073	17,093	18%
Serology	21,429	21,688	23,034	7%
Sydney Genome Diagnostics (Cytogenetics and Molecular Genetics	32,376	30,733	39,034	21
Virology	5,613	4,486	1,260	
Newborn Screening			3,752,902	
Total			4,691,647	

Source: *CHW Pathology Service*

The following provides an overview of the individual pathology services:

Anatomical Pathology (Histopathology Department) provides a full diagnostic service for routine histopathology examination (biopsy tissue samples, surgical resections and cytology) as well as specialised services with a paediatric focus such as paediatric malignancy and transplant biopsy. The service works with clinical multi-disciplinary teams to provide diagnostic input and provides an expert consultation service to external providers. The CHW Histopathology Department is the major provider of perinatal autopsy services in NSW and is part of the newly established Perinatal Postmortem Service.

Biochemistry (including Pharmacokinetics and Blood Gases) specialises in routine and fast turnaround pathology testing required for the management of critically ill patients and patient needing immediate attention. In the paediatric setting routine testing utilises very small sample volumes and delivers fast results. The Laboratory provides sweat testing for cystic fibrosis for infants diagnosed through the Newborn Screening Program and highly specialised diagnostic testing and interpretative services such as biomarkers with national and international referrals. The Laboratory has developed expertise in state-of-the-art mass spectrometry which has been applied to tumour biomarker measurement to assist diagnostic evaluation of paediatric cancers and immunosuppressed drug monitoring essential to support transplant services.

Infectious Diseases and Microbiology Service provides an integrated and comprehensive clinical and laboratory diagnostic service to patients and:

- provides a clinical consultation service for inpatients and outpatients;
- includes diagnostic laboratories of microbiology, virology, serology and molecular pathology;
- utilises laboratory results to guide patient care, infection prevention and control services; and,
- provides antimicrobial stewardship advice.

The Molecular, Virology and Molecular Pathology service identifies micro-organisms and performs sensitivity testing, where appropriate, and provides phone advice regarding significant microbiology or virology results and optimal therapy.

Immunology Service provides a comprehensive clinical and laboratory service specialising in allergy, autoimmunity and immunodeficiency. The Immunology Laboratory provides specialised testing for the diagnosis of immunodeficiency disorders including specific antibody responses to vaccinations, neutrophil function testing, boutique flow cytometric assays and genetic testing by Sanger sequencing. The Laboratory receives samples from adult and paediatric patients from NSW and other States. The Service also provides food allergy testing and statewide anaphylaxis education services.

Challenges and opportunities

All pathology services provided by CHW will continue to experience a rising increase in demand as a consequence of the growth in the hospital's inpatient and non-inpatient activity, changes in models of care and the changing health profile of the paediatric community.

Genetic testing provided by Sydney Genome Diagnostics (Cytogenetics and Molecular Genetics) will continue to expand as the range of discoverable genetic conditions increases, including acquired somatic causes of malignant disease/cancer together with the new genetic technologies.

NSW Newborn Screening Service (Statewide) will experience a rapid increase in the number of test being undertaken. There will be change from biochemical based testing to genetic testing in the coming years.

The Infectious Disease Service is experiencing an increase in demand associated with both disease prevalence and complexity of the paediatric population, the increase in multi-resistant organisms and the complexity of medical interventions an a consequent risk of infection. The provision of a consulting infectious diseases service is increasingly important in the delivery of paediatric clinical care. Future developments will include metagenomics for selected complex clinical cases and require additional resources including workforce, facility and equipment.

The Pathology Collection service is limited with any increase in demand having significant impact on the service.

There is high demand on pathology service arising from the increased presentations to the emergency department with subsequent impact on meeting NEAT targets.

Testing for rare conditions is low volume and high cost and only provided in the public sector. This includes special chemistry, endocrinology, immunology, microbiology. Patient testing is frequently challenging in that many of children have severe disabilities.

Whilst some demand can be managed through improved technology, additional laboratory space and trained staff will be required.

The impact of new technologies (e.g. mass spectrometry and whole genome sequencing) is particularly significant in pathology and related services.

Strategic Response

1. It is expected that CHW will continue to provide a strong and independent pathology to the children of NSW and continue to provide role delineation Level 6 services. However there is a need to clarify whether the future of pathology laboratory service will maintain its current service model and relationship with NSW Health Pathology.
2. Progress the establishment of a new CORE laboratory.
3. There is a need to determine the configuration of pathology services across the Westmead precinct and the scope of service provision in CHW Stage 2. This includes consideration of a Precinct CORE laboratory model.
4. The capacity for further automation for all aspects of laboratory service provision will be explored to enable CHW to respond to the increasing demand for services without significantly increasing staffing levels.
5. The impact of new technologies (e.g. mass spectrometry and whole genome sequencing) is particularly significant and will require resources to match demand.
6. The development, implementation and evaluation solution to manage the drivers and costs in pathology will need to be considered moving forward.

11.6 Haematology

The Department of Haematology provides a comprehensive clinical, consultative and diagnostic service in paediatric haematology and transfusion medicine.

The Haematology Clinical Service provides multidisciplinary inpatient and outpatient care to children with congenital bleeding disorders, bone marrow failure syndromes and other non-malignant haematological diseases.

The Haematology Clinic provides consultations and management of children and adolescents with non-malignant haematological disease including inherited bleeding disorders (eg haemophilia), disorders of haemoglobin (eg thalassaemia, sickle cell disease and bone marrow failure).

The Anticoagulant Clinic manages children on anticoagulant therapy, including warfarin and low molecular weight heparin.

The Haematology Clinical Nurse Consultants provide patients and their families with nursing care, advice, treatments, education and training and discharge planning.

The Kids Factor Zone, is a dedicated facility, providing a unique service to patients with haemophilia and other bleeding disorders within a family-centred environment and approach to care.

Admitted /non-admitted patient activity

Over the five-year period 2012/13 to 2016/17 haematology-related inpatient activity has increased. Total separations have increased by 16% from 955 to 1,205 – 78% of which were day-only in 2016/17. Bed days have increased by 20% from 2,066 to 2,417. The average length of stay for overnight and longer stay has risen from 6.0 days to 6.7 days.

Table 78 - SRG 17 – Haematology (non-cancer) 2012/13 to 2016/17

INPATIENT ACTIVITY		2012/13	2016/17	Change (%)
Separations	DO	735	865	18%
	O'night	220	240	9%
	Total	955	1105	16%
Bed days	DO	735	865	18%
	O'night	1331	1606	21%
	Total	2066	2471	20%
Average LOS		6.0 days	6.7 days	

Source: *MoH CaSPA FlowInfo V17.0 (Excl entirely within ED)*

In 2016/17 there were 600 children attending the CHW Haematology Department outpatient clinics accounting for 3,089 non-admitted occasions of service.

Table 79 – Non-admitted Haematology activity 2016/17

	Occasions of service
Haematology Department Haemophilia Treatment Followup	776
Haematology Department Haemophilia Treatment New	22
Haematology	980
Haematology Followup	1093
Haematology New	218
Total Occasions of Service	3089

Source: SCHN Performance Unit

Laboratory services

The Haematology Department provides a complete NATA accredited haematology for inpatients and outpatients as well as to referring medical practitioners. The laboratory provides a number of very specialised and highly complex and low volume testing unique to NSW (Donath-Landsteiner test) and Australia (red cell enzyme assays, telomere length).

Blood Bank

The Blood Bank provides a complete blood transfusion service from pre-transfusion screening, cross matching and supply of blood products. The Blood Bank is critical to support of major surgery, emergency, intensive care, oncology and transplant services.

Challenges and opportunities

The demand on the Haematology and Blood Bank Service is being impacted on both the changing health profile of the population and complexity of paediatric care.

Migration from Asia and Africa has seen an increase in the cohort of children with significant haemoglobinopathies, in particular sickle cell disease and the increase in children with haematological and other cancers requires diagnosis and blood product support provided by the Department.

The introduction of new technologies, specifically cellular and gene therapies, will have a significant impact on the way the Haematology Department provides services. This extends to the necessity for embedding of specialist clinicians into the multidisciplinary teams for numerous clinical services.

11.7 Genetics

The Western Sydney Genetics Program (WSGP) comprises clinical and laboratory services including:

- Clinical Genetics:
- Genetic Metabolic Disorders Services:
- Biochemical Genetics;
- Newborn Screening;
- Cytogenetics;
- Molecular Genetics; and,
- Academic Genetics.

WSPG provides clinical services through a multidisciplinary team approach in the inpatient, day-stay and ambulatory settings. The Program provides services across NSW for clinical genomic expertise in Neurogenetics, Connective Tissue Disorders, Ophthalmic Disorders and a wide range of other multisystem disease and intellectual disability.

The majority of the Sydney Genome diagnostics work is referred from external sources, particularly in the field of haematological malignancy diagnosis where CHW is the largest provider in NSW. CHW also provides molecular testing tailored for paediatric tumours with emerging technologies such as RNA sequencing for tumour diagnosis in the process for validation.

Newborn Screening and Biochemical Genetics are the Network's statewide services providing screening for a range of congenital endocrine and metabolic diseases.

Biochemical Genetics

The NSW Biochemical Genetics Service offers a statewide service for the diagnosis and monitoring of patients with inborn error of metabolism. This includes confirmation and second tier testing of cases detected by newborn screening as a small proportion of the total workload (<1% of total referrals). The remainder comes from clinicians in hospitals and the community on patients with a range of non-clinical indicators. Samples are primarily from children, but adult presentations and family studies results in referrals on adults being received.

Cytogenetics

The Cytogenetics Departments forms part of the Sydney Genome Diagnostics group, together with the Department of Molecular Genetics. The Cytogenetics Department provides a NATA accredited service for the diagnosis of a wide range of constitutional, prenatal and acquired chromosome disorders.

The Department performs G-band karyotyping, fluorescence in in-situ hybridisation (FIHS), CGH and SNP chromosome microarray, quantitative fluorescent PCR prenatal aneuploidy screening, and RT-PCR gene-fusion testing of soft tissue tumour biopsy specimens.

Clinical Genetics

Clinical Genetics is designated as a role delineation level 6 service providing consultative and diagnostic services including specialised genetic services such as metabolic medicine, cancer genetics/familial cancer, high risk reproductive disorders, cardiac genetics, neuro-genetics and pre-natal genetics. In addition to CHW, Clinical Genetic services are provided to WSLHD (Westmead Hospital) prenatal clinics and WLHD (Orange and Dubbo).

The demand for services is increasing exponentially with between 1,000 – 1,200 new families accessing the service annually (at least 2,000 patients per year with multiple family members). Accepted referrals have increased by 20%.

Patients referred to the Service are frequently seriously ill or complex including newborns with anomalies and those with multi-system disorders. The Service is often required to continue lengthy outpatient management of patients with complex conditions as a result of referrer or family request.

Service complexity is increasing. Other clinical services (such as Neurology, Cardiology, Oncology, Ophthalmology, Renal and Immunology) are request services recognising the need for highly responsive laboratory and counselling service to provide appropriate patient care and to mainstream genetic testing into clinical care.

Demand for genetic services will increase with the adoption of new technologies and next generation of sequencing.

Clinical research interfaces with organisations including Australian Genomics, Kids Research and the Children's Medical Research Institute (CMRI) Rare Disease research projects. The NSW Genomic Strategy[12] will have implications for the Network and CHW as it aims to promote collaboration in the field of genomics and develop new service delivery models that incorporate genomic and digital advances.

The availability of a skilled clinical workforce with a high level of expertise is critical to ensuring that the

[12] NSW Health Genomics Strategy June 2017

CHW clinical genetics service can maintain service delivery and respond to the increasing demand into the future. There has been no recent enhancement to the workforce. There is now a necessity to build capacity and undertake succession planning by increasing the number of counsellors, geneticists, genetic fellows, provide appropriate administrative support to manage the service and reduce non-clinical workload for clinicians.

Currently there a very few therapeutic options for these disorders however new and complex therapies and technologies including enzyme replacement therapies are used to manage these disorders and improve survival rates of infants and children.

Newborn Screening

The NSW Newborn Screening laboratory is the reference laboratory for newborn screening services for all babies born in NSW and ACT. The principal roles of the Service are:

- Provision of test to detect certain metabolic disorders in apparently healthy babies to facilitate commencement of treatment and avoid the onset of permanent damage; and,
- To have a system in place to ensure confirmation of results, counselling treatment and follow-up for those babies where results suggest a metabolic disorder. The confirmation of results includes arranging for samples to be forwarded to the NSW Biochemical Genetics Service.

Over 4million tests are conducted annually.

Metabolic Genetics

The NSW Genetic Metabolic Disorders Service (NSW GMDS)is a state-wide multi-disciplinary team dedicated to the diagnosis and treatment and management of children and adolescents inborn errors of metabolism (IEM) who are at risk of acute life-threatening metabolic de-compensation needing urgent interventions.

NSW GMDS is the only dedicated therapeutic genetic service for children in NSW and provides a clinical, consultative and diagnostic service in metabolic genetics to patients of CHW and Westmead Hospital Neonatal Intensive care unit and a consultative service to clinicians across NSW.

The Service provides personalised and highly specialised treatments and participates in clinical research trials of novel therapies. The Service is co-located with and works collaboratively with the NSW Newborn Screening and Biochemical Genetics Laboratories.

NSW GMDS has undergone significant changes over several years predominantly associated with workforce including staff movements and temporary workforce coverage. There a two paediatric genetic metabolic specialists to provide the 24/7 state-wide service.

Challenges and opportunities

Whilst genetic metabolic disorders are rare, there is an ever increasing number and complexity of patients being diagnosed and treated. Population growth, increasing number of immigrants from countries with a high prevalence of disorders, an increasing number of consanguineous unions, earlier and more sophisticated newborn screening and an increasing awareness by health care professionals and the community all contribute to the growth in patient numbers.

Currently there is a long waiting list to access clinical genetics clinics and genetics counselling. Referrals are triaged based on urgency and there is a wait list exceeding 9 months for General Paediatrics.

Ongoing temporary workforce arrangements complicate the stability of service provision and impact on the wait-time for non-urgent outpatient appointments which has increased over two years from three months to five to six months

12. CARPA PROGRAM

The Community Health, Ambulatory, Rehabilitation, Population Health and Allied Health (CARPA) comprises those services provided on an ambulatory and outpatient basis. In 2016/17 the Program reported approximately 100,000 Service Events.

Table 80 – CARPA Non-admitted activity 2016/17

Department Clinic	Service Events
Audiology	2,495
Child Development	3,525
Child Life Therapy	2,563
Deafness	771
Dermatology	1,684
Nutrition and Dietetics	9,771
Occupational Therapy	6,298
Orthotics	4,741
Outpatients	38,055
Physiotherapy	16,241
Rehabilitation	7,232
Social Work	3,020
Speech Pathology	1,671
Turner Ward	1,252
Weight Management	673
Total	99,992

***Source**: SCHN MSAU*

12.1 Rehabilitation Medicine

The Rehabilitation Medicine (Kids Rehab) is a role delineation Level 6 service and is a specialist provider of intensive rehabilitation programs for children and young people with acquired brain injury and/or physical disabilities and their families. Kids Rehab comprises:

- Brain Injury Service
- Cerebral Palsy and Movement Disorder Service
- Limb Service
- Complex Musculoskeletal Service
- Spina Bifida Service
- Spinal Cord Injury / Disease Service
- Inpatient Rehabilitation.

Each service provides inpatient (overnight and day-only), ambulatory and telehealth services.

The Kids Rehab undertakes assessment, makes recommendations for intervention to assist in restoring functions, follow-up review assessments and prevention strategies. It offers a consultative service in collaboration with other services to assist people and young people with Connective Tissue Dysplasia, Neuromuscular and Neurodevelopmental problems. CHW offers a unique neuro-modulation service for NSW and areas of specialty includes:

- Intrathecal Baclofen ITB pump program
- Deep Brain Stimulation DBS program
- Selective Dorsal Rhizotomy SDR program

Models of Care and current activity

Kids Rehab works in multidisciplinary teams involving all allied health specialties, nurse specialists as well as medical and surgical teams. Rehabilitation in the inpatient setting is typically provided in sub-acute multispecialty model with other services such as orthopaedics or neurosurgery.

Rehabilitation inpatient activity has reported a significant increase since 2012/13, largely due to the increase in day-only activity. The casemix of inpatient separations includes brain injury, cerebral palsy and spinal cord conditions. Providing rehabilitation services on a day-only basis allows children and families to return home and return to the hospital for intense day rehabilitation. Numbers are limited dependent on bed availability and staff capacity.

Table 81 –SRG 84 - Rehabilitation 2012/13 & 2016/17

		2012/13	2016/17	Change (%)
Separations	DO	42	110	162%
	O'night	3	33	Sig%
	Total	45	143	218%
Bed days	DO	42	110	162%
	O'night	46	1119	sig%
	Total	88	1229	sig%

***Source:** MoH CaSPA FlowInfo V 17.0 SRG 84 - Rehabilitation*

In2016/17 62% of inpatient separations were aged 10 years and over. Patients living in WSLHD and ACT accounted for the highest number of separations.

Rehabilitation Medicine outpatient Service events have increased significantly over the period 2012/13 to 2016/17 with over 7,232 service events reported in 2016/17.

Challenges and opportunities

The need for specialist paediatric rehabilitation services provided is dependent on many factors including population growth in western Sydney and the changing health profile of the paediatric population, increasing survival of children post catastrophic illness and injury and those children and young people with rare conditions involving moderate to severe disability.

CHW is experiencing an escalating number of children and young people requiring rehabilitation. Generally rehabilitation demand is associated with the highly specialised services including spinal cord injury, brain injury, multiple trauma and burn injury. However, over recent years children with cancer, bone marrow transplant, post organ transplant and requiring respiratory rehabilitation are increasingly contributing to the demand for rehabilitation services.

The greater number of children presenting to the ED also impact on rehabilitation services. Whilst injury from motor vehicular accidents requiring intense inpatient rehabilitation has decreased the number of injuries from falls, assaults and inflicted injuries is increasing.

Acquired brain injury in childhood is a major cause of death and disability. As an increasing number of children survive the cohort of children requiring timely and family-centre specialist rehabilitation is increasing. In addition to reducing physical disability and improving functionality, there is frequently the need to support the child through stages of development and education, achieve optimal outcomes and ensure continuity of care through to transfer to adult services.

The setting in which rehabilitation occurs is predicated on the needs of the paediatric population. The continuum of care for rehabilitation services continues beyond the acute through to sub-acute, ambulatory, community, school and home.

There is a need to provide spaces/facilities within the acute and ambulatory to enable therapies to be delivered by the bedside or within the unit. The provision of a quality and contemporary paediatric service requires access to appropriate number and sized rehabilitation facilities (sub-acute beds and treatment zones). The indicative bed base of four day-only and ten sub-acute overnight beds is required to meet service demand to 2031.

A significant proportion of rehabilitation is provided on an ambulatory basis and it is expected that more rehabilitation will be offered as ambulatory or home based programs. Because of the nature and frequency of interventions and therapies, particularly that children may be attending for a many hours, the design and configuration of the facilities need to cater for the complexity of patients, simulated home-like environments including outdoor areas to assess a child's level of functionality and provide the necessary therapeutic environment for the range of age groups and accommodate the family unit.

The development of new and emerging technologies and treatments will have a major impact on the trajectory of paediatric rehabilitation and on patient outcomes. It is important that these technologies including neuro-modulation (eg DBS), virtual reality, use of robotics and functional electrical stimulation are incorporated into the clinical service delivery model.

The implementation of the National Disability Insurance Scheme (NDIS) is an important new development which impacts on the delivery of rehabilitation service by the Network and CHW. Responding to the growing diversity of children in need of rehabilitation and for which longer term outcome is uncertain.

The NSW Model of Care for Paediatric Rehabilitation, as a joint project between SCHN and HNELHD Kaleidoscope Rehabilitation (KPRS), aims to provide accessible, equitable and tertiary rehabilitation care for all children in NSW. This offers an important opportunity to explore alternative models of rehabilitation for children and their families which is delivered close to home, in the community and in the home.

Strategic Response

1. Participate in the implementation and evaluation of the NSW Model of Care for Paediatric Rehabilitation.
2. Develop the day and home-based rehabilitation program as part of the streaming model of service delivery.
3. Develop a subacute zone at CHW for overnight, day-admitted and outpatient cases to provide multidisciplinary complex therapy and treatment in a rehabilitation like model. Consideration of integrating Kids Rehab, allied health, CHISM, Weight Management and other services into the future ambulatory zone of the hospital.
4. Develop, implement and evaluate strategies to improve the patient experience with rehabilitation services.
5. Strengthen and expand the provision of outreach clinics in rural and remote areas including upskilling of local clinicians and partnerships with other Local Health Districts.

12.2 Child Development

The Child Development Unit is a specialist and comprehensive multidisciplinary service for children with complex developmental problems and provides:

- A quality diagnostic and assessment for children with a wide range of developmental and behavioral problems
- Back-up assessment with practical recommendations to assist education, behavior and day to day management
- Support to stressed parents of children with problems of development and behavior
- New information and ideas to health professional and families in the community.

Model of service delivery and activity

Children attend the Child Development Unit for assessment, diagnosis and treatment for a wide range of conditions which impact on function, participation and/or child-carer/family relationship including:

- Development delay and behavioural problems associated with development delay
- Severe language impairment – communication, speech and language difficulties
- Autistic spectrum disorders
- Neurodevelopmental disorder associated with medical conditions requiring neuropsychological assessment
- Complex learning difficulties associated with comorbidity

The Child Development Unit multi-disciplinary team uses a family-centred approach to support families to achieve the best-possible outcomes for the child or young person and to empower parents and carers to gain a deeper understanding of their child's developmental strengths and difficulties.

The duration of appointments is dependent on the condition and ability of the child/young person. Generally assessments require between 3 and 5 hours to complete.

The activity profile is summarised below.

Table 82 – Child Development Service activity summary 2016/17

Service	Service Events
Centre for Effective Reading - CDU	98
Child Development Unit 1	997
Child Development Unit 2	284
Disability Specialist Unit 1	157
Parramatta Early Childhood Assessment Team (PECAT) 1	501
Parramatta Early Childhood Assessment Team (PECAT) 2	471
Specialist Disability Health Team 1	261
Specialist Disability Health Team 2	756
Total	3525

Challenges and opportunities

The Child Development Service at CHW has grown significantly as a clinical service over the past decade and demand for the services will continue to increase in response to the changing health profile of the NSW paediatric population and the patients attending the hospital.

In NSW 1 in 5 children in 2012 were developmentally vulnerable when they started school [13]. The incidence of developmental disability is considerably higher in vulnerable populations. Children and young people who have experienced abuse and neglect, those in out-of-home care, those from an Aboriginal and Torres Strait Islander population often have high, unrecognised and unmet developmental needs. The likelihood of psychiatric disorder increases with the severity of the intellectual disability. 30% - 42% of children with an intellectual disability require treatment for mental health problems.

In addition to the incidence of children and young people with developmental disorders increasing a significant proportion of these children have other and often complex medical conditions or disabilities.

The increasing survival of infants and children with previously life-limiting conditions including cancer, cystic fibrosis, neonatal surgery for major birth defects such as cardiac, gastrointestinal and renal or with a rare disease has resulted in a growing cohort of children with developmental impairment and many requiring intensive and long term child development interventions and support.

[13] The Health of Children and Young People in NSW Report of the Chief Health Officer 2014

Autism spectrum disorder is persistent development disorder with symptoms evident from early childhood. In 2015, an incidence of 0.7% or about 1 in 150 people were estimated to have autism. The number of people in Australia has increased significantly in recent years up from an estimated 64,000 people in 2009. Of those who were estimated to have autism in 2015, 143,900 were also identified as have a disability (88%).[14]

In 2012 about 3% of NSW children and young people had a severe or profound disability. The relationship between health and disability is complex. Children with intellectual disability have different patterns of health needs compared with the general population.

An important issue for the CHW Child Development Service is the long wait times. Whilst CHW provides a unique and highly specialised child development service there is a lack of complementary services in Local Health Districts and in the community to provide locally based non-specialist multi-disciplinary child development services in assessment, diagnosis and treatment. This is resulting in a significant and increasing level of unmet demand, families experiencing stress and children suffering lower self-esteem, increased depression and anxiety, and decreased school attendance.

At the same time there have been a number of major changes and funding models in relation to community health and disability services. This has impacted on the number and location of paediatric child development medical and allied health providers and the ability of services to meet the needs of children/young people and their carers.

The current Child Development facility has been operational for over twenty-five years with no increase in area or upgrading despite the increase in service activity. The facility is dated, requires expansion and reconfiguration to provide sufficient and appropriate spaces to undertake the clinical activities. There is a need to provide larger internal and outdoor spaces to enable the complex and variety of physical and other assessment activities now undertaken by the multi-disciplinary team and provide sufficient and comfortable space for children with disabilities and their families.

Strategic response

1. Development of strategies to improve access to child development services particularly for vulnerable populations including Aboriginal and Torres Strait Islander children and young people.
2. Development of care pathways for priority populations
3. Growing partnerships with other Local Health Districts to develop/enhance child development services.
4. Undertake facility planning for the expansion and reconfiguration of the Child Development Unit within the Ambulatory Zone.

[14] AIHW Autism in Australia https://www.aihw.gov.au/reports/disability/autism-in-australia/contents/autism

12.3 Allied Health

Sydney Children's Hospitals Network Allied health encompasses a diverse range of therapeutic and diagnostic services. Allied health services are provided across a range of service delivery models including inpatient, ambulatory /outpatient services, emergency department and community. The majority of this activity occurs within the multidisciplinary team on a referral basis. In addition allied health professionals conduct outpatient clinics with patients/families attending on an individual or group basis for consultation and / or therapy.

Challenges and opportunities

The demand for allied health service is increasing in response to the growth in emergency, inpatient and non-inpatient activity and the increasing acuity of patients requiring intensive and complex care.

The implementation of new models of care particularly those aimed at hospital avoidance and/or reduction in the length of stay impact on the way the allied health personnel deliver care and put pressure on the small number of therapists.

As demand for allied health services is closely associated hospital activity, growth in the number and range of specialist paediatric services provided and the changing models of care it is difficult to appropriately plan, develop and grow the workforce to meet the changing requirements of other clinical services.

Currently there are long waiting times for the majority of allied health services. There are increased referrals from Local Health Districts for children requiring high intensity and specialised treatment and where there is a lack of locally based therapist with paediatric expertise.

The changing health profile of the paediatric community including increase in obesity, diagnosis of children with autism spectrum disorder, allergies, developmental problems and respiratory conditions and the increasing complexity and survival rates of seriously ill children has resulted in longer and more intensive treatment sessions involving allied health.

Physical environment constraints have become a significant concern for the majority of allied health specialties. Despite a significant increase in the volume of activity and increase in the workforce the space accommodated is unchanged since 1995. The physical therapy departments are overcrowded with lack of capacity to provide clinical interventions and therapies for infants and children, provide required work space for the workforce and compliance with contemporary health facility standards.

Strategic response

1. Improve the capture and utilisation of allied health activity data in inpatient and non-admitted areas.
2. Explore the potential for expanded scope of practice, developing areas of practice and first practitioner roles. An example of this is the growing role of Orthotics for non-operative management of spinal conditions.
3. Explore expand physiotherapy scope roles: orthopaedics (club foot and normal variants clinic), first contact roles in orthopaedics, Emergency Department and outpatient respiratory setting.
4. Increased multidisciplinary care through enhanced allied health across acute, sub-acute and community settings.
5. Proactively participate in the development and implementation of new clinical services and models of care to ensure early identification and resourcing of allied health service needs.

12.4 Nutrition and Dietetics

The Department of Nutrition & Dietetics offers a range of dietetic clinical services to admitted and non-admitted patients and their families/carers to enable children to achieve optimal health and nutritional outcomes. The Department's team includes dieticians and technicians. In addition to clinical services the Department comprises the:

- Diet Office which processes all patient menus and, in collaboration with CHW Food Services, jointly manages the production and delivery of more than 620 inpatient meals per days including 85 special diets; and,
- Formula Room which prepares and distributes over 1,000 feeds and formulas per week to inpatients and sterilisers and distributes infant bottles. The facility adheres to stringent protocols to ensure a safe product for all patients.

The Department works closely with clinical teams in a multidisciplinary approach to provision of nutritional support particularly in the areas of obesity, allergy, metabolic and rare diseases, oncology and critical care and transplant.

Challenges and opportunities

The primary issue for the Department of Nutrition and Dietetics is growth in service demand as the number of admitted and non-admitted patients increase, the increasing complexity of the patient population and their nutritional needs, the need for long term follow-up with frequent and multiple appointments.

The arrangement for patient meals is via a cook fresh system conducted on site at CHW. The My Food Choice Model is currently being introduced in a number of hospitals by NSW HealthShare. In order for CHW to continue its high quality food service delivery for children with complex needs and needs of the the multi-cultural populations, on-site facilities to provide meals via a diet kitchen should be retained.

An ongoing issues for both the inpatient and outpatient areas the lack of appropriate and readily accessible facilities for families to store and prepare meals for themselves and their children and appropriate facilities for the provision of education and consultation with families.

The demand on the Formula Room has grown exponentially since 1995. Technology for preparation and ordering of formula is becoming more sophisticated, multiple storage facilities for formula are required and to ensure compliance with the Food Safety standards reverse osmosis (RO) water to the facility needs to be installed.

Provision of support, advice and education to LHDs to manage complex patients is increasing and there is a requirement to incorporate technologies such as tele-health into the Nutrition and Dietetics model of care.

Strategic response

1. Facility planning is undertaken to expand and upgrade the Formula Room to accommodate future demand and standard compliance and to the Nutrition and Dietetics Department
2. Inclusion of weight and height measurement stations (including wheelchair scales) in facility planning for new build and refurbishment to enable mandatory weights and heights measurement for all patients.
3. Workforce planning for the Nutrition and Dietetics Service to accommodate future demand and ensure succession planning.

12.5 Speech Pathology

The Speech Pathology Department provides a range of acute and ambulatory services to infants, children and young people including assessment, treatment and consultation for communication and feeding/swallowing difficulties.

The current models of care include inpatient ward based and Departmental based individual and group therapy as part of the multidisciplinary team including the Feeding Clinic, Dysphagia and Nutrition, Rehabilitation Service, Cleft Palate, Newborn Follow-up Clinic and Speech Pathology.

Video-fluoroscopic Swallow Study (VFSS) and Fibre-optic Endoscopic Evaluation of Swallowing (FEES) are used to perform objective swallow assessments. CHW provides VFSS services to other LHDs including the NICU at Westmead Hospital and Nepean Hospital.

Challenges and opportunities

Demand for Speech Pathology has increased significantly with resources concentrated in developing the feeding and dysphagia services at CHW. Whilst there is scope to further develop services, attention needs to be given to developing capacity and services for children with complex communication disorders including an augmentative and alternate communication service. Innovation, education and research are also priorities for the service.

Despite the increased caseload and change in service delivery models, the Speech Pathology workforce has remained static resulting in a redirection of resources and service delivery from the communication services to the feeding and dysphagia services.

Speech Pathology services will be required to meet the increasing service demand through the development of efficient and innovative models, partnering with community services, universities and key stakeholders. This will include the development of clear and robust referral pathways, engagement in research development and innovation for this work to be realised.

New emerging technologies in swallow rehabilitation, augmentative communication and environmental access need to be incorporated into the planning of a tertiary care model.

Changes to the Speech Pathology Department physical environment over time has resulted in decreased available space and limited the ability to expand Departmental-based services.

Timely access to Medical Imaging to deliver Video-fluoroscopic Swallow Study (VFSS) is an important issue for the service. Delay in delivering prompt VFSS service hs the potential to place fragil and medically complex patients at increased risk of aspiration pneumonia due to long wait for objective assessment of swallow function.

Strategic response

1. Develop a comprehensive feeding therapy service with the capacity to deliver multi-disciplinary individual and group feeding/dysphagia interventions.
2. Establish Australia's first Aerodigestive Clinic for the coordinate, efficient and timely management of children with complex feeding issues who require input from a multidisciplinary team.
3. Expand the utilisation of FEES in the assessment of dysphagia.
4. Develop and introduce Speech Pathology Extended Scope of Practice position in areas including NIDCAP/Developmental Care, Voice, Videofluoroscopic Swallow Studies
5. Establish a Paediatric Swallow Laboratory with capacity to introduce new technologies an treatments.
6. Include Speech Pathology in the HITH service to provide home-base feeding support in the post-discharge period, minimising the need for families to access this service at CHW.

12.6 Orthotics

The Orthotics Departments provides orthoses (rehabilitation, orthopaedic, orthotic and related devices) worn by children and young people to offer support, protection, correction to the musculo-skeletal system and to enhance mobility. The Department provides a consultative service in orthotic management of paediatric conditions to other community centres and participates in teaching programs.

The Orthotics Department works in the inpatient and ambulatory environment. Orthotics has a role in post-operative management using orthoses as an adjunct to surgical stabilisation, in particular, with post-operative hip and spinal surgery. Orthoses are also used as an adjunct to surgical fixation following trauma, primarily trauma of the spine and lower limb.

The vast majority of orthoses are custom-made from a cast to ensure optimal fit and function. Orthotists are available to attend clinics as well as to the wider community. Orthopaedics accounts for the highest volume of the hospital's surgical activity. Orthopaedics is the largest referrer to the Orthotics followed by Kids Rehab.

Challenges and opportunities

The size and configuration of the current Orthotics Department is the major issue for the service. The increased number of patients/families attending the Department has resulted in severe overcrowding of the clinical and public spaces.

The Spine Casting room is inadequate to ensure safe and quality patient care particularly to the lack of lifting equipment (hoist) to assist in the movement and transfer of children and young people.

The Department has experienced an increase in spine work as a result of the spinal redesign project which aims to minimise the need for surgical intervention. This has increased the volume of big heavy casts that need to be manufactured manipulated which contributes to the WH&S issues for the service.

The volume and and variety of equipment and stock required in the Department has increased over time and the requirement for additional and appropriate storage capacity has become as issue impacting on the efficiency and productivity of the workforce.

The implementation of the NDIS has resulted in a small number of paediatric patients having accessed the private sector. This is the cohort of less complex patients and this development has had little or no impact on the demand for the CHW orthotics service. Additionally, private providers are reluctant to care for children and young people with challenging disorders (ie autism).

There is an unmet demand for the orthotics service with a wait time of between 4 and 6 months for non-urgent referrals.

Strategic response

1. Facility planning to be undertaken to identify the appropriate location, size and configuration of the Orthotics Department to comply with current standards and accommodate current and future demand
2. Explore the establishment of a Bracing Clinic to assess and triage bracing patients out of the main Spine Clinics
3. Increase the Orthotics presence in Orthopaedic and Rehab clinics.
4. A strategy is developed to provide additional storage and demand capacity for Orthotics.

12.7 Occupational Therapy

The Occupational Therapy (OT) provides therapy services for all ages of paediatric patients with developmental, physical, psychological and social difficulties and resulted in a temporary or permanent disruption of daily life.

The service utilises a family-focused approach to facilitate development, development of motor skills and hand function, training in the use of artificial upper limbs, assist development of emotional, behavioural regulation skills and facilitate school readiness.

In 2016/17 there were 19,627 Non-admitted occasions of service (OOS) reported for the CHW Occupational Therapy Clinic.

Challenges and opportunities

As a result of changes in clinical practice, surgical advances and drug regimens the complexity of inpatients is increasing. OT provides quality of life to these patients, practical management of conditions and assists with discharging/hospital avoidance.

In parallel, the complexity of patients attending outpatient clinics is increasing. Frequently with short length of hospital stay patients often require more follow-up as an outpatient.

The lack of paediatric service in the community, particularly in western Sydney, is impacting on the CHW OT service with increasing numbers of referrals and lengthening wait-times for specialist services.

The increase in Emergency Department presentations, inpatient separations and outpatient attendances projected into the future translates to increased demand for allied health services including OT.

Whilst the NDIS has been implemented with changes to community funding models the OT workload has not reduced. There is ongoing need to provide specialist care for complex presentations. In addition, the necessity to communicate and consult with external providers, particularly in the development of therapy planning has contributed to significantly increasing workload.

The lack of physical infrastructure has become a major issue for OT. There is a requirement for additional treatment spaces for individual patients and larger spaces for group interventions and consult rooms to accommodate multidisciplinary teams. Special purpose treatment spaces which can accommodate differing patient needs such as hand therapy is required. In addition there is a need for access to modified kitchens & bathrooms and inclusion with plinths & ceiling hoists where appropriate.

Lack of sufficient storage capacity is of major concern. The volume and variety of equipment therapists require for service delivery cannot be accommodated within the existing Department with resultant overcrowding.

Strategic response

1. Facility planning is undertaken to expand and upgrade the Occupational Therapy Department.
2. Ensure that the therapy requirements for OT are included in facility planning for inpatient units and specialist services.
3. Workforce planning for the Occupational Therapy as part of the development of models of care and to ensure succession planning.

12.8 Child Life Therapy

Illness and hospitalisation is an anxious and stressful experience for many children and their families, particularly when there is a need for frequent hospital visits and/or medical interventions.

Child Life therapists utilised knowledge and skills in child development to support children and young people through their medical journey and assist them to develop and use coping strategies related to illness and hospitalisation. Therapists aim to normalise the therapeutic environment as much as possible and reduce anxiety through the provision of therapeutic and medical play, procedural education and support and distraction.

Play/recreation spaces help children and young people to normalise their environments, engage in their usual occupation, allow children to reach milestones and engage in therapy despite the confines of the hospital environment. Play/recreation spaces are “medical treatment free zones” and should be accessible to patients in the inpatient units and ambulatory zones. Currently the majority of inpatient play and preparation sessions conducted by therapists occur at the bedside.

There is growing research and anecdotal evidence supporting the benefits of child life education in assisting children and young people to be more active participants in their healthcare experiences. As such Child Life Therapists work closely with clinical teams in contributing to improving health and developmental outcomes.

In addition to the provision of Child Life Therapy services to inpatients and children presenting to the

Emergency Department, there were 9,688 non-admitted occasions of service (OOS) in 2016/17.

Challenges and opportunities

The increasing variety and complexity of procedures (diagnostic and treatment) is requiring Child Life therapists to become more integrally involved with the clinical team and is contributing to the demand for the therapy services.

There is a requirement for improved resource development to educate children, young people and their families, utilise simulation style clinics and work with clinical teams to develop individualised coping plans.

With the increasing recognition of the benefits of Music Therapy, there is a growth in demand for services both in collaboration with others and in isolation.

Physical and development therapists use a vast array of equipment and materials to provide services to patients and to cater for the age range from infants to adolescents. Sufficient and appropriate storage facilities are important to these services. The lack of facilities has been on ongoing issue needing to be addressed.

Access to appropriate, secure and weatherproof outdoor spaces is important to the psycho-social wellbeing of children and young people who are hospitalised. There is a lack of these spaces within the existing CHW built environment.

Strategic response

1. Ensure that the play and therapy requirements are considered in facility planning for inpatient units and specialist services.
2. Workforce planning for the Child Life and Music Therapy as part of the development of models of care and to ensure succession planning.
3. Facility planning for new builds and refurbishments, particularly in multi-storey developments, provides for patient accessible outdoor spaces.

12.9 Psychology

Psychology services at CHW are provided through a range of specialist clinical Units including:

- Adolescent Medicine
- Cardiology
- Child Development Unit
- Kids Rehab
- Neurology
- Oncology
- Psychological Medicine
- Pain Management
- Weight Management

Clinical Psychologists and Clinical Neuropsychologists work within the multi-disciplinary teams. The Hospital's psychologists are also involved in postgraduate teaching and research.

The Psychology Department also provides diagnostic and assessment services for toddlers and preschool age children with suspected developmental delay, intellectual disability and/or Autism Spectrum Disorder (Tumbatin Clinic) and school age children with suspected learning difficulties (Learning Difficulties Clinic). The Clinical Neuropsychologists also provide diagnostic and assessment services for children and young people with a history of neurological insult or disorder (eg. epilepsy, traumatic brain injury, brain tumour).There are psychologist in a range of specialist clinical Units with CHW, including:

The Psychology Department at CHW comprises clinical psychologist and Clinical psychologists providing assessment, diagnosis and treatment of emotional and behavioural conditions.

There are psychologists in a range of specialist clinical units within The Children's Hospital at Westmead, including Adolescent Medicine, Cardiology, Child Development Unit, Kids Rehab, Neurology, Oncology, Psychological Medicine, Pain Management and Weight Management. They work as part of multi-disciplinary teams with other medical, nursing and allied health staff.

- Developmental, behavioural, emotional and psychosocial assessment, to provide an understanding of the presenting problems and their origins
- Standardised, comprehensive cognitive, neuropsychological, and educational achievement tests which evaluate intellectual and learning ability;
- Diagnostic assessment involving structured interviews and/or rating scales, and/or projective tests in cases where this is relevant to the child's presentation;
- Short term interventions based on a range of treatment models and techniques including cognitive behaviour therapy, individual psychotherapy, family therapy, pain management, parenting skills, group therapy;
- Secondary and tertiary consultation and liaison to professionals within the hospital regarding psychological problems related to children, parents and families;

- Group therapy programmes from time to time.

Clinical Psychologists provide assessment, diagnosis and treatment of emotional, behavioural, cognitive and mental health problems that may result from or complicate the management of acute and chronic medical illnesses. Clinical neuropsychologists provide comprehensive assessments of children's cognitive and adaptive functioning within a developmental framework. They are skilled in understanding changes in thinking and behaviour that may arise from brain dysfunction such as head injury, epilepsy, neurological disease and developmental disabilities. The assessments assist with rehabilitation planning by identifying strengths and weaknesses and monitoring progress or recovery.

There are also research psychologists who contribute to a greater understanding of a range of paediatric medical and mental health conditions.

13. PRIORITY POPULATIONS PROGRAM

The Network is committed to protecting and promoting the health and wellbeing of children and young people and in ensuring that there is equity of access to specialist paediatric services. The term "priority populations" is use to identify target patients groups who, due to burden of disease, increased risk of poor patient outcomes or decreased access to paediatric health services, would benefit most from services and interventions

It is well established that the early years of a child's life are important in creating a solid foundation for the rest of life. Children with chronic condition, those with special needs including with disability, Aboriginal children, children and young people with mental health conditions, vulnerable children at risk of harm, refugees and children who live in rural and remote areas are priority populations for the Network and a focus in terms of access and service delivery.

The Priority Population Program is a whole of Network Program. In 2016/17 the Programs non-admitted activity accounted for 7,263 face to face patient contacts.

Table 83 – Priority Populations non-admitted activity 2016/17

Department	Service Events (Patient Contact)
Adolescent Medicine	3,315
Child Protection	1,002
Priority Populations	391
Trapeze	2,555
Total	7,263

Source: *SCHN MSAU*

13.1 Child Protection

The Child Protection Unit (CPU) is designated as a role delineation level 6 service providing a 24 hour crisis intervention service including clinical and forensic responses to child abuse (physical or emotional or exposure to domestic violence) and neglect.

The CHW Child Protection Unit provides a multi-disciplinary service and includes:

- Joint forensic, medical and psychosocial assessment
- Accepts referrals from other LHDs and manages and facilitates a health response for Joint Investigation Response Team matters.
- Medical treatment
- Crisis intervention and counselling
- On-going sexual assault counselling, including individual, family and group therapy
- Court preparation and support
- Child protection case management and advocacy

Clinical consultancy including a 24 hour telephone consultation service to provide advice and information to members of the public, other departments within the hospital, doctors and other health professionals, the Department of Community Services and other government and non-government agencies.

Children and young people who have been abused or neglected often end up in out-of home care. The appointment of an Out-of-Home Advisor based at CHW is a priority focus for the Network as more and more children and young people are in out-of-home care. The National Framework for protecting Australia's children indicators shows that 67% of indigenous children in care have a cultural support plan and 70% of young people in care aged 15 – 17 years have a leaving care plan[15].

The Networks child protection and wellbeing services are committed to facilitating research aimed at preventing abuse and neglect improving resources where abuse and neglect has occurred.

Challenges and opportunities

The demand for child protection services is high and is expected to increase as the population in line with population growth and in response to the changing legislative requirement for reporting. It is estimated that 1 in 32 children with require child protection services. 74% of children who access child protection services are repeat clients.

[15] AIHW National Framework for protecting Australia's children indicators https://www.aihw.gov.au/reports/child-protection/nfpac/contents/summary

The number of children in out-of-home care is growing. Many of these children will be in out-of-home care for more than 2 years and many will have multiple placements. The impact of socio-economic disadvantage and family disruption particularly associated with abuse, drug abuse or carer incarceration frequently results in these children and young people requiring specialist paediatric assessment and long term management of medical and psycho-social conditions.

The complexity of cases and the associated comorbidities of patients managed by the Child Protection Units is increasing and requires greater and more frequent interagency collaboration with multiple agencies to respond to the needs of the individual child or young person.

Access to child protection services is an issue for vulnerable groups e.g. Aboriginal children and families and children living in rural and remote areas.

There continue to be gaps in child-protection systems both internally and externally.

Strategic response

1. Enhanced and flexible work practices with 7 day week, extended hours coverage for social work to support patient/families with child protection, trauma, domestic violence, victims of crime.
2. Delivering timely care to children living in out of home care though the prioritisation of these children to health assessment and treatment services.
3. Improving responses to the Ministry of Health guidelines for the protection of children and Young People. This includes improved identification and assessment of children at risk presenting to the Emergency Department and continue to implement NSW Government keeping them safe reforms.
4. Improving collaboration and coordination with health services and building relationships.
5. Address the facility requirements for the conduct forensic examination and that complies with current standards and an appropriate and supportive environment for the child and family.

13.2 Aboriginal Health

There are many aspects of the health and wellbeing of Aboriginal children where significant improvements are continuing or improving. However there are significant gaps between Aboriginal and non-Aboriginal children remain. Aboriginal people are disproportionately represented in the juvenile custodial system and Aboriginal children are over-represented living in out of home care.

The disadvantage or gap starts from birth and continues through childhood. A healthy and safe start to life and investing in children's early years is critical to improving the long term health outcomes of Aboriginal children.

The Sydney Children's Hospital Network plays both a state-wide and a local catchment role to the needs of our Aboriginal and Torres Strait Islander children – through the provision of both tertiary and specialised care. The Network's Aboriginal Health Management Advisor works across the executive structure to develop the organisation's strategic response to State and National Aboriginal Health and Aboriginal Workforce needs.

The Network's Aboriginal Health Strategic Plan[16] focuses on healthcare services for Aboriginal children and families to ensure access to high-quality services that is evidence-based, culturally safe and responsive and support optimum outcomes for child health, development and wellbeing. There is a focus on integrated services that ensure children and families are at the centre and included in all aspects of decision-making.

The aim is to connect the Network's strategies to enhance the care outcomes of Aboriginal children and their families and effectively seeking to Close the Gap across the broadest spectrum possible across the Network.

Over the five year period 2012/13 to 2016/17 Aboriginal children accounted for 5,133 presentations to the CHW Emergency Department and presentations has increased by 44% over the period. 50% of children were aged five-years or less. Children living in WSLHD accounted for the highest number of presentations and presentations have increased by 50% over the period, presentations for SWSLHD have increased by 40% and NBMLHD residents by 71%. In 2016/17 major injury, mental illness and digestive system illness were the most common conditions for emergency department presentation.

For the same five-year period there were 4,621 inpatient separations for CHW. Over 50% of patients were aged less than 5 years. Children living metropolitan Sydney account for approximately one-third of inpatient separations however a significant

[16] Over Our Tracks – SCHN Aboriginal Health Strategic Plan 2018 – 2021 https://intranet.schn.health.nsw.gov.au/files/attachments/56/ahu5071-aboriginal-health-strat-plan-2018-fa-lr.pdf

proportion of children admitted live in rural and remote areas including Western NSW LHD and Hunter New England.

Strategic Response

1. Continue to provide comprehensive healthcare for Aboriginal children and young people through close collaboration with Local Health Districts, Primary Health Networks and Aboriginal Community Controlled Health Organisations
2. Undertake review of inter-service referral processes to ensure Aboriginal clients are provided timely services that are appropriate to their clinical and psychosocial needs throughout their patient journey/care continuum
3. Develop and strengthen the SCHN Aboriginal Workforce Implementation Plan under the guidance of NSW Good Health – Great Jobs: Aboriginal Workforce Strategic Framework 2016 – 2020 including developing and implementing an Aboriginal career planning and development program to support succession planning and professional of Aboriginal staff within SCHN.
4. Increase the responsiveness and cultural competence of services provided and the level of utilisation of SCHN services by Aboriginal families and children.
5. Build the ability of staff to treat patients by implementing programs which consider the specific needs of Aboriginal children and their community.
6. Build relationships and work with local Aboriginal Community Controlled Health Services to establish a framework for all CHW services to develop models for engagement and ensure that they remain a priority group for action.
7. Strengthen the support for Aboriginal children and their communities through implementation of the SCHN Aboriginal Health Strategic Plan

13.3 Refugee Health

There are over 13,000 refugees and humanitarian entrants settle in Australia each year and up to three quarters initially settle in Greater Western Sydney - over 50% settle in SWSLHD and a further 24% in WSLHD.

Many refugees arrive in Australian with complex medical needs as a result of poor living conditions and/or trauma. Children often have chronic health problems, developmental and behavioural issues, and poor oral hygiene arising from poor nutrition. Resettlement in a new country also brings with it new challenges as children and young people are exposed to a new western cultural, social and educational environment.

Demand for population health services for refugee people in western Sydney is increasing and specifically for newly arrived refugee families with young children.

The NSW Refugee Health Plan 2011-2016[17] outlines a model of refugee health care which emphases the importance of early universal assessment and intervention and that health services facilitate timely access of refugee children to health.

The Network's Children's Refugee Service provides advocacy, research, training, and clinical services to children with a refugee background and their families and the health professionals caring for them. It combines the two well-established multidisciplinary clinics:

- The CHW Health Assessment for Refugee Kids (HARK) clinic
- The SCH Refugee Child Health Clinic.

Both clinics see children aged up to 16 years and provide:

- Specialist assessment, treatment and referral for refugees and asylum seekers with specific health problems; and,
- Health screening of asylum seekers in accordance with ASID guidelines.

The Network's Refugee Service:

1. Supports and conducts collaborative research in order to ensure the Service's work is evidence-based and contributes to the knowledge base of this relatively new field;
2. Plays an active role in educating health professionals on critical elements of working with people from a refugee background;
3. Contribute to community education by providing expert opinion to a variety of media, organisations and public forums on the health needs of displaced children; and,
4. Advocates for the health and wellbeing of refugee and asylum seeker children and their families at state, national and international levels.

[17] NSW Refugee Health Plan 2011-2016 https://www1.health.nsw.gov.au/pds/ActivePDSDocuments/PD2011_014.pdf

13.4 Child and Adolescent Mental Health

The Child and Adolescent Mental Health Service is configured as a whole of Network service providing a range of services to support the positive mental health of children and young people and to care for those who experience problems associated with mental illness. The Service integrates acute mental health and eating disorders.

CHW Child and Adolescent Mental Health Service is a role delineation level 6 service accepting patients aged 0 to 18 years including those:

- Presenting to the Emergency Department with an acute mental health episode
- Admitted to the Inpatient Mental Health Unit (Hall Ward)
- Admitted to other inpatient units including the Paediatric Intensive Care Unit and Oncology Service
- Receiving specialist outpatient care from other CHW clinical departments
- Referred by rural NSW child health specialists for review through the child and adolescent telemedicine psychiatry outreach service (CAPTOS).

Principles of care

The fundamental principle that the service delivery model is person-centred, holistic, instils hope, empowers the child and family and is 'recovery-orientated' as defined by the person rather than the clinician. An important aspect of the model is the support of peers with lived experience and that it reflects a transformational development in the care of the individual child and adolescent.

The Department seeks to provide excellent, evidence-based and culturally appropriate clinical psychiatric care to children and young people with mental health problems or disorders and their carers and:

- Promotes the health and psychosocial well-being of all children through education, liaison and advocacy
- Strengthens the quality of psychosocial care provided to children and young people through leadership in the training and supervision of health care workers
- Conducts and disseminates research to promote service improvement, the well-being of children, young people and their families, and the advancement of knowledge

The following are integral to the provision of mental health services and are part of the multi-disciplinary approach together with medical and nursing clinicians:

- Department of Psychology provide assessment, diagnosis and treatment of emotional, behavioural, cognitive and mental health problems that may result from or complicate the management of acute and chronic medical illness
- The Eating Disorders Service provides a tertiary and specialist services for children and young people with an eating disorder.
- The Social Work Department offers a wide range of services focussed on the family with the aim of minimising the impact of illness and hospitalisation on the child and family, promote health outcomes and link children and families with appropriate support services in their community.

Current activity

Inpatient activity, as reported for SRG 82 – Psychiatric – Acute, shows that there over the five-year period 2012/13 to 2016/17 activity has increased in terms of separations (29%).

Table 84 – SRG 82 – Psychiatry – Acute 2012/13 to 2016/17

		2012/13	2016/17	Change (%)
Separations	DO	37	41	11%
	O'night	278	366	32%
	Total	315	407	29%
Bed days	DO	37	41	11%
	O'night	5366	5590	4%
	Total	5403	5631	4%
ALOS o'night (days)		19.3	15.3	

Source: *MoH CaSPA FlowInfo V17.0*
(Excl entirely within the ED) SRG Psychiatry Acute

The clinical profile by ESRG demonstrates the growth in activity associated with care of patients with an eating disorder and other psychiatry.

In 2016/17 patients aged 10 years and over accounted for 97% of bed days. Over the five year period 54% of bed days were reported for those in the 10 – 14 year age group and 43% for those 15 years and over.

The average duration of hospital stay is significantly greater than for the general hospital population – 15.3 days in 2016/17 compared with length of stay of 5.0 days for other overnight and longer patients. In

2016/17 there were average 15 admitted patients per day.

In 2016/17 57% of inpatients patients were managed within the general ward setting and 43% in the designated mental health inpatient unit.

Over the five year period acute care separations have increased by 6% and bed days have declined by 5% whereas activity for the mental health unit has increase by 84% in separations and 15% in bed days. The average length of stay ranged between 16.1 days and 21.3 days for ward patients and between 16 and 34 days for those admitted to the mental health unit.

Table 85 – Mental Health Patient Type 2012/13 to 2016/17

	Patient Type	2012/13	2016/17	Change (%)
Seps	Acute	221	234	6%
	Psychiatric	94	173	84%
	Total	**315**	**407**	**29%**
Bed days	Acute	2969	2832	-5%
	Psychiatric	2434	2799	15%
	Total	**5403**	**5631**	**4%**
ALOS O'Night (days)	Acute	15.9	16.1	
	Psychiatric	24.9	16.1	
	Total	19s	15.3	

Source: *MoH CaSPA FlowInfo V17.0*
(Excl entirely within the ED) SRG Psychiatry Acute

Eating Disorders

The provision of services for children and young people and their families is an integral component of the Network's Mental Health Service. The Service works in collaboration with Adolescent Medicine and Mental Health Services together with a clinical, academic, and research capacity.

In 2016/17 there were 336 inpatient separations and 5,942 bed days reported for NSW residents aged 0 – 19 years

Table 86 – Eating Disorders inpatient demand NSW residents 0 – 19 years 2016/17

Age	Separations	Bed days
0 – 4 years	6	8
5 to 9 years	8	59
10 to 14 years	103	1635
15 to 19 years	219	4240
Total	336	5942

Source*: MoH CaSPA FlowInfoV17 – ESRG 881 (excl ED only) age 0 – 19 years NSW residents*

Research has shown that eating disorders can be diagnosed individuals as young as seven years old and can extend to the elderly, although they are most common in adolescents and young adults. It is estimated that approximately one in 100 adolescent girls will develop anorexia nervosa - this is the third most common chronic illness for adolescent girls in Australia, after obesity and asthma.

In 2016/17 approximately 50% of the inpatient separations and bed days were reported for CHW.

Table 87 – Eating Disorders inpatient activity 2016/17

Hospital	Seps	Bed days
The Children's Hospital at Westmead	112	2133
Westmead	52	1164
Private Hospitals	31	682
John Hunter	35	593
Lismore	12	196
Gosford	15	188
Canberra	6	141
Other		845
Total	336	5942

Source*: MoH CaSPA FlowInfoV17 – ESRG 881 (excl ED only) age 0 – 19 years NSW residents*

The NSW Service Plan for People with Eating Disorders [18]set out the networked and integrated response to ensure timely access to developmentally appropriate services for children, young people and adults with the eating disorders. The Government's investment during the implementation period provided the Network to enhance the eating disorders service.

Challenges and opportunities

The incidence of mental health conditions in the paediatric community, particularly in the 9 to 15 year old age group is increasing. The demand for child and adolescent mental health service will continue to grow and is reflected in increasing presentations to the Emergency Department and admissions to the inpatient mental health unit.

There is increasing demand for services, particularly for those children and young people with clinical complexity and for those the demand for those patients who have failed treatment in the medical setting and who are at risk of long term disability and require multimodal rehabilitation.

There is a year on year increase in the number of children presentations to the Emergency Department, the bulk of which present afterhours. This is particularly an issue in rural areas where, due to the lack of specialist paediatric mental health services, community mental health support is unavailable necessitating children and their families to access the local hospital.

[18] MoH Mental Health Branch (2013) NSW Service Plan for People with Eating Disorders

The lack of adequate and contemporary inpatient and non-inpatient facilities is a significant issue for CHW. The existing inpatient unit with maximum capacity of 8 beds was commissioned in 2005 with no expansion since that time despite the significant increase in demand and the necessity to accommodate patient with a mental health condition in other wards in the hospital.

There is an urgent requirement to increase the mental health bed capacity in the hospital together with the provision of some additional capacity in the Emergency Department (ED).

Strategic response

1. Addressing the barriers to accessing appropriate mental health services for the individual child and promotion of early intervention and effective care
2. Building on the streaming model for provision of mental health services to ensure that each child is provided with the right care, at the right time and in the right setting and within a seamless care pathway from hospital emergency, inpatient and ambulatory/day programs through to community and home care.
3. Establishing a day-program model for mental health to minimise the need for a hospital stay and/to support the child and the family in transitioning from an inpatient stay to home.
4. Building on the existing day-program for the management of children with an eating disorder to minimise the need for hospital admission and respond to the increase in demand for tertiary care for children and young people living in greater Western Sydney.
5. Expanding the Kids Acute Liaison in Mental Health (KALM) program in the emergency Department.
6. Developing and implementing programs which build resilience of the family/carer unit to support the child or young person
7. Increasing the stock of inpatient beds at CHW from the current 8 overnight beds to 30 and 8 day-only beds.
8. Addressing the physical capacity, facilities and patient amenities of the inpatient mental health unit to comply with current facility guideline standards and collocate school classrooms and day-program facilities with the inpatient unit.
9. Expansion of telehealth delivered mental health services to regional areas and LHDs
10. Enhancing mental health services for children with intellectual disability and autism in collaboration with Ageing Disability & Home Care (ADHC) and Department of Education and Training (DET)

13.5 Drug and Alcohol Services

Alcohol consumption at risky or high risk levels and drug missue are associated with substantial health risks including injury and mental health problems. However rates of alcohol consumption in young people in NSW are declining and fewer young people drink alcohol at levels posing a lifetime risk.

Rates of Emergency Department visits for alcohol problems remain high at 203/100,000 15 – 17 year olds and 327/100,000 people aged 18 – 24 years. A key target of the NSW State Health Plan 2021 is to reduce total risk drinking to below 25% by 2015. Alcohol-attributable hospitalisations are highest amongst young males, young aboriginal people and young people living in more remote areas and lower socioeconomic status areas.

People with drug and alcohol issues generally have a lower physical and mental health status than the general community. The Drug and Alcohol Service has undergone substantial change in the last few years. People with drug and alcohol issues focus is on individuals experiencing disadvantage. Alcohol has been identified as a significant contributing factor in many hospitalisations. Population health initiatives for reducing alcohol consumption in young people in NSW primarily focus on education and harm minimisation in large-scale.

The five year summary of patients presenting to the CHW Emergency Department and requiring a hospital admission is shown in the following table.

Table 88 – Drug & Alcohol related activity

Category		2012/13	2016/17
ED Presentations*	1D – Alcohol/drug abuse & alcohol drug induced mental disorders	31	18
Admitted activity ESRG 5.0 Code & Name**	812 – Drug & alcohol dependence and withdrawal	3	5
	813 – Poisoning/toxic effects of drugs and other substances	131	113
	Total	134	118

Source: **MoH EDAA17 **MoH CaSPA FlowInfo V17.0 (Excl entirely within the ED) SRG 81 – Drug and Alcohol*

Strategic response

- At CHW, the CICADA (Care and Intervention for Children and Adolescents Affected by Drugs and Alcohol) Centre brings together three teams of experts from the Feotal Alcohol Spectrum Disorders Clinic, Family Service and Adolescent Drug and Alcohol Service to assist children, adolescents, families and NSW health professionals to build leadership and research into the prevention of harm to children and adolescents from drugs and alcohol.
- The Family Service supports the health and wellbeing of children, young people and their families who have a parent with a drug and alcohol history
- Clinics are run with a multidisciplinary team including a paediatrician and psychologist who provide assessment, management and intervention for a variety of concerns including physical health and nutrition, growth and development
- The CICADA Adolescent service provides clinical services, primarily the assessment and management of young people under 16 years presenting to the hospital with substance abuse. It provides leadership in developing effective responses to alcohol and illicit drug use by young people and provides prevention, harm minimisation and management of the health consequences associated with drug use.

13.6 Adolescents and Young Adults (AYA)

The Department of Adolescent Medicine provides tertiary, subspecialty services to address the comprehensive health care of the adolescent patient. Services are provided within a clinical department with clinical, academic and research capacity. The Department includes inpatient, outpatient/ambulatory and transitional care services and undertakes a range of education and training roles and has a comprehensive clinical research program in addition to the initiatives of the Academic Department of Adolescent Medicine.

In addition, a range of special programs and opportunities for adolescent patients in hospital are offered, including the Youth Arts Program, the Chronic Illness Peer Support Program (ChIPS) and the Youth Advisory Council. The Department works closely with Trapeze supporting chronic care coordination and transition to adult care.

The Adolescent Medical Unit (AMU) provides inpatient and outpatient services to adolescents and their families. Clinics conducted on an outpatient basis include Complex Chronic Illness Services, Eating Disorders Service, Addiction Medicine Program, Adolescent Gynaecology Service, Gender Dysphoria Service and Weight Management Service.

Models of Care and current activity

The AMU addresses the comprehensive health care needs of referred adolescent patients. The team aims to create a 'youth friendly' environment within a developmental framework and recognising psychosocial and environmental stressors. The model of care is a unified medical and psychosocial approach, supported by research.

The Adolescent Inpatient Unit (Wade Ward) manages adolescents 12 – 18 years.

Activity profile patients 12 yrs plus

In 2016/17 7,627 Emergency Department presentations were aged 12 yrs and greater and represented of total ED presentations. Presentations have increased by 13% from 6,734 in 2012/13. An average of 63% of ED presentations in this age group are residents of WSLHD.

Table 89 – ED presentations 12 years plus 2012/13 to 2016/17

Age	2012/13	2016/17	Change (%)
Departed	4870	5561	14%
Admitted	1864	2066	11%
Total	6734	7627	13%
% admitted	28		30%

The major diagnosis categories for Emergency Department presentations include injury, single site, major, Digestive system illness, Injury, single site, minor and psychiatric illness

In 2016/17 there were 3,737 Inpatient separations and 24,243 bed days reported for patients aged 12 years and over. 54% of separations were day-only and the average length of stay for overnight and longer stays was 6.3 days. Over the five-year period AYA inpatient activity has increased with a 15% in separations and 1% increase in bed days.

Table 90 – Inpatient activity age 12 years plus 2012/13 to 2016/17

		12/13	16/17	Change (%)
Seps	DO	2931	3737	27%
	O'night	2123	3235	52%
	Total	6054	6972	15%
Bed days	DO	2931	3737	27%
	O'night	21070	20506	-3%
	Total	24001	24243	1%

Source: *MoH CaSPA FlowInfo V17.0 (excl entirely within ED) age 12 yrs and over*

In 2016/17 68% of AYA separations were planned and 75% of separations were classified as paediatric specialist.

Residents of WSLHD account for the highest number of AYA separations and separations have increased by 14% over the period from 2,139 to 2,430. Residents of SWSLHD, NSLHD and NBMLHD also account for high number of separations and have reported an increase in separations of 13%, 10% and 18% respectively.

The casemix for AYA patients is diverse. In 2016/17 Orthopaedics accounted for the highest number of separations, followed by Non Subspecialty medicine, gastroenterology and haematology.

The following summarises outpatient clinic activity by service events for adolescent medicine related activity. The count relates to one patient attendance per event.

Table 91 – Non-admitted Patients – Service Events

	2012/13	2015/16
Adolescent Med Unit	1226	1481
Adolescent Med Unit AMU	1392	1200
Adolescent Med Unit Psychiatry Service	12	16
AMU – ChIPS Program	609	0
Trapeze	319	6292
Total	3558	8989

Source: *SCHN Health Information Unit*

Challenges and opportunities

Population growth and the increasing number of young people living with chronic medical condition or disability are the primary drivers of demand for health services by this age group. In the GWS region the population aged 10 to 24 years is projected to grow by 14% in the 10 year period 2011 to 2021 – an additional 84,237 residents and by 2026 the population will increase by a further 70,000.

The number of young people living with a chronic condition is increasing. The most recent national survey estimated that almost 60% of Australian young people aged 12-24 years (approximately 2.2 million) had a chronic condition and this situation will be sustained into the future as survival rates for neonates and children with chronic conditions survive into adulthood and the impact of new technologies and advances in clinical practice and research

Adolescence is recognised as a time of considerable biopsychosocial change. An estimated 26% of Australian 16-24 year olds experienced at least one mental disorder in a 12 month period and those with chronic conditions experience higher rates of mental health problems.

The challenge for the Network and CHW is the provision of medical and psychosocial services which is responsive to the needs of the AYA group and is adaptive the changing societal make-up of this group in the general population. To assist the individual to make a successful transition from the paediatric health care setting to adult and community healthcare services has been identified as an important priority for the Network. The Trapeze program provides that person-centred care and coordinated approach to supporting the transitioning process. CHW is working with WSLHD within this AYA framework at Westmead Hospital to enhance and support adult clinicians to become skilled in working within a biopsychosocial whole person model to identify protective and risk factors of young people.

Strategic response

1. The expansion of the ambulatory service department and zones as part of the Westmead Redevelopment will include the establishment of an Adolescent and Young People Transitional care area as part of the Westmead Redevelopment Business Case Addendum.
2. The facility will provide an age appropriate care environment for the growing AYA population with chronic. This initiative will facilitate the implement an integrated model of care which places the young person at the centre of the transition planning process.
3. The model will clearly articulate an efficient triage system and clinical pathways to create a seamless transition from paediatric to adult care teams and strengths the multidisciplinary and interdisciplinary team based care.

13.7 Weight Management

The Weight Management Services (WMS) is a tertiary clinical multidisciplinary team service providing support and weight management intervention through structured programs for children and adolescents (aged 2- 16yr) with obesity, in particular those with severe obesity (body mass index BMI >35kg/m2 or equivalent). The service is primarily an ambulatory service with a small team providing medical, nursing, dietetic, and psychological input.

A physiotherapist from the physiotherapy department rotates through the service on a 6 monthly basis as part of their training. There is an additional dietitian-only clinics for children and adolescents with less severe obesity. Furthermore the service provides support for out of area families through telephone and email contact with the treating paediatricians and/or general practitioners and other health care clinician including dietitians, clinical psychologists, and nursing staff.

The staff within the service conduct clinical intervention treatment programs, have a leading role in advocacy for families of children with obesity and in the education and training of other health care staff locally, regionally and state-wide, having been the only MDT WMS in NSW until 2018.

The WMS has seen a tripling of referrals over the past 10 years and has changed its program to double the throughput of referred children. The patients are highly complex with many psychosocial issues and up to 20% of families have FACS involvement requiring WMS staff to liaise with multiple providers involved with the families. There is a high attrition rate which is not uncommon in such services. For those who do attend the outcomes are positive with significant improvements in anthropometric measurements in at least two thirds of the cohort.

The team has been successful in obtaining a number of grants over the past 6 years to undertake projects to develop a universal model of care and an online e-learning training program (Weight4KIDS) for health care clinicians. In addition members of the team have been key participants in the Ministry of Health working party on childhood obesity over the past 18 months as part of the Premiers Priority – Tackling Childhood Obesity. Through this work a generic model of care has been developed and a project (CHAMP – Child and adolescent weight management pathway) is in progress to assess its implementation and effectiveness in some of the newly forming secondary level WMS clinics within NSW. In addition collaboration within the working group has enabled the development of a new NSW Health Website https://pro.healthykids.nsw.gov.au/ whereby resources in relation to paediatric obesity are easily accessible for all clinicians, including access to Weight4KIDS (which is also now accessible through HETI).

Challenges and opportunities

There has been an increase in prevalence of obesity and in particular severe obesity over the past 20 years. Currently 1.9% of school-aged children in NSW have severe obesity and western Sydney has the highest prevalence of childhood obesity in Sydney.

Obesity in children is often not recognised as it is not usually the primary reason why children present to healthcare services and is thus rarely addressed due to several perceived barriers including difficulty raising the issue and lack of training.

The increasing prevalence of obesity is complicating other primary illnesses thus impacting other services provided by CHW eg in particular orthopaedics, sleep, endocrinology, gastroenterology (fatty liver disease) and mental health issues

Increasing prevalence of obesity in children with developmental disabilities and behavioural disorders whereby a separate service for such children is warranted.

There has been no increase in service resourcing over the past 10 years until this financial year – current aim to employ an additional dietitian (navigation co-ordinator) covering both SCHN sites is a start but overall inadequate to meet demands.

There is a need for social worker as part of team to assist and support the families with complex social needs and to further develop services across both sites and outreach clinics via telehealth to support regional and rural services where weight management resources are limited.

There is a lack of dedicated facilities for treating affected children and difficulty in obtaining inpatient beds for severely affected patients requiring assessment and acute intervention for weight loss. In addition there is a lack of appropriately sized equipment eg chairs, beds, for children with severe obesity

Currently there are no dedicated surgical options/interventions for adolescents with severe obesity. It is envisaged that bariatric surgery is likely to be located within adult services in areas of high need such as western Sydney.

Strategic Response

1. Progress with current plans to develop a network approach to obesity.
2. Advocate for additional resources to include dedicated enrolled nurse, social worker, physiotherapist for the clinic
3. Further develop training program for dedicated nursing and dietetic staff in particular to manage in-patients with severe obesity
4. Further develop integrated models of care within the network and through primary and secondary healthcare services for managing children with obesity
5. Continue collaboration through the MoH working party to assist in strengthening and expanding services for children with overweight and obesity across NSW
6. Develop a subacute zone at CHW for overnight, day admitted and outpatient treatments to provide multidisciplinary complex therapy and treatments as suggested in the Rehabilitation strategic response
7. Advocate for bariatric surgery services for adolescents with severe obesity and medical input pre- and post-surgery
8. Advocate for availability of specialised equipment eg bariatric beds, chairs, bathroom facilities, for children with severe obesity throughout the hospital
9. Advocate for sufficient resources to develop, implement and evaluate telehealth services

14. SUPPORTING THE CHILD & FAMILY IN HOSPITAL

Spending time in hospital can be very stressful and traumatic experience for children and their families. For many children, who require treatment at a specialist children's hospital, the visits may be frequent, over many years, require surgical intervention and involve short or long periods of inpatient admission.

Keeping families together is a fundamental principle in the way CHW provides care for sick children. The Hospital offers a range of services to support the child in hospital, their carers and families. The demand for these services is great and will continue to grow over the years as the number of children accessing care at CHW increases and treatments and surgical care become more complex.

14.1 The Children's Hospital School

Students who miss school because of significant illness or injury face a variety of challenges in their education and may experience a range of adverse short-term and long term consequences [19]

In addition to clinical care CHW focuses on ensuring that programs, activities and structures are in place to minimise the negative effects of hospitalisation on children and young people and to ensure that their educational needs continue to be met during periods of hospitalisation.

The Children's Hospital School is a Department of Education and Training (DET) school which provides an educational service for school aged patients. The teaching and support staff enable students to continue an educational program and keep in touch with their home schools.

The School caters for school aged students (K-12) with an anticipated hospital stay of five (5) days or more, are admitted on a regular basis or referred under special needs. The School operates four classrooms at CHW and Westmead Hospital; Primary classroom (Kindergarten to Year 6), High school classroom (Years 7 to 12) and Hall Ward and High School classroom at Westmead Hospital for adolescents admitted to the Hospital.

School activities are designed to complement the child's day in hospital. The School works collaboratively with hospital teams, home school, families and the student. In addition to classroom teaching the School delivers education services to students by the bed side.

Challenges and opportunities

- The major issues confronting the Hospital School are the growth in demand for its services and the capacity of the school classrooms, student amenities and the administrative facility to respond appropriately to current and future demand.
- Each year there are over 2,000 school aged children who have a hospital stay of five days or more and this number is expected to increase over the next fifteen years.
- There is a requirement to comply with the Disability Discrimination Act and ensuring that children can access and participate in education including younger children accessing pre-school education.

Strategic response

1. The linkage between the Network and Department of Education will be formalised through the development of a memorandum of understand and including a cohesive and integrated model for the provision of education of students on campus.
2. Determine the facility requirements for the provision of schooling within the hospital including the appropriate location of class rooms

14.2 Starlight Express Room (SER)

The Starlight Express Room (SER) is an important space within the Hospital building. SER, run by volunteers and supported by the Starlight Foundation, provides a treatment free, bright and innovative entertainment space specifically designed

[19] ARACY Missing School 2015 – Full report: *School connection for seriously sick kids: who are they, how do we know what works and whose job is it* p5

for patients to have fun, be creative and play. During the day the children and their families use the facility for play, use electronic equipment and watch-live shows. At night the facility is intended for use by adolescents. In addition, Starlight TV delivers the activities live to the patient's bedside for those unable to leave their beds.

The CHW Stage 2 redevelopment is expected to provide an opportunity for expanding the range of activities and providing new spaces in the building. As such the involvement of Starlight Foundation in the planning of the spaces will be important.

14.3 Volunteer Service

The Volunteer Service provides invaluable support for children and their families and is supported by over 400 volunteers. In addition to general tasks and operating the Volunteer Shop, the Service provides:

- A Concierge Service assisting patients and their families to clinical departments;
- The Ward Grandparents whereby volunteers develop a one on one relationship with children in hospital when parents/carers cannot be present;
- Paediatric Palliative Care Family support. Where volunteers work off-campus visiting families at home and support families who have children with life-limiting illnesses;
- Sibling Care Centre provides a short term play and area for siblings of children have hospital treatment under the supervision of a Volunteer; and,
- Parent and Carer Resource Centre, operated by Volunteers, has been designed by parents for parents and is a non-clinical, homely environment where carers can take a break in comfort.

14.4 Family Accommodation

Parents and carers play a key role in the in the physical and emotional care of their children particularly when a hospital stay is required. Therefore whenever a child is admitted every endeavour is made to enable parents and families to stay. This is particularly important for mothers and carers with critically ill neonates and babies in the Neonatal Intensive Care Unit, many of whom are cared for in the Unit for many weeks. CHW parental accommodation options include:

- A single sofa bed at the child's bed side which is available in most wards.
- A parent accommodation suite of two-bed rooms and amenities at the rear of several wards.
- A suite of three single rooms with ensuite and a shared lounge in NICU and a suite of two single rooms with ensuite in the PICU.
- A Parent Accommodation facility comprising 29 single rooms with amenities.
- Long stay facility is a self-contained suite of six motel-style units and two communal kitchens configured around an internal courtyard. The units are intended for use by children who have undergone organ transplantation and their families and require close monitoring in relative isolation to minimise the risk of infection and organ rejection.

Ronald McDonald House (RMDH) is located on the CHW campus. The original RMDH commissioned in 1995 and been replace with the a newly constructed multistorey facility comprising 60 bed rooms, 6 kitchens, indoor and outdoor entertainment areas and provides for some 1360 families staying per year. Accommodation is offered for parents with seriously ill children receiving treatment at CHW. Priority is given to families who liver further from the hospital and/or recently diagnosed, seriously injured or who require emergency treatment.

Challenges and opportunities

- In 2016/17 an average of 235 children were in a hospital bed overnight or longer - 28 staying 1 or 2 nights and 207 staying 3 nights more. With over 60% of children admitted to the hospital aged under 5 years and the majority of children staying for 3 nights or more it is assumed that parents/carers desire to stay on-campus or nearby.

Table 92 – Overnight Beds days and residential distance from CHW – 2016/17

Distance from CHW	LOS 2 nights or less	LOS 3 nights or more	Total overnight bed days
0 – 20 kms	6,534	32,251	41,785
21 – 50 kms	2,118	19,824	22,447
51 – 100 kms	395	4,814	5,209
101 kms	855	12,472	12821
Interstate	91	1,588	1,679
Overseas	95	1,894	1989
Unknown	4	17	22
Total	10,092	75,860	85,952

Source: *MoH FlowInfo V17.0 (excluding ED only and Day Only activity)*

- A significant issue for CHW is the current level of unmet demand for parent/carer accommodation, in particular where there is a need to accommodate parents/carers in an emergency situation.
- Hotel accommodation in proximity to the hospital is limited to one small motel which services Westmead Hospital as well as CHW. Other private hotels are located in excess of one kilometre from the hospital with a convoluted road journey to Parramatta.
- The need to develop a strategy/business model to respond to the increasing demand for parent/carer accommodation.

Strategic response

1. Facility planning for inpatient wards in future redevelopments and refurbishments will include a high proportion of single rooms with rooming-in facilities for a parent/carer.
2. The commissioning of the CHW Short Stay inpatient unit in the CASB will deliver 30 single patient rooms and 2 shared 2 patient bed rooms with a rooming-in area for a carer. In addition, the Carer's Retreat located adjacent to the Unit includes one bed-room which can be used for emergency overnight accommodation for the Emergency Department and Short Stay Unit.
3. Development a long-term Strategy/Business Model outlining options for addressing the need for on-campus and off-campus accommodation for Parents/Carers.

15. CONSULTATION PROCESS

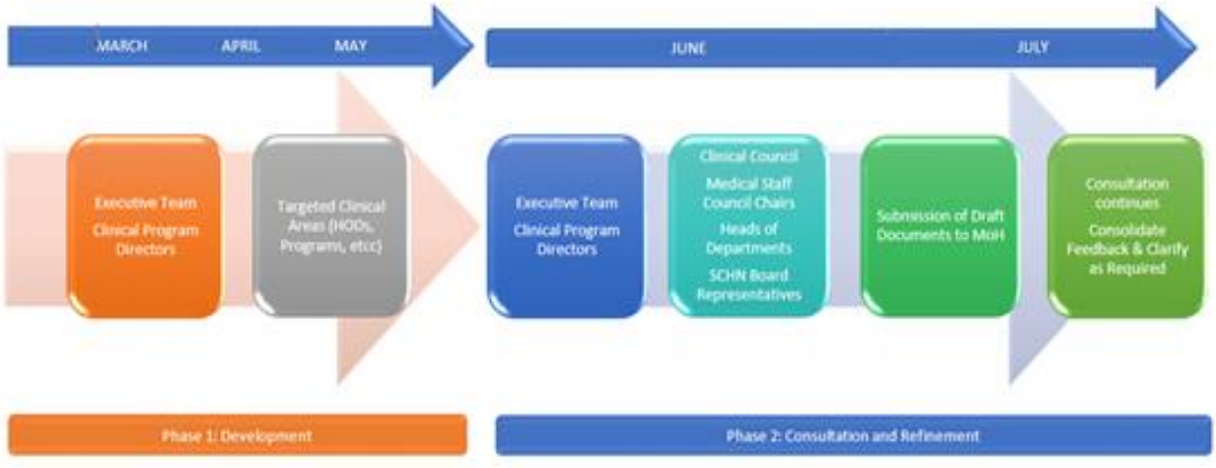
This section summarises the key issues raised by internal and external stakeholders.

The Network has been developing Clinical Service Plans for CHW and SCH. This has ensured a "whole-of-Network" approached is embedded into clinical planning and serving the children of NSW.

The consultation process for the CHW CSP 2018 – 31 has incorporated consultation exercises undertaken over the past two and a half years. This has included:

- CHW CSP 2016 to support CHW Stage 1 expansion. The focus being the in-scope services for Stage 1, in particular the Emergency Department and Paediatric Short Stay Unit;
- CHW Master Plan in late 2015. A highly consultative process with clinicians and consumers to outline the strategy for development and renewal of CHW to 2030. Over 370 staff responded to a survey, and forty (40) clinicians and two (2) Consumer Council representatives were participants in the development of the Master Plan.
- The CHW CSP 2018 – 2031 has been developed over the period March to June 2018. Consultation has been limited to Clinical Program Directors, selected clinical leaders and Department Heads. Further and broader consultation has continued through 2019.

Figure 17 – Consultation process



The consultation focused on the identification and articulation of:

- issues confronting clinicians and non-clinicians with regard to current service delivery for the hospital as a whole and for specific clinical services;
- Aspects of clinical care delivered for specific paediatric patient populations which are expected to change over the coming decade as a consequence of greater demand, new technologies/medications, emerging medical condition
- Strategies which will impact on improving access to services, quality of patient care, efficiency and positions CHW as a world-class leader in care, education and research.

The consultation engagement activities provided a rich and informative source of information to undertake the service gap analysis and develop the opportunities for future development. The following is a summary of the common issues that emerged from the consultation.

1. At CHW **children are more unwell and with more complex conditions** than ten-years ago and require more care co-ordination and involvement of a multidisciplinary team.
2. There is a **greater use of the multidisciplinary models of care** in the provision of clinical services with a requirement for an increase in medical, nursing and allied health workforce and a potential for workforce shortages.

3. There are **significant gaps in the existing facility infrastructure including operating theatre capacity and interventional suites** to respond to changing emergency and planned surgical demand and ensure that the children are treated within benchmark standards.
4. The existing **bed-base is inadequate to accommodate current and future activity,** provide required isolation capacity, enable adoption of enhanced models of paediatric care and adoption of new and/or upgrade of existing technologies.
5. **Paediatric and Newborn Intensive Care Services are experiencing high demand** and are at physical capacity is in urgent need to increase critical care capacity.
6. There is a need to take advantages of **opportunities to enhance paediatric services in LHDs (particularly Western Sydney and South Western Sydney) and in the community** so that they can respond to the demand generated by population growth and reduce reliance on the CHW and SCH and for the provision of paediatric care.
7. **Adoption of digital health strategies is increasing,** however in the clinical environment their use is time consuming and can impact on time with patients.
8. **New and emerging therapies including personalised medicine** will place increased demand on many of the hospital's highly specialised services in particular genetics, pathology, pharmacy, medicine and cancer.
9. **Workforce requirements need to be addressed** to support new models of care and respond to the projected increase in Emergency Department, admitted and non-admitted activity. This includes workforce planning, potential to extend scope of practice and ensure timely recruitment to minimise workforce shortages.
10. **Demand for allied health services is increasing and wait times are increasing** as a consequence of evolving service delivery models and pressures arising from hospital avoidance strategies and increase in demand for ambulatory services.
11. **Innovations in HITH, telehealth and care co-ordination** have been positive and can be expanded.
12. Changing **patient and community expectations** regarding the delivery of care, involvement in care, support for the family and quality of the hospital environment.
13. **Cancer Services are insufficient to meet current and future demand** and require expansion in facilities and end-of-life care should be incorporated into the facilities.
14. **An increasing proportion of patients are vulnerable due to social circumstances with a growing number of children in out-of-home-care** contributing t**o** an increased demand on child protection, mental health services and allied health services and a significant increased workload associated with liaison with community health and non-government organisations.
15. **General medicine** accounts for a major volume the hospital's admitted and non-admitted activity and is experiencing the highest growth in demand. Much of this growth is a result of an increasing number of children with multiple medical co-morbidities who are frequent users of the hospital's services for many years.
16. **Demand for Pathology Services** is increasing exponentially in response to the increase in admitted and non-admitted activity over many years. Realising the scope of highly specialised services provided by CHW pathology services there is an urgent need to determine the future model of service delivery with respect to NSW Pathology and the Westmead Precinct. There are significant infrastructure issues confronting pathology service with a requirement to address the spatial, configuration and functionality aspects for the immediate and medium term.

16. INTEGRATING EDUCATION AND TRAINING

Education and training, the conduct of research and access to state-of-the art information technology are considered integral to the current and future delivery of high quality patient care. The Network is a leader in the provision of paediatric education and training, research and application of information technology. There are long standing affiliations with University of Sydney, the University of NSW and the University of Technology, Sydney and evolving relationships with Notre Dame, Western Sydney and Macquarie Universities.

The vision for the Network is create a strong research and education culture and to embed education and training, research (ETR) and information technology (IT) into the how, where and when paediatric clinical care is provided and to continue to influence and contribute to children's health through high-quality education, research and high quality paediatric care.

Education and training is an important investment for the Network to ensure that current and future generations of its workforce are skilled and ready to provide high quality, safe and appropriate care for paediatric patients and their families.

The Network has a major role in undergraduate and post graduate education of health professionals including facilitation of education and training opportunities. Currently the Network has Student Placement Agreements in place with twenty-five higher education.

Over the next five-year period the Network's goal as set out in the Education and Training Plan 2017 – 2022 is to be prepared for, and incorporate new, cutting edge models of training (eg simulation, telehealth and virtual reality based training) including the delivery of education and training programs informed by research and

- An increase in the number of student placements;
- Implemented and evaluated innovative methods of education and training; and,
- An education and training information hub.

At Westmead, CHW, the Sydney University Nursing School and Westmead Hospital have worked together to offer the Graduate Entry Masters (GEM) Program in the Nursing Program. This program allows participants to study from Westmead Campus and potentially enter the Precinct's workforce.

The integration of simulation based training to support paediatric clinical practice has been a hallmark of education and training at CHW. In addition to the integration of simulation training in the clinical areas, the Kim Oates Australian Paediatric Simulation Centre provides a dedicated facility for simulation training.

The University of Sydney Children's Hospital Westmead Clinical School, Department of the University's Faculty of Medicine and Health, coordinates placements for over 500 medical students annually.

In moving forward, CHW is taking advantage for greater collaboration and synergies offered the Westmead Precinct redevelopment. Partnership in the Westmead Health, Education and Research precinct has enabled the integration of education & training, research and information technology into clinical and facility planning for paediatric services in CHW Stage 1 development based on the principles that:

Every interaction is a teaching, learning and research opportunity;

- The environment supports inter-disciplinary collaboration, peer-to-peer learning, dialogue, visualisation and translation;
- There is a culture which supports the integration of students into the clinical teams; and,
- State of the art IT (information technology) enables contemporary research, learning and teaching opportunities.

The detailed integration of education and training achieved in the development of models of care for the paediatric service and in facility planning for CHW Stage 1 will be incorporated into the planning for Stage 2. This is particularly important for those services in Stage 1 and will also be in Stage 2 - Peri-operative, Medical Imaging, Pharmacy and Short Stay Inpatients.

17. INTEGRATING RESEARCH AND TECHNOLOGY

17.1 Research and Clinical Trials

Kids Research is the Network's research arm and includes Sydney Children's Hospital, the Kids Cancer Alliance and the Children's Hospital at Westmead.

Kids Research Has strong collaborations with biomedical institutes including the Children's Cancer Institute of Australia (CCIA) at Randwick and the Children's Medical Research Institute (CMRI), Westmead Institute of Medical Research (WIMR) as part of the Westmead Research hub and:

- Is a key member of Paediatrio, a cooperative joint venture between SCHN, Children's Cancer Institute and CMRI to coordinate and integrate paediatric research in Sydney and potentially NSW; and,
- A member of Sydney Health Partners and the Sydney Partnership for Health, Education, Research & Enterprise (SPHERE) which are two of the Advanced Health Research and Translation Centres in Australia as recognised by the National Health and Medical Research Council (NHMRC) for being a world leader in translating research into better community health outcomes.

There are approximately 180 FTE researchers, 150 post graduate students and 70 clinicians/academic research leaders undertaking research across five key research themes – genetics & genomic medicine, developing mind, clinical & implementation Sciences, Immunity, inflammation & infection and cancer.

The Network's strong research culture which aims to find cures for the prevention and treatment of ill health in children. Translational research provides patients and families early access to new and innovative treatments and improves the quality and efficiency of the Network's clinical services. Kids Research is looking to increasing the number of translational research projects.

The conduct of clinical trials has resulted in significant improvements in the management of medical conditions. The outcomes of clinical trials in children have been most noteworthy in the remarkable improvement in survival of children with cancer, particularly leukaemia. Clinical trials are an essential part of the development of new treatments and tests to prevent, detect or treat disease. The need to better integrate research and clinical care has led to the establishment the Clinical Research Centre on the Westmead campus. Commissioned in March 2018, this facility will facilitate the growth of research and particularly for the conduct of paediatric clinical trials.

The Westmead Redevelopment Innovation Centre will play a leading role in creating an environment which draws expertise, fosters a culture of innovation in health and attracts industry and commercial partners. As a Precinct partner Kids Research will benefit from new and additional opportunities to expand paediatric research and advances in research technology.

The development of CHW Stage 2 expansion will enable Kids Research to continue with the conduct of research including clinical trials, particularly childhood cancer. The facility planning and development of models of care will aim to support the integration of translational research into clinical care.

17.2 Information Technology

Digital and other technologies make possible the delivery of exceptional hospital services and treatments for patients and facilitate communication between health care professionals, patients and their families within and outside the hospital walls.

The Network has an aspiration of being a leader in ICT innovation to improve patient care and its integration program is working closely with eHealth NSW to further bring systems into alignment and increase consistency.

The Network's aims to create a single patient view for the medical record to address risks and inefficiencies for all patients and bring together hybrid and satellite records into one electronically accessible record. The Network's MEMORY strategy delivers clinical information systems that support the paediatric clinical teams and their families to record all aspects of care electronically.

The primary initiatives for ICT include Electronic Medication Management for the Sydney Children's Hospital, SurgiNet for the Children's Hospital at Westmead and SurgiNet Anaesthesia and device integration across the Network. FirstNet has gone

live at the CHW and will bring both major paediatric hospitals into alignment for these systems.

The Network's ICT implementation plan and WSLHD DHIP set out the extent of investment required to achieve the ICT vision in relation to SCHN and outline the platform for integration and corresponding investment by other partners (WSLHD).

17.3 The Virtual Hospital

The stage is set for the hospital without beds "the virtual hospital" – patients being treated at home or if not possible, a hospital or health service closer to home.

The Sydney Children's Hospital Network has focused on leveraging off technology to connect children and their families and the hospitals' clinical teams in ways that has not been possible in the past.

To date the Network has focused on growing cohort of children and adolescents with long term, chronic and complex disorders through the Kids GPS Care Coordination Program

With an emphasis on quality care, better care coordination and improved collaboration the Network now is seeking to ensure that it is leading embracing virtual care technology to improve patient outcomes and support the choices of patients and their families.

The Patient Cohort Model places patients and their needs at the centre of virtual care and a technology framework and a vision for new ways of working across the Network.

The Network has identified the requirements to streamline access to health services and information. The workforce requirement will see new roles being developed. The physical environment requirements have been identified.

The next stage is the development of the Virtual Care Centres at CHW and SCH and refinement on the model, development of the business case including bendfits realisation.

18. FUTURE DEVELOPMENT STRATEGIES

The Children's Hospital at Westmead is classified as a Peer2 – Specialist Paediatric Hospital. In 2031 CHW clinical roles will continue to be the provision of quaternary and tertiary service delivery and District-level services for children and their families from areas located close to CHW.

To ensure that the hospital can maintain the level of service delivery provide evidence-based and patient-centred clinical care, education and training and a develop leadership in the conduct of world-class research, expansion of the overall capacity (beds and services) is required to achieve this goal.

The following is a summary of the overarching strategic directions for future development. Individual service related strategies can be found in the relevant sections of the Plan.

Critical Care. Commissioning of the CHW Emergency Department in the CASB in 2020. Expansion, reconfiguration and increased bed capacity of both the Paediatric and Neonatal Intensive Care Units. Planning for NSW Poisons Information Centre including location, facility requirements and workforce.

NETS. SCHN and NSW Ministry of Health will be undertaking a planning process to consider the strategic development of NETS and the preferred long term location beyond the current lease to 2026. CHW and SCH will both be considered along with other sites in line with strategic direction re development.

Cancer. Enhance the capacity of the Cancer Service in medical oncology, chemotherapy/procedures, develop haematology and cancer genetics, and develop the Comprehensive Paediatric Cancer Centre model integrating inpatient and ambulatory services, clinical trials pharmacy and research. Development of the Acute Assessment Clinic as a model of care.

Cardiac. Increasing the bed base to meet service demand. Expand the physical capacity and services for inpatient and outpatient cardiology. Enhance the development of paediatric cardiac surgery to include heart transplantation. Improve access to rehabilitation and child development service to optimise patient outcomes. Increase access to ICU/HDU beds for cardiothoracic surgery patients corresponding to increased OR sessions.

Mental Health. Enhance the physical capacity of the mental health inpatient unit. Establish an ambulatory facility collocated with the inpatient unit. Establish a Mental Health Day Program. Develop innovative approaches to support children and young people with mental health problems including those presenting to the CHW Emergency Department.

General medicine and chronic and complex care. Increase the medical inpatient bed base including isolation capacity. Build on the acute short stay streaming model of care. Utilised advancing technology in sleep studies to enable sleep studies to be conducted in the home. Improved access to allied health services in the outpatient setting. Enhance services/workforce to meet increasing demand for medical services particularly for those patients with complex and ongoing care requirements. Provide additional outpatient clinics including specialty respiratory complex clinics with appropriate isolation facilities.

Neurology and Neurosurgery. Enhance neuro-interventional radiology services to meet demand for complex and highly specialised diagnostic and treatment of paediatric patients.

Surgical Services. Expand the capacity of the Peri-operative services to include additional operating rooms and enable. Expand and reconfigure the short-stay surgical model of care. Strengthen the existing networks with other LHDs to enhance access to paediatric surgical services closer to home.

Medical Imaging and Nuclear Medicine. Further development of Medical Imaging service model of integrate service provision across CHW Stage 1, CHW Stage 2 and the remainder of the hospital. Plan for the relocation of the 1.5T MRI Suite to be collocated with the 3.0T MRI to enhance service provision and enable the day-stay model of care to expand.

Ambulatory Care. Extended hours may provide flexibility for patients and families and the feasibility of this approach should be explored. Future planning will be undertaken to identify the volume of services to be provided to 2031 and proposed service models to inform infrastructure requirements and capital planning.

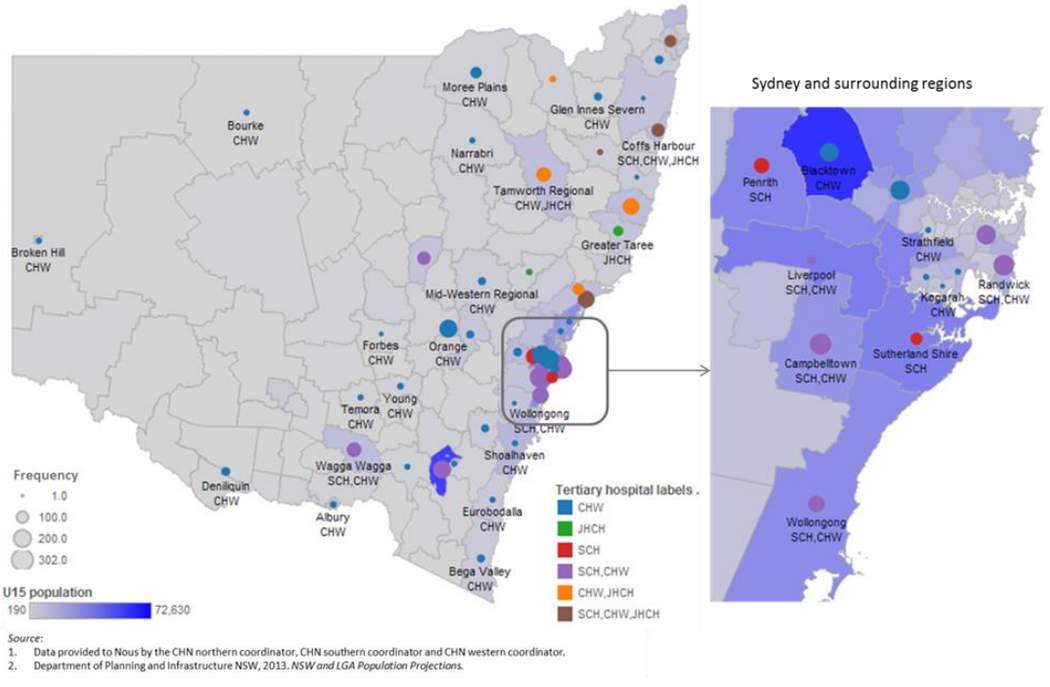
Palliative Care and end-of-life care. End of life care to be incorporated into models of care and planning of inpatient unit/ICUs.

18.1 Partnerships

The Network and works collaboratively with Local Health Districts and organisations in the community as service partners in relation to the provision and enhancement of paediatric services, build capacity and identify the resultant impact of services provides by the Network.

Both CHW and SCH have had long standing arrangements with Local Health Districts in the provision of paediatric outreach services within metropolitan Sydney and NSW generally and to the ACT.

Figure 18 – Paediatric outreach services



Source: *Paediatric Outreach Services Final Report 24 Aug 2014 compiled by Nous Group*

CHW has a strong and long-standing partnership with Western Sydney LHD. Westmead Hospital provides radiation oncology, Endoscopic Retrograde Cholangio-Pancreatography (ERCP) and Electro-Physiology Study (EPS) services to CHW patients and CHW provides critical care services particularly cardiac services, eye surgery and MRI services for Westmead Hospital neonates.

The Adolescent and Young Adults (AYA) Service has been incorporated into the development of the Westmead Precinct CASB. This important initiative between WSLHD and the Network will enable CHW patients transitioning to Westmead Hospital adult services to have access to ambulatory and support services in an environment which is conducive to the specific needs of young people particularly those with a disability.

In 2014 the release of the Surgery for Children in Metropolitan Sydney Strategic Framework provided direction to develop paediatric surgical services in Local Health Districts. The Network is collaborating with LHDs to develop strategies to expand their surgical capabilities and enable children to access non-complex paediatric surgery closer to home and reduce the need for admission to a specialist children's hospital.

A significant issue in western Sydney is growing number of children and young people diagnosed with a mental health condition and the lack of specialist child and adolescent mental health services to provide timely and appropriate services to this patient population. The development of the Child and Adolescent Mental Health Services (CAHMS) Clinical Service Plan by WSLHD and the Network aims to address the service gaps and outlines a future direction for enhancing acute inpatient and ambulatory mental health services for children and young people.

The Western Sydney Primary Health Network (PHN) as a partnership between the Network, WSLHD and the PHN developments

18.2 Enhancement of paediatric services statewide

The 2014 State Infrastructure Strategy identified significant CHW is working closely with WSLHD to enhance paediatric services in the LHD including the delivery of paediatric surgery at Blacktown Hospital, reducing the number of Blacktown LGA residents presenting to CHW Emergency Department, enhancing ambulatory paediatric services at Blacktown and Mt Druitt Hospital and planned health service development at Rouse Hill.

Preliminary discussions have been held with SWSLHD in terms of the LHDs strategic planning for the enhancement of paediatric services with emphasis on planned development for Campbelltown Hospital.

Meetings are held quarterly between the Network and NBMLHD in relation to the provision of paediatric services and strategic planning on enhancement of paediatric services locally. A particular focus is enhancement of paediatric surgery at Nepean Hospital. This has enabled CHW to support the conduct of more ENT surgery at Nepean Hospital.

Partnership with MLHD as part of the Integrated Care Program for the management and on-going care of children with complex medical conditions

19. APPENDICES

19.1 Role Delineation

		2013	2018	Networked with
Core Services	1. Anaesthesia and Recovery	6	6	
	2. Operating Suite	6	6	
	3. Close Observation Unit	NPS	4	
	4. Intensive Care Service	6	6	
	5. Nuclear Medicine	6	6	Westmead Hospital for PET
	6. Radiology & Interventional Radiology	6	6	
	7. Pathology	6	6	
	8. Pharmacy	6	6	
Clinical Services	**A. Emergency Medicine**	6	6	
	B. Medicine			
	B1. Cardiology and Interventional Cardiology	6	6	Westmead Hospital for EPS
	B2. Clinical Genetics	6	6	
	B3. Dermatology	6	6	
	B4. Endocrinology	6	6	
	B5. Gastroenterology	6	6	
	B6. General and Acute Medicine	6	6	
	B7. General Medicine	6	6	
	B8. Haematology	6	6	
	B9. Immunology	6	6	
	B10. Infectious Diseases	6	6	
	B11. Neurology	6	6	
	B12. Oncology – Medicine	6	6	
	B13. Oncology – Radiation	4	4	Westmead Hospital for Onc Radiation
	B14. Palliative Care	6	6	
	B15. Rehabilitation Medicine	6	6	
	B16. Renal Medicine	6	6	
	B17. Respiratory and Sleep Medicine	6	6	
	B18. Rheumatology	6	6	
	B19. Sexual Assault Services	6	6	
	B20. Sexual Health	5	5	
	C. Surgery			
	C1. Burns	6	6	
	C2. Cardiothoracic Surgery	6	6	
	C3. Ear, Nose and Throat Surgery	6	6	
	C4. General Surgery	6	6	
	C5. Gynaecology	2	2	
	C6. Neurosurgery	6	6	
	C7. Ophthalmology	6	6	
	C8. Oral Health	6	6	
	C9. Orthopaedic Surgery	6	6	
	C10. Plastic Surgery	6	6	
	C11. Urology	6	6	
	C12. Vascular Surgery	6	6	
	D. Child and Family Health Services			
	D1. Child and Family Health	4	4	
	D2. Child Protection Services	6	6	
	D3. Maternity	NPS	NPS	
	D4. Neonatal	6	6	
	D5. Paediatric Medicine	6	6	
	D6. Surgery for Children	6	6	
	D7. Youth Health	6	6	
	E. Mental Health & Drug and Alcohol Services			
	E1. Child/Adolescent Mental Health (Inpatient Care)	6	6	
	E2. Child/Adolescent Mental Health (Community Care)	NPS	NPS	
	E3. Adult Mental Health (Inpatient Care)	NPS	NPS	
	E4. Adult Mental Health (Community Care)	NPS	NPS	
	E5. Older Adult Mental Health (Inpatient Care)	NPS	NPS	
	E6. Older Adult Mental Health (Community Care)	NPS	NP	
	E7. Drug and Alcohol Services	1	1	
	F. Aboriginal Health	2	2	
	G. Community Health	2	2	

19.2 Emergency Department Activity - 2012/13 to 2016/17

ED ESRG NM	12/13	13/14	14/15	15/16	16/17	% change
Admitted Triage 1-2	1676	1727	1703	1997	2236	33%
Admitted Triage 3	7572	7456	7660	8041	8440	11%
Admitted Triage 4-5	3901	4805	5390	4647	4518	15%
Admitted Total	13149	13988	14753	14685	15194	12%
Did not Wait	6392	4753	3854	6468	6266	-2%
Non admitted Triage 1-2	420	357	305	346	365	-13%
Non admitted Triage 3	6628	5318	4928	5680	6026	-9%
Non admitted Triage 4-5	24929	29518	32160	30656	29832	20%
Departed Total	31977	35193	37393	36682	36223	13%
Total presentations	51518	53935	56000	57836	57684	12%

Source: *MoH CaSPA EDAA 2017*

Triage Category	2012/13	2013/14	2014/15	2015/16	2016/17	% change
1	281	316	340	454	476	69%
2	1815	1768	1668	1890	2126	17%
3	14280	12792	12603	13750	14502	2%
4	34516	38383	40902	41298	40197	16%
5	626	676	487	444	383	-39%
	51518	53935	56000	57836	57684	12%

Source: *MoH CaSPA EDAA 2017*

LHD of residence	2012/13	2013/14	2014/15	2015/16	2016/17	Change (n)	Change (%)
ACT	67	71	69	79	76	9	13%
Central Coast	227	262	284	269	281	54	24%
Far West	0	1	1	0	1	1	n/a
Hunter New England	164	189	217	169	182	18	11%
Illawarra Shoalhaven	100	140	118	143	146	46	46%
Mid North Coast	49	49	58	48	71	22	45%
Murrumbidgee	64	55	65	69	73	9	14%
Nepean blue Mountains	2702	2780	2781	3118	2898	196	7%
Northern Territory	12	19	6	6	7	-5	-42%
Northern	16	30	21	11	9	-7	-44%
Northern Sydney	3395	3369	3615	3590	3517	122	4%
Other	806	600	441	460	571	-235	-29%
Queensland	100	93	74	91	89	-11	-11%
South Australia	19	20	22	27	16	-3	-16%
South Eastern Sydney	427	393	399	404	390	-37	-9%
South Western Sydney	8418	8579	8781	9154	9311	893	11%
Southern	73	63	51	53	62	-11	-15%
Sydney	3067	3382	3503	3476	3295	228	7%
Tasmania	4	0	5	6	5	1	25%
Victoria	76	95	83	94	87	11	14%
West Australia	27	28	24	22	22	-5	-19%
Western	270	250	264	311	219	-51	-19%
Western Sydney (CHW Catchment)	20858	22465	23685	24413	24710	3852	18%
Western Sydney (remainder)	10561	11013	11430	11834	11638	1077	10%
Western Sydney (Total)	31419	33478	35115	36247	36348	4929	16%
Total	51502	53946	55997	57847	57676	6174	12%

Source: *MoH CaSPA EDAA 2017*

19.3 Inpatient Activity – 2012/13 to 2016/17

19.3.1 Acute inpatient activity

	12/13	13/14	14/15	15/16	16/17	12/13	13/14	14/15	15/16	16/17	Change (%)	
	SEPARATIONS					BED DAYS					Seps	BDays
11 Cardiology	308	336	319	311	350	1127	1316	1352	1086	1142	14%	1%
12 Interventional Card	342	193	236	219	217	393	298	468	477	333	10%	-15%
13 Dermatology	372	326	343	338	282	893	825	872	855	552	-24%	-38%
14 Endocrinology	564	526	534	577	528	1210	945	896	1160	924	-6	-24%
15 Gastroenterology	1672	1602	1776	1874	2043	4467	3965	4044	4280	4601	22%	3%
16 Diag GI Endoscopy	524	507	517	549	551	935	1024	800	849	962	5%	3%
17 Haematology	1746	1887	1969	2036	2137	7665	8840	8173	7934	8710	22%	14%
18 Imm & Infection	461	479	475	446	462	583	656	649	485	637	0	9%
21 Neurology	1859	1634	1833	1613	1829	5384	4378	4928	4785	4999	-2%	-7%
22 Renal Med	126	130	161	203	218	293	290	513	331	566	73%	96%
24 Resp Med	3386	3654	4173	4339	4507	9586	10312	10630	10955	11375	33%	19%
25 Rheumatol	637	695	619	556	534	939	918	963	813	883	-16%	-6%
26 Pain manage	58	73	61	55	53	206	212	206	157	334	-9%	62%
27 Non sub Med	3609	4190	4467	4447	4476	8341	8656	9055	9330	9279	24%	11%
41 Breast Surg	9	5	12	5	14	12	5	16	5	24	56%	100%
42 Cardiothor Surg	265	271	296	293	267	2266	2242	2715	2526	2281	1%	1%
43 Colorectal Surg	145	154	135	128	145	793	1064	1357	689	914	0	15%
44 Upper GI Surg	231	194	200	206	225	1576	1267	1655	1884	1567	-3%	-1%
46 Neurosurgery	421	468	463	418	445	3124	2883	3176	2980	2880	6%	-9%
47 Dentistry	226	244	226	260	283	284	292	270	301	339	25%	19%
48 ENT. Head/Neck	1459	1317	1247	1245	1234	2140	2021	1918	1856	2109	-15%	-1%
49 Orthopaedics	2967	3231	3219	2975	3091	8522	8913	9370	8167	8160	4%	-4%
50 Ophthalmology	810	787	807	896	890	1162	1109	1043	1154	1197	10%	3%
51 Plast & Rec Surg	1050	1220	1242	1130	1115	1835	2294	2455	1983	1857	6%	1%
52 Urology	1178	1022	994	1037	1150	1700	1572	1689	1617	1827	-2%	7%
53 Vascular Surg	415	460	424	412	278	783	1074	733	684	569	-33%	-17%
54 NonSubsp Surg	1770	1992	2024	1867	1861	4811	5370	4782	4678	4754	5%	-1%
61 Transplant	26	22	28	25	25	896	784	654	825	801	-4%	-1%
62 Exten Burns	77	80	78	80	64	532	483	541	780	437	-17%	-18%
63 Tracheostomy	112	107	95	112	100	4178	4558	4044	4832	4388	-11%	5%
71 Gynaecology	97	99	96	119	120	203	211	258	188	234	24%	↑15
72 Obstetrics	1	1	0	1	1	1	1	0	4	1	n/a	n/a
73 Qual Neonate	460	493	421	452	531	1481	1669	1287	1655	1741	15%	18%
75 Perinatology	377	361	384	345	396	9040	7876	8596	10102	9376	5%	4%
81 Drug & Alcohol	134	166	202	127	118	189	274	279	261	184	-12%	-3%
99 Unallocated	16	7	46	53	45	62	66	110	77	133	45%	Sig%
Total	**27910**	**28933**	**30122**	**29749**	**30585**	**87612**	**88663**	**90497**	**90745**	**91070**	**10%**	**3%**

Source: *MoH CaSPA FlowInfo Version 17.0 SRG 5.0 (excl entirely in ED)*

19.3.2 Sub-acute Inpatient activity

	12/13	13/14	14/15	15/16	16/17	12/13	13/14	14/15	15/16	16/17	Change (%)	
	SEPARATIONS					BED DAYS					Seps	Bed Days
84 Rehabilitation	45	68	93	67	143	88	552	1320	1592	1229	218%	Sig%
86 Palliative Care	1	251	291	278	278	1	1887	2018	1965	1941	n/a	n/a
87 Maintenance	0	8	8	4	2	0	132	47	18	156	n/a	n/a
Total	**46**	**327**	**392**	**349**	**423**	**89**	**2571**	**3385**	**3575**	**3326**	**Sig%**	**Sig%**

19.3.3 Mental Health Inpatient Activity

PATIENT TYPE	ESR Gv50 Code and Name	SEPARATIONS					
		2012/13	2013/14	2014/15	2015/16	2016/17	Change
Acute	823 - Mental Health treatment, same day (excl ECT)	37	25	28	39	41	11%
	825- Schizophrenia, paranoia & acute psychotic disord	0	0	0	0	1	n/a
	826 – Major affective disorders	6	9	12	14	7	17%
	827 – other affective and somatoform disorders	12	12	19	19	5	-58%
	828 – Anxiety disorders	31	50	32	28	34	10%
	829 – Other Psychiatry	20	11	15	17	12	-40%
	881 – Eating and obsessive-compulsive disorders	93	98	111	113	113	22%
	882 – Personality disorders and acute reactions	22	6	9	10	21	-5%
	Total	**221**	**211**	**225**	**240**	**234**	**6%**
Psychiatric	829 – Other Psychiatry	94	82	116	140	173	84%
	Total	**94**	**82**	**116**	**140**	**173**	**84%**
TOTAL		**315**	**293**	**341**	**381**	**407**	**29%**
		BED DAYS					
		2012/13	2013/14	2014/15	2015/16	2016/17	Change (%)
Acute	823 - Mental Health treatment, same day (excl ECT)	37	25	28	39	41	11%
	825- Schizophrenia, paranoia & acute psychotic disord	0	0	0	0	9	n/a
	826 – Major affective disorders	65	81	88	180	53	-28%
	827 – other affective and somatoform disorders	132	75	149	134	34	-74%
	828 – Anxiety disorders	231	508	435	341	358	55%
	829 – Other Psychiatry	155	488	44	105	116	-25%
	881 – Eating and obsessive-compulsive disorders	2251	2792	2393	2719	2139	-5%
	882 – Personality disorders and acute reactions	98	28	24	83	82	-16%
	Total	**2969**	**3997**	**3161**	**3601**	**2832**	**-5%**
Psychiatric	**829 – Other Psychiatry**	2434	2327	3706	3948	2799	15%
	Total	**2434**	**2327**	**3706**	**3948**	**2799**	**15%**
TOTAL		**5403**	**6324**	**6867**	**7549**	**5631**	**4%**

Source: *MoH CaSPA FlowInfo V17.0 (Excl entirely within the ED) SRG Psychiatry Acute*

Other	12/13	13/14	14/15	15/16	16/17	% Δ	12/13	13/14	14/15	15/16	16/17	% Δ
	Separations						Bed days					
20 - Chemotherapy	121	189	128	170	275	127%	121	189	128	170	275	127%
23 - Renal Dialysis	898	1118	608	399	716	-20%	898	118	608	399	716	-20%5%
Total	**1019**	**1307**	**736**	**569**	**991**	**-3%**	**1019**	**307**	**736**	**569**	**991**	**-3%%**

Source: *MoH CaSPA FlowInfo Version 17.0 SRG 5.0 (excl entirely in ED)*

Patient Type Code and Name	12/13	13/14	14/15	15/16	16/17	% Δ	12/13	13/14	14/15	15/16	16/17	% Δ
	Separations						Bed days					
01 – Acute	29044	30447	31079	30556	31806	10%	91590	93928	94340	94898	94853	4%
02 - Psychiatric	94	82	116	141	173	84%	2434	2327	3706	3948	2799	15%
04 – Sub and Non Acute	46	328	392	349	423	Sig%	89	2607	3385	3575	3326	Sig%
09 - Other	6	3	4	2	4	33%	10	3	54	17	40	Sig%
Total	**29190**	**30860**	**31591**	**31048**	**32409**	**11%**	**94123**	**98865**	**101485**	**102438**	**101018**	**7%**

Source: *MoH CaSPA FlowInfo Version 17.0 SRG 5.0 (excl entirely in ED)*

19.4 Operating Room activity – 2012/13 to 2018/19

		12/13	13/14	14/15	15/16	16/17	17/18	18/19
Theatre Attendances	No of Operating Room attendances	14402	14632	14651	14486	14,486	13965	14036
Theatre Utilisation for Book sessions	Theatre – Minutes Used - Numerator	721840	738035	766040	802133	791954	793074	772674
	Theatre – Total Mins Staffed Sessions Denominator	838330	94020	947824	977210	992200	987990	1020110
First Case on Time Theatre Performance	Number of Defined on time starts - Numerator	2518	2522	2557	2463	2662	1946	1012
	Number of sessions scheduled - Denominator	3792	3792	3815	3893	3980	2936	2091
Cancellations on Day of Planned Surgery	Cancellations on Day of surgery (Patient Related)	466	256	268	339	153	370	372
	Cancellations on Day of Surgery (Hospital Related)	225	286	294	329	255	419	364
	Booked surgical cases completed	14402	10343	10644	10369	10222	10201	10167

19.5 Non-Admitted Patient (NAP) Service Events

Division - Clinica	Department - Clinic	2016/17	2017/18	2018/19
CARPA – W	Ambulatory Service - N	0	0	497
	Audiology - W	2495	2799	2305
	Child Development - W	3525	3702	2691
	Child Life Therapy - W	2563	6031	1687
	Deafness – W	771	781	759
	Dermatology - W	1684	1715	1475
	Nutrition & Dietetics - W	9771	14365	9052
	Occupational Therapy - W	6298	10674	5591
	Orthotics - W	4741	4637	3788
	Outpatients - W	38055	38187	37040
	Physiotherapy - W	16241	22334	12780
	Rehabilitation - W	7232	7072	6209
	Social Work - W	3020	5779	2195
	Speech Pathology - W	1671	2418	1584
	Turner Ward - W	1252	1746	3360
	Weight Management - W	673	692	662
	Total	**99992**	**122932**	**91675**
Critical Care - N	Emergency Medicine - W	822	662	740
	Heart Centre for Children - W	1358	1466	1775
	Neonatology - W	437	464	434
	Total	**2617**	**2592**	**2949**
Diagnostic Imaging – W	Medical Imaging – W	20	35	45
Diagnostics Pathology - W	Allergy and Immunology – W	4430	4915	4946
	Clinical Genetics – W	807	838	812
	Haematology – W	1885	1608	1319
	Infectious Diseases and Microbiology – W	84	82	126
	Institute of Endocrinology and Diabetes – W	5446	4512	4133
	Western Sydney Genetics Program Admin – W	556	531	693
	Total	**13208**	**12486**	**12529**
KRI – W	RU Institute of Neuroscience and Muscle Research – W	131	178	322
Medical – W	Bear Cottage - W	43	51	81
	Gastroenterology - W	2870	2353	2298
	General Medicine – W	2737	3091	3308
	Nephrology – W	1501	1872	1737
	Neurology – W	3549	3259	3454
	Neurosurgery – W	259	175	204
	Oncology – W	10732	8625	11262
	Pain Medicine Department – W	882	672	730
	Palliative Care Department – W	1151	987	1026
	Pharmacy – W	142	142	134
	Renal Treatment Centre - W	51	69	23
	Respiratory Medicine – W	2765	2284	3081
	Respiratory Support Service (Sleep Unit) – W	3033	3198	1429
	Total	**29715**	**26779**	**28767**
Priority Populations – N	Adolescent Medicine – W	3315	3160	4172
	Child Protection – W	1002	745	1028
	Priority Populations Management – N	391	306	282
	Trapeze – N	2555	2371	1586
	Total	**7263**	**6582**	**7068**
Surgical_Anaesthetics – W	Burns and Plastic Surgery Treatment Centre – W	3882	3765	3761
	Cochlear Implant Centre – W	3244	2842	2519
	Dentistry - W	53	56	56
	Department of Surgery - W	5351	5078	4972
	Ear, Nose and Throat (ENT) - W	2624	2494	2756
	Ophthalmology - W	8815	9165	9505
	Orthopaedics - W	15280	16652	16357
	Orthoptics – W	6340	6191	5073
	Plastic Surgery – W	4557	4957	4931
	Total	**50148**	**51201**	**4993**
Grand total		**203124**	**222915**	**193536**

19.6 Inpatient Activity projections – Episodes

19.6.1 Acute

ACUTE	ACTUAL	PROJECTED			ACTUAL	PROJECTED			ACTUAL	PROJECTED		
SRG V50	**16/17**	**20/21**	**25/26**	**20/31**	**16/17**	**20/21**	**25/26**	**20/31**	**16/17**	**20/21**	**25/26**	**20/31**
	DAY ONLY				**OVERNIGHT**				**TOTAL**			
11Cardiology	159	165	170	250	191	192	195	400	350	357	365	650
12 Inter Cardiology	15	30	32	33	202	204	206	208	217	234	238	241
13 Dermatology	144	146	151	165	138	177	206	225	282	323	357	390
14 Endocrinology	363	418	435	467	165	197	201	209	528	615	636	676
15 Gastroenterology	938	1059	1282	1469	1105	1175	1318	1485	2043	2234	2600	2954
16 Diag GI Endoscop	442	472	498	559	109	115	120	125	551	587	618	684
17 Haematology	1386	1628	1904	2208	751	758	841	951	2137	2386	2745	3159
18 Immun & Infect	400	553	634	713	62	58	57	57	462	611	691	770
21 Neurology	811	1008	1145	1306	1018	1266	1420	1528	1829	2274	2565	2834
22 Renal Medicine	164	168	170	172	54	45	46	46	218	213	216	218
24 Respiratory Med	1291	1132	1335	1495	3216	3392	3834	4299	4507	4524	5169	5794
25 Rheumatology	423	668	734	797	111	97	99	99	534	765	833	896
26 Pain Management	0	0	0	0	53	58	60	59	53	58	60	59
27 Non-Subsp Med	1812	2020	2345	2668	2664	3206	3659	4190	4476	5226	6004	6858
41 Breast Surgery	4	3	6	3	10	10	11	12	14	13	17	15
42 Cardiothor Surg	1	0	0	0	266	293	294	301	267	293	294	301
43 Colorectal Surg	51	40	39	41	94	101	105	102	145	141	144	143
44 Upper GI Surg	13	9	9	10	212	204	212	240	225	213	221	250
45 Neurosurgery	13	1	1	2	432	468	490	504	445	469	491	506
46 Dentistry	187	190	195	200	96	65	69	67	283	255	264	267
48 ENT Head Neck	622	777	901	983	612	689	748	810	1234	1466	1649	1793
49 Orthopaedics	1417	1687	1899	2129	1674	2136	2395	2633	3091	3823	4294	4762
50 Ophthalmology	708	836	956	1110	182	179	181	185	890	1015	1137	1295
51 Plast & Recon S	705	771	833	934	410	577	639	676	1115	1348	1472	1610
52 Urology	811	966	1120	1282	339	421	477	516	1150	1387	1597	1798
53 Vascular Surgery	202	319	321	339	76	138	141	139	278	457	462	478
54 Non Subsp Surg	624	886	1003	1106	1237	1438	1599	1778	1861	2324	2602	2884
61 Transplantation	0	0	0	0	25	27	30	33	25	27	30	33
62 Extensive Burns	27	20	20	20	37	57	55	58	64	77	75	78
63 Tracheostomy	0	0	0	0	100	105	110	115	100	105	110	115
71 Gynaecology	58	48	43	46	62	60	64	72	120	108	107	118
72 Obstetrics	1	0	0	0	0	0	0	0	1	0	0	0
73 Qual Neonates	56	58	60	70	475	402	433	462	531	460	493	532
75 Perinatology	0	0	0	0	396	427	447	477	396	427	447	477
99 Unallocated	34	35	36	36	11	1	1	1	45	36	37	37
	13882	16113	18277	20613	16585	18738	20763	23062	30467	34851	39040	43675

19.6.2 Sub-acute

SUB-ACUTE	ACTUAL	PROJECTED			ACTUAL	PROJECTED			ACTUAL	PROJECTED		
SRG V50	**16/17**	**20/21**	**25/26**	**20/31**	**16/17**	**20/21**	**25/26**	**20/31**	**16/17**	**20/21**	**25/26**	**20/31**
	Day only				**Overnight**				**Total**			
84 Rehabilitation	110	115	480	480	33	38	46	57	143	153	526	537
86 Palliative Care	2	2	2	2	276	302	302	312	278	304	304	314
87 Maintenance	0	0	0	0	2	10	13	14	2	10	13	14
Total	112	117	482	482	311	350	361	383	423	467	843	865

19.6.3 Mental Health

MENTAL HEALTH	ACTUAL	PROJECTED			ACTUAL	PROJECTED			ACTUAL	PROJECTED		
SRG V50	**16/17**	**20/21**	**25/26**	**20/31**	**16/17**	**20/21**	**25/26**	**20/31**	**16/17**	**20/21**	**25/26**	**20/31**
	Day only				**Overnight**				**Total**			
Psychiatry-Acute	41	49	890	1680	366	430	480	600	407	479	1370	2280

19.6.4 Total

TOTAL	ACTUAL	PROJECTED			ACTUAL	PROJECTED			ACTUAL	PROJECTED		
	16/17	**20/21**	**25/26**	**20/31**	**16/17**	**20/21**	**25/26**	**20/31**	**16/17**	**20/21**	**25/26**	**20/31**
	Day only				**Overnight**				**Total**			
Acute	13882	16113	18277	20613	16585	18738	20763	23062	30467	34851	39040	43675
Sub-acute	112	117	482	482	311	350	361	383	423	467	843	865
Mental Health	41	49	890	1680	366	430	480	600	407	479	1370	2280
Total	14035	16279	19649	22775	17262	19518	21604	24045	31297	35797	41253	46820

19.7 Inpatient activity projections – Bed days

19.7.1Acute

ACUTE	ACTUAL	PROJECTED			ACTUAL	PROJECTED			ACTUAL	PROJECTED		
SRG V50	**16/17**	**20/21**	**25/26**	**20/31**	**16/17**	**20/21**	**25/26**	**20/31**	**16/17**	**20/21**	**25/26**	**20/31**
	Day only				**Overnight**				**Total**			
11Cardiology	159	165	170	250	983	1133	1160	1700	1142	1298	1330	1950
12 Inter Cardiology	15	30	32	33	318	411	412	416	333	441	444	449
13 Dermatology	144	146	151	165	408	550	580	650	552	696	731	815
14 Endocrinology	363	418	435	467	561	678	685	716	924	1096	1120	1183
15 Gastroenterology	938	1059	1282	1469	3663	3700	3880	4155	4601	4759	5162	5624
16 Diag GI Endoscop	442	472	498	559	520	530	540	560	962	1002	1038	1119
17 Haematology	1386	1628	1904	2208	7324	7400	7700	8600	8710	9028	9604	10808
18 Immun & Infect	400	553	634	713	237	210	207	207	637	763	841	920
21 Neurology	811	1008	1145	1306	4188	5000	5500	5800	4999	6008	6645	7106
22 Renal Medicine	164	168	170	172	402	330	332	331	566	498	502	503
24 Respiratory Med	1291	1132	1335	1495	10084	10500	11500	12000	11375	11632	12835	13495
25 Rheumatology	423	668	734	797	460	433	445	446	883	1101	1179	1243
26 Pain Manage	0	0	0	0	334	187	191	189	334	187	191	189
27 Non-Subsp Med	1812	2020	2345	2668	7467	8000	8800	9586	9279	10020	11145	12254
41 Breast Surgery	4	3	6	3	20	16	17	18	24	19	23	21
42 Cardiothor Surg	1	0	0	0	2280	2567	2618	2690	2281	2567	2618	2690
43 Colorectal Surg	51	40	39	41	863	1250	1339	1348	914	1290	1378	1389
44 Upper GI Surg	13	9	9	10	1554	1600	1700	1790	1567	1609	1709	1800
45 Neurosurgery	13	1	1	2	2867	3490	3600	3700	2880	3491	3601	3702
46 Dentistry	187	190	195	200	152	112	121	300	339	302	316	500
48 ENT Head Neck	622	777	901	983	1487	1550	1550	1600	2109	2327	2451	2573
49 Orthopaedics	1417	1687	1899	2129	6743	7490	8331	8900	8160	9177	10230	11029
50 Ophthalmology	708	836	956	1110	489	495	500	550	1197	1331	1456	1660
51 Plast & Recon S	705	771	833	934	1152	1661	1842	1928	1857	2432	2675	2862
52 Urology	811	966	1120	1282	1016	1200	1300	1322	1827	2166	2420	2604
53 Vascular Surgery	202	319	321	339	367	472	500	540	569	791	821	879
54 Non Subsp Surg	624	886	1003	1106	4130	4300	4700	5300	4754	5186	5703	6406
61 Transplantation	0	0	0	0	801	935	931	1024	801	935	931	1024
62 Extensive Burns	27	20	20	20	410	502	500	511	437	522	520	531
63 Tracheostomy	0	0	0	0	4388	4900	5200	5500	4388	4900	5200	5500
71 Gynaecology	58	48	43	46	176	165	171	199	234	213	214	245
72 Obstetrics	1	0	0	0	0	0	0	0	1	0	0	0
73 Qual Neonates	56	58	60	70	1685	1856	1789	1750	1741	1914	1849	1820
75 Perinatology	0	0	0	0	9376	9700	9750	10500	9376	9700	9750	10500
99 Unallocated	34	35	36	36	99	6	6	6	133	41	42	42
Total	13882	16113	18277	20613	77004	83329	88397	94832	90886	99442	106674	115435

19.7.2 Sub-Acute

SUB-ACUTE	ACTUALI	PROJECTED			ACTUAL	PROJECTED			ACTUAL	PROJECTED		
SRG V50	**16/17**	**20/21**	**25/26**	**30/31**	**16/17**	**20/21**	**25/26**	**20/31**	**16/17**	**20/21**	**25/26**	**20/31**
	Day only				**Overnight**				**Total**			
84 Rehabilitation	110	115	480	480	1,119	1460	1600	1800	1229	1575	2080	2280
86 Palliative Care	2	2	2	2	1,939	1945	1904	1985	1941	1947	1906	1987
87 Maintenance	0	0	0	0	156	74	110	119	156	74	110	119
Total	112	117	482	482	3,214	3479	3614	3904	3326	3596	4096	4386

19.7.3 Mental Health

MENTAL HEALTH	ACTUAL	PROJECTED			ACTUAL	PROJECTED			ACTUAL	PROJECTED		
SRG V50	**16/17**	**20/21**	**25/26**	**20/31**	**16/17**	**20/21**	**25/26**	**20/31**	**16/17**	**20/21**	**25/26**	**20/31**
	Day only				**Overnight**				**Total**			
Psychiatry - Acute	41	49	890	1680	5590	6300	7500	9000	5631	6349	8390	10680

19.7.4 Total

TOTAL	ACTUAL	PROJECTED			ACTUAL	PROJECTED			ACTUAL	PROJECTED		
SRG V50	**16/17**	**20/21**	**25/26**	**20/31**	**16/17**	**20/21**	**25/26**	**20/31**	**16/17**	**20/21**	**25/26**	**20/31**
	Day only				**Overnight**				**Total**			
Acute	13882	16113	18277	20613	77004	83329	88397	94832	90886	99442	106674	115435
Sub-acute	112	117	482	482	3,214	3479	3614	3904	3326	3596	4096	4386
Psychiatry-Acute	41	49	890	1680	5590	6300	7500	9000	5631	6349	8390	10680
Total	14035	16279	19649	22775	85,808	93108	99511	107736	99843	109387	119160	130501

19.8 Acronyms / Abbreviations

ABS	Australian Bureau of Statistics
AIHW	Australian Institute of Health and Welfare
ALOS	Average length of stay
AMU	Adolescent Medical Unit
ASP	Asset Strategic Plan
AYA	Adolescents and Young Adults
BMT	Bone Marrow Transplant
CARPA	Community, Allied Health Rehabilitation,
CASB	Central Acute Services Building
CaSPA	Clinical Service Planning Analytics
CHD	Congenital Heart Disease
CHERI	Children's Hospital Education Research Institute
CHISM	Children's Hospital Institute for Sport Medicine
CHW	The Children's Hospital at Westmead
CMC	Children with Medical Complexity
CPAP	Continuous Positive Airway Pressure
CSP	Clinical Services Plan
CT	Computerised Tomography
DO	Day only
DOSA	Day of Surgery Admission
ECMO	Extra-Corporeal Mandatory Oxygenation
ED	Emergency Department
EEG	Electo-encephalogram
EMU	Emergency Medical Unit
EPS	Electro Physiological Study
ERCP	Endoscopic Retrograde Cholangio-Pancreatography
ESRG	Enhanced Service Related Group
ESS	Emergency Surgical Service
GDP	Gross Domestic Product
GIT	Gastrointestinal tract
GWS	Greater Western Sydney
H.E.A.D.S.S.	A psychological Interview for adolescents (home, education, activities ,drugs, sexuality, suicide/depression)
HETI	Health Education Training Institute
HITH	Hospital in the Home
HLHS	HypoplasticLeft Heart Syndrome
IBD	Inflammatory bowel disease
IMDC	Integrated Multi-disciplinary Model of Care
KALM	Kids Acute Liaison in Mental Health
KIDS GPS	CHW Guided Personalised Service
KRI	Kids Research Institute
JIRT	Joint Investigative Response Team
LGA	Local Government Area
LHD	Local Health District
MAU	Medical Assessment Unit
MoH	Ministry of Health
MRI	Magnetic Resonance Imaging
NBMLHD	Nepean Blue Mountains Local Health District
NDIS	National Disability Insurance Scheme
NESB	Non-English Speaking Background
NFC	Nationally Funded Centre
NGO	Non-Government Organisation
NICU	Neonatal Intensive Care Unit
NSLHD	Northern Sydney Local Health District
NWAU	National Weighted Activity Unit
OLT	Orthopaedic Trauma List
ON	Overnight
OOS	Occasions of Service
OR	Operating Room
OTC	Oncology Treatment Centre
PEC	Psychiatric Emergency Care Unit
PICU	Paediatric Intensive Care Unit
POFP	Process of Facility Planning
PSN	NSW Pregnancy and Newborn Services Network
RTC	Renal Treatment Centre
SAR	Safe Assessment Room
SCH	Sydney Children's Hospital
SCHN	Sydney Children's Hospital Network
SEIFA	Socioeconomic Indexes for Areas
SESLHD	South Eastern Sydney Local Health District
SEPS	Separations
SLE	Simulated Learning Environment
SHN	Specialty Health Network
SRG	Service Related Group
SWISH	NSW State Wide Infant Screening Hearing Program
SWSLHD	South Western Sydney Local Health District
WSLHD	Western Sydney Local Health District
% Δ	Percentage Change

19.9 Reference Documents

Australian Government – Cancer Australia. Children's Cancer https://childrenscancer.canceraustralia.gov.au/about-childrens-cancer/statistics/pdf

Australian Institute of Health and Welfare Autism in Australia https://www.aihw.gov.au/reports/disability/autism-in-australia/contents/autism

Australian Institute of Health and Welfare 2016. Australian Burden of Disease Study: Impact and causes of illness and death in Australia 2011. Australian Burden of Disease Study series no. 3. BOD 4. Canberra: AIHW https://www.aihw.gov.au/getmedia/d4df9251-c4b6-452f-a877-8370b6124219/19663.pdf.aspx?inline=true

Australian Institute of Health and Welfare 2016. Australia's health 2016. Australia's health series no. 15. Cat. no. AUS 199. Canberra: AIHW. https://www.aihw.gov.au/getmedia/9844cefb-7745-4dd8-9ee2-f4d1c3d6a727/19787-AH16.pdf.aspx?inline=true

Australian Institute of Health and Welfare 2012. A picture of Australia's children 2012. Cat. no. PHE 167. Canberra: AIHW http://www.aihw.gov.au/WorkArea/DownloadAsset.aspx?id=10737423340

Australian Institute of Health and Welfare 2015. Health expenditure Australia 2013-14. Health expenditure series no. 54 Cat. No HWE 63. Canberra: AIHW http://www.aihw.gov.au/WorkArea/DownloadAsset.aspx?id=60129552833

Australian Institute of Health and Welfare 2011. Young Australian: their health and wellbeing 2011. Cat. no. PHE 140. Canberra: AIHW http://www.aihw.gov.au/WorkArea/DownloadAsset.aspx?id=10737419259

Biassoni L & Easty M *Paediatric Nuclear Medicine Imaging* British Medical Bulletin, 2017, **123:**127-148

Currow D, Thomson W, Lu H, *Cancer in NSW: Incidence and Mortality Report 2010. Sydney: Cancer Institute NSW*, October 2015. Published by the Cancer Institute NSW http://www.cancerinstitute.org.au/media/451409/Cancer-Incidence-and-Mortality-Report-2010.pdf

Gilmour, M., Hopkins, L., Meyers, G., Nell, C & Stafford, N. (2015) School Connection for seriously sick kids. *Who are they, how do we know what works and whose job is it*? Canberra, Australia: Australian Research Alliance for Children and Youth (ARACY) https://www.aracy.org.au/publications-resources/command/download_file/id/331/filename/School-connection-for-seriously-sick-kids-full-report-web.pdf

Greater Sydney Commission – Greater Sydney Region Plan A Metropolis of Three Cities – connecting people https://gsc-public-1.s3-ap-southeast-2.amazonaws.com/greater-sydney-region-plan-0618.pdf

Health Policy Analysis 2014, *Review of the Specialist Paediatric Activity Flag: Final report* Commissioned by NSW Ministry of Health

McGuire, A. & Sheach, S (2015) *NHS Ayrshire & Arran Chemotherapy Service Change Brief* https://www.nhsaaa.net/media/2721/chemochangebrief.pdf

NHS England (2017) Paediatric Critical Care and Specialised Surgery in Children Review. https://www.england.nhs.uk/wp-content/uploads/2017/06/paeds-review-demand-capacity-analysis-v1-5.pdf

NSW Child Death Review Team Annual Report 2014 published October 2015 https://www.ombo.nsw.gov.au/__data/assets/pdf_file/0009/28359/Child-Death-Review-Team_Annual-Report_2014.pdf

NSW Health (2018) Services Planning Guide for health services and infrastructure development and investment http://caspa.nswhealth.net/TrainingMaterial/Planning/Services%20Planning%20Guide_Jan18.pdf

NSW Ministry of Health (2017) NSW Health Genomics Strategy June 2017 http://www.health.nsw.gov.au/services/Publications/nsw-health-genomics-strategy.pdf

NSW Ministry of Health (2016) Maternity and Neonatal Service Capability Framework GL2016_018 http://www0.health.nsw.gov.au/policies/gl/2016/pdf/GL2016_018.pdf

NSW Ministry of Health (2019) End of Life and Palliative Care Framework 2019 – 2024 https://www.health.nsw.gov.au/palliativecare/Publications/eol-pc-framework.pdf

NSW Ministry of Health Centre for Epidemiology and Evidence. 2014. The Health of Children and Young People in NSW: Report of the Chief Health Officer 2014. http://www.health.nsw.gov.au/epidemiology/Publications/2014-cho-report.pdf

NSW Ministry of Health Mental Health Branch (2013) NSW Service Plan for People with Eating Disorders 2013-2018 https://www.health.nsw.gov.au/mentalhealth/resources/Publications/service-plan-eating-disorders-2013-2018.pdf

NSW Ministry of Health Centre for Epidemiology and Evidence. 2014. The health of Aboriginal people of NSW: Report of the Chief Health Officer, 2012. Sydney: NSW Ministry of Health http://www.health.nsw.gov.au/epidemiology/Publications/Aboriginal-Health-CHO-report.pdf

NSW Ministry of Health (2012) NSW Aboriginal Health Plan 2013-2023 http://www.health.nsw.gov.au/aboriginal/Publications/aboriginal-health-plan-2013-2023.pdf

NSW Ministry of Health (2012) NSW Pain Management Plan 2012 – 2016 NSW Government Response to the Pain Management Taskforce Report http://www.health.nsw.gov.au/PainManagement/Publications/government-response-taskforce-report.pdf

NSW Surgical Services Taskforce Paediatric surgery Sub Group (Oct 2008). Paediatric Surgery Model for Designated Area Paediatric Surgical Sites https://www.aci.health.nsw.gov.au/resources/surgical-services/delivery/predictable-surgery/documents/paediatric-surgery.pdf

Salvador-Carulla, L., Fernandez, A., Feng, X., Astell-Burt, T., Maas, C., Smith-Merry, J., Gillespie, J. (2016). The Integrated Mental Health Atlas of Western Sydney-Draft for comments. Mental Health Policy Unit, Brain and Main Research Institute, Faculty of Health Sciences, University of Sydney. Western Sydney Partners in Recovery, Sydney https://rsph.anu.edu.au/files/Western_Sydney.pdf

Sydney Children's Hospitals Network (2016) *Strategic Plan 2017 – 2022*

Viner RM, Arkell EK, Ashe M, et al. Responding to the changing burden of disease for children and adolescents in modern Britain: the RCPCH State of Child Health Report 2017. BMJ Paediatrics Open 2017;1:e000026. doi:10.1136/bmjpo-2017-000026