

AOTEAROA NEW ZEALAND HAEMODIALYSIS INFRASTRUCTURE SURVEY

A report on Aotearoa New Zealand's haemodialysis service capacity

Proposed and prepared by:
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Te Whatu Ora
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AOTEAROA NEW ZEALAND HAEMODIALYSIS INFRASTRUCTURE SURVEY

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Commissioning group:

National Renal Advisory Board, Manatū Hauora – Ministry of Health
New Zealand

INFOGRAPHIC SUMMARY

AOTEAROA, NEW ZEALAND HAEMODIALYSIS INFRASTRUCTURE SURVEY

100% | **15** | **2499**
RESPONSE (JUN 2022 - FEB 2023) | RENAL CENTRES | PATIENTS DIALYSED (7 days)

ALL CENTRES → **CAPACITY ISSUES**
ACROSS NEW ZEALAND | PHYSICAL INFRASTRUCTURE, STAFFING, FUNDING

HAEMO 'CHAIRS'

603
TOTAL 


244	164	33
'INCENTRE'	SATELLITE	ASSISTED
21	52	17
INPATIENT	ACUTE	ICU
17	55	
COMMUNITY	HHD Training	



HAEMO VS. POP.

6.22 PER 10,000

AVERAGE pts per 10,000 pop
(RANGE 1.42 - 13.96)

NORTH		SOUTH
3.27 - 13.96		1.42 - 2.38
pts per 10,000 pop		pts per 10,000 pop



NEW STARTS

6 OF 13 CENTRES

46% of pop

CANNOT START NEW HD PT

1 x CENTRE - START on 2 x sessions per week



ACUTE HD

197 SESSIONS

(Over 7 days)

12 OF 15 CENTRES - HD FOR INPATIENTS

BUT

9 OF 10 - REDUCED 'BUSINESS AS USUAL'

Inpatient dialysis negative impacts ability to undertake Business As Usual HD



AWAY FROM HOME

11 OF 14 CENTRES

78% of pop

CANNOT OFFER AWAY FROM HOME

AOTEAROA, NEW ZEALAND
HAEMODIALYSIS INFRASTRUCTURE SURVEY

PATIENTS : HAEMODIALYSIS CHAIRS

HD PTS PER CHAIR



IF RATIO ≥ 4
CANNOT DO WITH
6 DAY/WEEK + 2 SESSIONS/DAY
NEEDS
7 DAY/WEEK OR 3 SESSIONS/DAY

9 OF 15
60% UNITS
RATIO ≥ 4
(3 UNITS, RATIO ≥ 6)

MITIGATION MEASURES TO COPE

REPORTED MITIGATION STRATEGIES USED TO COPE WITH CAPACITY ISSUES



2009

STAFFING STRATEGIES

CALL IN STAFF
OVERTIME WORK

2022

DIALYSIS UNIT STRATEGY

DECLINE AWAY FROM HOME DIALYSIS
COVERT OFFICES TO HD STATION
OPEN 3RD SHIFT
DOUBLE BOOK SLOTS - RELY ON DNA'S

INDIVIDUAL PATIENT STRATEGY

ALTER TREATMENTS HOURS
REDUCE MACHINE CLEANING
SKIP DAYS
DELAY DIALYSIS START
USE INCREMENTAL REGIME

STAFFING STRATEGIES

REDUCE STAFF : PATIENT RATIO
SHORT NOTICE ROSTER CHANGES
OVERTIME
DOUBLE SHIFTS
CANCEL NON_FRONT LINE ACTIVITIES
NON CLINICAL STAFF STEP IN

TRAVEL & FUNDING

TIME TO USUAL HD



60 - 120 MIN

97 PTS

> 120 MIN

17 PTS

LONGEST

2.5 HRS



60%

% OF UNITS WHICH
PROVIDE MORE HD
THAN FUNDED FOR



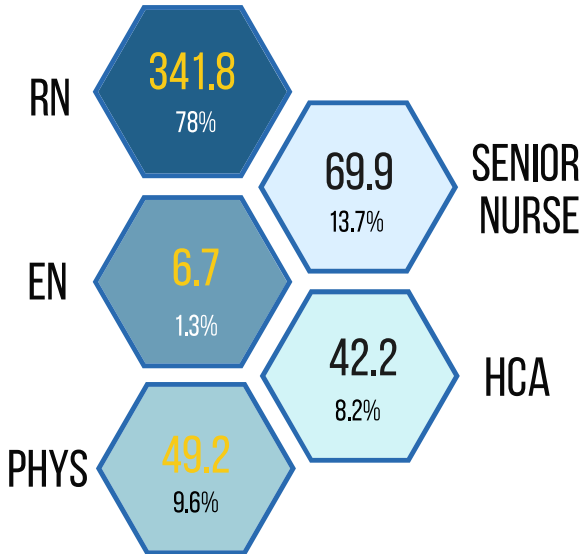
53%

NO. OF UNITS WHICH
PROVIDE DIALYSIS TO
PTS OF ANOTHER DHB

AOTEAROA, NEW ZEALAND
HAEMODIALYSIS INFRASTRUCTURE SURVEY

STAFFING

REPORTED FTE



FLOOR FTE

397.7

RN + EN + PHY

TOTAL FTE

509.8

ALL DIALYSIS STAFF

RATIO PATIENT : STAFF FTE

6.28

3.83 - 13.28

FLOOR FTE

RN + EN + PHY

2009 RATIO

6.3

NO CHANGE

RENAL CENTRES

13



PHYSICAL STAFF

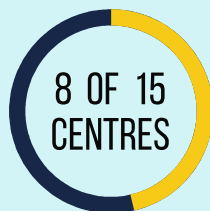
562

1.35



PER 1 FTE

UNABLE TO STAFF
PHYSICAL SPACE TO
APPROPRIATE STAFF RATIO



TO MAINTAIN A SAFE
STAFF : PT RATIO - WE NEED

25% FTE

135 STAFF OR 100 FTE

PATIENT : STAFF RATIO - 5 : 1

"We need for solutions to haemodialysis staffing capacity so as not to burn-out the permanent staff"

"we need more experienced staff that are able to look after acute patients"

EXECUTIVE SUMMARY

Rationale

There are substantial inequities in kidney disease prevalence, treatment access and long-term outcomes for different groups of New Zealanders. Māori and Pacific people in New Zealand are 4-5 fold more likely to receive Renal Replacement Therapy (RRT: dialysis or kidney transplant) for End-Stage Kidney Disease (ESKD) than New Zealand European peopleⁱ, and have lower access to kidney transplantsⁱⁱ. Therefore any constraints on the capacity of renal centres to deliver adequate haemodialysis care will disproportionately impact Māori and Pacific people in New Zealand. Across New Zealand there are variable ethnicities and geographical proximities of patient populations in each health district. Capacity constraints in different Renal Services therefore affect different groups of New Zealanders in different ways.

Haemodialysis is an essential life-preserving service that cannot be deferred or wait-listedⁱⁱⁱ. It is therefore essential that renal services infrastructure has sufficient capacity to account for the spectrum of presentations, variations in demand for acute and chronic treatment schedules, acuity and co-morbidities of patients, relative geographical locations of affected populations and provider services, and requirement for life-long uninterrupted treatments in the context of the holistic needs of affected individuals/communities. Capacity within services must also be sufficient to allow patients to make an informed decision about the dialysis modality of their choice, with sufficient information available to ensure that there is 'capacity' to accommodate this decision^{iv}.

The provision of an individual dialysis session, utilising a physical space, requires a particular nursing and allied health structure to safely function. Due to the life-preserving and non-deferrable nature of haemodialysis, renal teams are required to implement solutions to continue provision of haemodialysis treatments even if there is insufficient infrastructure (physical spaces, staffing, funding or regional arrangements).

Although the numbers of patients living with End Stage Renal Disease (ESRD) is known in each centre, there is no clear, nation-wide data on the proportion of adults in each district requiring haemodialysis services, their travel burdens to/from dialysis facilities, or the number of dialysis resources (physical infrastructure, staffing, funding, regional arrangements) available to provide haemodialysis treatments to these individuals. In order to ensure that *"appropriate funding of health services [must be] balanced with a focus on efficiency and equity"*^v health care services need access to information about the size/proportion/distribution of their population requiring haemodialysis services, the current infrastructure capacity for delivering these services, and projected future requirements for haemodialysis services.

Through benchmarking our current capacity position we can inform planning to address the current and future need for haemodialysis services in Aotearoa New Zealand.

Survey aims

- To characterize for each Renal Centre within New Zealand:
 - Current Haemodialysis demand
 - Current staffing and physical infrastructure in haemodialysis units
 - The ability of infrastructure and staff to adapt/flex/mitigate issues with demand
 - The impact of dialysis capacity constraints on the patient experience.
 - The comparable state of dialysis units, allowing teams to review their individual situation within a regional/national context.

- Highlight areas/activities which could serve as templates for change for those centres/districts looking to adapt their local services.
- To provide relevant data and analysis to empower patients/whānau/communities, medical professionals, the wider nephrology community, management teams, and funding agencies to work towards future proofing haemodialysis infrastructure, staffing and funding to meet patients' needs.

Methodology

A questionnaire (56 questions; see Appendix A) was sent to each independent renal service. The questionnaire comprised of both free text descriptive elements, as well as fixed quantitative elements. The reference population for each contributing renal service will be derived from publicly-available resources (Stats NZ for general population level data, ANZDATA for haemodialysis population level data).

Key Results

100% response rate was achieved, with information submitted from 15 Renal services across New Zealand. Responses were received over a period of months June 2022-February 2023. For some questions in the survey, incomplete responses were received from some units.

Haemodialysis Provision

Haemodialysis treatments were provided to 2499 patients in the 7 days prior to survey completion.

- Haemodialysis treatments in dialysis facilities were provided to 2037 patients (including 1555 receiving haemodialysis in-centre, 57 receiving interim haemodialysis, 362 receiving assisted haemodialysis, 57 receiving training for home haemodialysis, and 6 receiving haemodialysis as inpatients).
- 437 patients were established on home haemodialysis.
- A further 25 patients received haemodialysis treatments categorised as “other”.

Acute haemodialysis

- Haemodialysis for inpatients admitted to general medical/renal/intensive care wards were provided by 12 of 15 units.
- 2 of these units had dedicated acute haemodialysis areas. The remaining units reported bedside plumbing facilities in specific bed space to enable inpatient dialysis.
- **90% of responding units reported that providing inpatient dialysis reduced capacity to provide business-as-usual chronic outpatient dialysis services.**

In total, an estimated 194 acute haemodialysis sessions were delivered in the 7 days captured by the survey.

Number of haemodialysis patients per population

- The number of haemodialysis patients per 10,000 population (18+ population) in each health districts is highly variable – from 1.42 per 10,000 to 13.96 per 10,000, with the national average being 6.22 haemodialysis patients per 10,000 adults.
- Overall, there is a notable variation between the South and North Islands in terms of haemodialysis populations per 10000 adults; South Island 1.42 – 2.38 per 10,000, as compared with the North Island range 3.27 – 13.96 per 10000.

Provision of Home Haemodialysis (HHD)

- 437 patients were reported as established on HHD, representing 17% of all adults receiving haemodialysis in NZ in the 7 days prior to submission of the survey. This proportion rises to 19% when patients training for HHD are included in the total.
- 13 of 15 centres reported that HHD patients constituted part of their total haemodialysis population, with HHD patients constituting between 9%-75% of each unit's total haemodialysis population.
- **4 centres reported using their HHD unit for overflow chronic HD patients** in the previous 7 days.

Provision of dialysis to patients from other health districts

- **8 of 15 units (53%) report provision of chronic HD to individual's resident in another health district.**
- 4 units provided Chronic HD to 5 or more patients from another health district under an agreed regional model of care.
- Outside these formal regional relationships for chronic HD provision, there is very little HD capacity (~4:1000 session)s that is used to provide HD treatments to individuals who reside in another health district.

Provision of away- from-Home HD

- **11 of 14 responding units (79%) state they are unable to provide away-from-home dialysis sessions on request.**
- Of the 3 units able to offer away-from-home dialysis, centres reported limitations in their capacity to offer this service: "*Mostly do our best*"; "*Only for home trained patients on [a specified haemodialysis machine]*".

Provision of new start haemodialysis

- 13 of 15 units reported 318 patients who had a planned start onto haemodialysis in the preceding 12 months (*it is unclear whether this number includes those who started dialysis acutely, or transitioned from another RRT modality acutely*).
- From these 13 responding units, **6 units reported that they lacked capacity to start new patients onto haemodialysis in a planned fashion.**
- **A 7th unit reported starting new patients on 2 (rather than 3) HD sessions per week.**
- **46% of the New Zealand adult population live in districts in which there are constraints in capacity to provide a planned start onto haemodialysis.**

Haemodialysis capacity

- Renal centres identified 603 physical spaces across Aotearoa New Zealand which can be used to provide haemodialysis. 73% (441) of these spaces are in dialysis facilities (in-centre, satellite and assisted-care units), 15% (90) are in inpatient/acute areas, and 12% (72) are allocated to home haemodialysis training/delivery.
- In these 441 in-centre, satellite and assisted-care unit dialysis facility spaces, 1980 HD patients received dialysis (2,037 dialysis facility patients less 57 receiving training for home haemodialysis) at **an average of 4.22 facility-based haemodialysis patients are treated per facility unit haemodialysis space.** This means that, on average, centres need to provide more than 2 treatments per day, or treatments on more than 6 days per week, or offer some patients fewer than 3 haemodialysis treatments per week, or offer treatment to some chronic haemodialysis patients in other spaces (HHD or inpatient spaces), in order to meet the needs of

Aotearoa New Zealand's current facility-based haemodialysis population within current haemodialysis facilities.

- **3 centres had facility based HD patient:space ratios of ≥ 6** , indicating 3 or more treatments per day per space, or treatment of patients in other spaces, or other mitigating steps
- Information on the number of dialysis-enabled spaces on inpatient wards was not available for the majority (>75%) of reporting units, and this total of 603 haemodialysis-enabled spaces is therefore likely an underestimate of the total number of physical spaces in Aotearoa New Zealand in which haemodialysis could be provided.

Capacity: Staff FTE roles

- Total Haemodialysis delivering workforce 397.7 FTE (Registered nurses 341.8 FTE, Dialysis physiologists 49.2 FTE, Enrolled nurses 6.7 FTE)
- 12 of 15 units had HCAs, who constituted between 2-17% of HD clinical staff workforce. Senior nurses (non-clinical roles/ not delivering HD sessions) 69.9 FTE, constituting 14% of the total dialysis unit workforce.

Haemodialysis workforce capacity: number of staff

- 13 of 15 units provided details on staff numbers contributing to this dialysis workforce FTE. In these 13 units, 562 Individuals were employed to provide 414.8 FTE, averaging 0.74 FTE (29.6hrs/week) per staff member.

Haemodialysis workforce capacity: patient to staff ratio.

- 2499 Individuals receiving HD across NZ 15 renal centres received their dialysis treatments from 397.7 FTE dialysis delivering staff.
- **The number of patients for each full time equivalent of dialysis delivering staff in NZ is 6.28;** this patient:staff ratio varies from 3.83-13.28 between New Zealand renal centres
- **This overall ratio is unchanged from the last New Zealand dialysis workforce survey in 2009, despite a substantial increase (81%) in the proportion haemodialysis population requiring high staff:patient ratio care (hospital-based haemodialysis).**
- **If staff growth had occurred in line with both patient growth and patient dependency, then a minimum 25% increase (~135 individuals) in the current dialysis-delivering workforce would be required to meet minimum recommended patient:staffing ratios**
- **More than half of renal centres (8 of 15) reported that they do not have enough current staff to provide haemodialysis treatments at an appropriate patient:staff ratio in current spaces.**

Capacity for flexibility: providing outside schedule HD.

- **10 from 14 units reported they find capacity to provide additional HD sessions to patients for medical reasons, using strategies such as glide shifts, staff overtime, and reliance on DNAs.**

Capacity funding

- **All 15 services reported one or more capacity constraints resulting in an inability to meet current dialysis needs, including insufficient staffing, insufficient funding/haemodialysis arrangements or insufficient space.**
- **Over half (60%— 9 of 15) of the renal centres surveyed provide more dialysis sessions than they are funded for.**
- Examples reported by haemodialysis teams included providing dialysis six days a week whilst only being funded for five days a week, or permanently running a Saturday dialysis shift despite

not being funded for this, or the provision of sufficient chronic HD sessions ‘at the expense of home dialysis training chairs or repurposing clinic rooms/ CNM office space within the facility’

- Units reported additional physical infrastructure was required to meet current dialysis demands. Work arounds for lack of physical haemodialysis infrastructure includes: Installing additional machines and chairs in existing units, Converting nonclinical spaces (offices) into haemodialysis areas, Provision of dialysis on wards for space, Transferring patients requiring chronic haemodialysis to another renal unit.
- **9 of 15 (60%) – did not feel confident in their future proofing for providing additional dialysis sessions.**

Capacity impacts: strategies adopted in dialysis units to meet demand despite capacity constraints

- **In 2009, renal centres reported use of 2 mitigating measures to meet demand (staff overtime, call-in staff).**
- **In 2022, renal centres reported 22 mitigating measures to meet demand, including (but not limited to): declining away-from-home dialysis, double-booking dialysis slots (anticipating non-attendance will occur), converting offices to HD stations, overtime work, double shifts, reduce staff:patient ratios, call in non-clinical staff, reduce machine cleaning, shorten treatment hours, delay treatment starting time, skip treatment days, delay initiation of dialysis**

Patient experience: Travel for haemodialysis (within own health district)

- Response obtained from 13 of 15 units.

Travel 50-100km	Travel 100-200km	Centres where patients travel >100km	Max travel distance	Travel 1-2hrs	Travel >2hrs	Centres where patients travel >2hrs	Max travel time
75	34	10	169km	97	17	6	2.5hr (one-way)

Transition to Home HD

- Service-related barriers - **Centres reported capacity restraints were impacting their ability to train patients for home haemodialysis.**
- Additional barriers - Erosion of home haemodialysis philosophy by patient undertaking home haemodialysis and being exposed to incentre patients being cared for by staff and witnessing any adverse events in the incentre may create fear and a barrier to a safe learning environment for home training patients.

Conservative care

- 2 centres reported it was possible that patients had opted for conservative care due to a lack HD facilities.
- **9 of 15 units (60%) stated it was unknown if patients had opted for conservative care due to lack of HD facilities.**
- Results suggest the majority of renal teams don’t have facilities to monitor or track patients’ priorities that inform decisions about conservative care / RRT modality choices.

Conclusion

Aotearoa New Zealand’s haemodialysis facilities are significantly under-resourced with respect to current haemodialysis demands.

Every renal centre in New Zealand is affected by capacity constraints in terms of haemodialysis service staffing, physical infrastructure, funding and/or regional arrangements.

The findings of this survey indicate failure of sufficient staff growth, physical infrastructure growth, and adaptation of funding/regional arrangements to meet the volume and dependency of Aotearoa New Zealand’s current haemodialysis population.

This is particularly concerning given the year-on-year growth in the haemodialysis population, the shift in the population towards more haemodialysis treatments delivered in dialysis facilities, and the absence of future-proofing for providing additional dialysis sessions.

These capacity constraints are impacting patients (*e.g. undue travel burdens, unable to achieve planned starts onto haemodialysis, unable to access away-from-home haemodialysis, unable to exercise rangatiratanga*), staff (*e.g. insufficient staff to meet current demand, services report “mass exodus” of staff*) and renal services (*unable to train individuals for home HD, converting offices into dialysis spaces, cancelling non-frontline activities*).

Recommendations

The report contains a series of recommendations to enable services to meet national recommendations that *“Dialysis services should be adequately resourced in terms of staffing, infrastructure, and financing to optimise outcomes and minimise unfair financial social and travel burdens”*^{vi}. These recommendations include:

Te Whatu Ora, Te Aka Whai Ora and local funders	Acknowledge capacity constraints, associated risks and current impacts of current haemodialysis services in Aotearoa New Zealand
	Enable an immediate 25% increase in the dialysis-delivering workforce, and plan for further increases in the dialysis-delivering workforce
Te Whatu Ora, Te Aka Whai Ora, local funders, renal centres and KHNZ	Work with partners in Māori and Pacific communities to develop national and local leadership, governance and accountability frameworks that involve these communities to support optimisation of renal service delivery to meet the needs of patients and communities
	Complete/disseminate/implement guidelines on kidney disease care for Māori
	Enable equitable access to planned starts onto haemodialysis without delay
	Establish a formal programme to enable away-from-home dialysis for patients (alongside work to address capacity limitations), including expectations, national coordination and reciprocal agreements
	Establish a working group with the National Travel Assistance Scheme to review whether current supports for HD patients are up-to-date and fit-for-purpose
	Acknowledge that solutions to home HD and facility-based HD capacity constraints are required in tandem, since capacity issues in both areas are inter-twined and self-perpetuating
National Renal Advisory Board	Commissions reports/ research/serial surveys on other factors informing dialysis capacity requirements
	Provide definitions of “lengthy” and “unreasonable” travel burdens

	Work with paediatric renal services in Aotearoa New Zealand to assess whether there are concerns about the capacity of paediatric renal services to meet current or anticipated future service demands
National Renal Advisory Board, ANZDATA	Create a New Zealand-wide system for regular review of the patient experience of receiving haemodialysis services
	Create registries of conservative care and advanced CKD / renal replacement therapy assessment programmes that include patient-prioritised decision-making
	Expand data capture to include fixed-schedule and flexible/acute HD treatments
	Audit the total number of physical spaces in which haemodialysis can be provided by a renal service, and the use of each of those spaces on a repeated snapshot-audit basis
	Include haemodialysis workforce diversity metrics in future surveys
	Repeat haemodialysis capacity surveys regularly, and incorporate with routine ANZDATA processes
Local health district funders and renal centres	Define whether physical infrastructure and/or staffing capacity are the major factor impacting local haemodialysis service delivery
	Where physical infrastructure constraints exist/are impending, teams should set an interim plan for service delivery until solutions are delivered
	Review pandemic preparedness in haemodialysis facilities
	Consider local feasibility of novel options for local HD service delivery (see “illustrative service model” section)
	Consider separate rosters for flexible/acute inpatient services including staff roles with deferrable tasks
	Consider establishing acute inpatient haemodialysis centres with dedicated staffing
	Consider establishing transition units

FULL STUDY RATIONALE

Background

Health care services need to fully understand all of current infrastructure capacity, current demands and future requirements for renal replacement therapy in order to maintain delivery of effective and equitable renal services.

Dialysis by its very nature, conflicts with the current definition of “planned care” – Dialysis is not ‘elective’, nor can it be deferred on a waiting list, patients waiting weeks or months. New patients to dialysis include the unexpected acute start or ‘crash lander’ – through to a highly choreographed planned start.

Renal infrastructure therefore must have sufficient capacity to account for the spectrum of presentations, acuity of patients, and allow those to travel to other centres to receive secondary or tertiary level medical care.

It also must allow patients; known to the service years or months in advance the opportunity to make an informed decisions about the dialysis modality of their choice, in the knowledge of ‘capacity’ to accommodate this decision. These demands requires a unique approach to the planning of haemodialysis resources.

Any mismatch between this demand and supply relationship, leads to increased risk of poor patient and whanau outcomes.

Whilst we understand the number of patients current receiving renal replacement through a long running registry (ANZDATA) – we do not yet have an accurate understanding of the exact prevalence of those with Chronic Kidney Disease (CKD) stage 3-4; those most at risk of developing End Stage Renal Disease (ESRD). More crucially however, we do not have any understanding of the total Capacity in New Zealand’s infrastructure to treat the current or emergent future need.

With the shift away from District Health Boards to a centralised Te Whatu Ora, it is crucial that the renal community understand their current infrastructure provision and its capacity. Only through benchmarking our current position can we be best placed to inform the national and regional task forces across the motu about how to address the current and future need for haemodialysis services.

Dialysis services for New Zealanders

It has long been acknowledged that for different ethnic groups, there exists systemic inequity in access to health care. These inequities in health outcomes, particularly for Māori and Pacifica have persisted despite considerable research and policy efforts; often due to the entrenched effects of infrastructure and historic funding models ^{viiiviii}. In Aotearoa/New Zealand, Māori experience chronic kidney disease at three times the rate of non-Māori, non-Pacific New Zealanders, whilst commencing dialysis treatment for end-stage kidney disease at three times the rate of New Zealand European adults ^{ixxxixii}. In contrast to the decreasing incidence of dialysis in non- indigenous populations globally, dialysis rates for Māori have not declined over time. Any systemic inequity or differences within the health infrastructure or provision of adequate resource, has a disproportionate effect on

long term outcomes for these groups. Depending on the health district in question, the ethnic makeup and geographic proximity of the patient population is highly variable - hence systemic inequities affect different health districts and different renal services in different ways.

Although there are commonalities, each renal service in New Zealand is structured in a different way. This variation is often most clearly visible in the provision and structure of the facility-based haemodialysis service. The structure of a dialysis unit may be heavily influenced by a services promotion of home-based dialysis treatments, the co-morbid, ethnic and socioeconomic profile of their patients, and their connection to other regional renal services.

Dialysis infrastructure

The provision of an individual dialysis session, utilising a physical space, requires a particular nursing and allied health structure in order to safely function. This dialysis chair or space, although present physically, may not attract appropriate fully funded nursing and medical FTE (Full Time Equivalent) for dialysis delivery. Despite the lack of funding, this same physical chair may be used simply used by a renal service due to meet the demands of the acute clinical need, to accommodate the ever-growing dialysis population and acute admissions.

Anecdotally, these un-funded dialysis sessions/chairs may be utilised by adapting established nursing ratios or shorten or adapting hours of other patients to manage demand. As such, the presence of a physical space, does not guarantee the provision of a clinically safe dialysis session nor the recovery of costs incurred for the renal service. This is all the more relevant during periods of COVID-19 restrictions which may further curtail the available physical space and push nursing resources.

Limitations in infrastructure may have consequences for the available of a particular shift; afternoon or weekend slots for those wanting to work, the provision of holiday dialysis, the ability to do additional sessions as medical indicated or to fulfil a patient request to change shift. This survey aims to gain a better understanding of units' ability to flex in these ways.

Throughout New Zealand, there is notable variation in the ethnic and socioeconomic makeup of each population served by a renal centre, hence the underlying dialysis population a particular service serves. Although the numbers of ESRD patients is known in each centre, there is not a clear understanding of the number of dialysis slots per population at risk; a crude marker of the whether the health district population has adequate or inadequate access to dialysis facility. With direct comparison with ESRD data from ANZDATA, and population data derived from statistical data provided by Statistics New Zealand, the survey aims to establish an understanding of a health district's physical dialysis capacity per at risk population unit (e.g. dialysis slot per 1,000 at risk patients).

Dialysis provision in a geographical context

Renal services increasingly recognise that the total 'patient journey' around each dialysis session starts long before and ends long after a patient sets foot in a dialysis facility. The preparation and travel time involved can be immense, especially as the physical distance travel escalates. This time burden has an increasing burden on our frail, older, multi-comorbid patients, some of which may pursue a conservative pathway rather than continue haemodialysis. The impact of distance is even more pronounced, when travelling outside their local health district, far from their own whenua – often creating a further sense of disconnection and displacement. This questionnaire aims to characterise the geographic distribution of patients served by a given renal service; to better understand the total patient journey.

Tino rangatiratanga

In undertaking this survey, the study working group fundamentally acknowledges Te Tiriti o Waitangi/The Treaty of Waitangi and its foundational principles of mana whakahaere (stewardship/governance), mana motuhake (self-determination), mana tangata (equity), mana Māori (cultural identity), also including the breaches of the past. These principals cannot be applied inconsistently in systems we hope to develop utilising the information gathered in this survey

Renal service should be structured in a way to allow person-centred and/or whānau-centred care; where patients and their whānau feel empowered and have the ability to make choices about their treatment. Ideally it should have sufficient resources to provide them with the outcome of their informed choice, i.e. the ability to undertake their dialysis modality of their choice. Failure to deliver services that meet the needs of an individual and their whānau fundamentally undermines their sovereignty. A renal service should recognize the detrimental effect on patients and whānau when situations arise when people may only access a resource (e.g. haemodialysis in their home city) because of demise or death of another patient, who may be a whanaunga (relative) related or someone well known within a close-knit community.

The development of any health service and associate facilities must aim to empower those, who are able, to continue with their lives; stay in employment, remain care givers for their whānau, rangatahi, tamariki and/or mokopuna - to remain a living part of their community. The infrastructure available to them must aim to not exacerbate any displacement of a people from their whānau and whenua. It must not perpetuate the existing displacement of a vulnerable cohort of people, nor make them more dependent and disengaged.

Dynamics of dialysis service provision

Renal services throughout New Zealand are at various stages of development and evolution, hence it is understood the information derived from this National survey will be utilized differently by different services. Some may have recently expanded, whilst others keen to apply for new funding. As the organisation framework within Te Whatu Ora develops it crucial to understand the national 'stock' to ensure any review does not undermine the total dialysis capacity, nor unequally re-distribute supply *versus* demand. A whole of New Zealand picture is therefore essential.

This national survey will provide a wider understanding of the national facility-based haemodialysis infrastructure and factors which affect the wider patient journey.

Existing information

Staffing infrastructure (particularly nursing FTE and experience) was surveyed on October 2008 (6). Medical staffing infrastructure and staff-led protocol/procedural activities were surveyed in December 2019^{xiii}. These surveys are informative about staffing levels and activities.

These surveys do not, however, offer an analysis of dialysis facilities from a patient-centred perspectives, focusing on physical infrastructure provision and patient's geographical context.

STUDY AIMS

This survey, through a mixed quantitative/qualitative methodology aims to characterise, for each haemodialysis renal centre within Aotearoa, New Zealand.

- the current demand for haemodialysis services
- the current staffing within haemodialysis units, particularly in relation to the Haemodialysis demand
- the ability of infrastructure and staff to adapt/flex/mitigate issues with current demand, including acute out of hours services, and home haemodialysis training, as well as accommodate future demand
- the impact of dialysis capacity constraints on the patient experience.
- the comparative state of dialysis units, allowing local teams to review their individual situation within a regional/national context
- to highlight areas/activities which could serve as templates for change for those centres/districts looking to adapt their local services

The survey report aims to provide relevant data and analysis to empower the multidisciplinary renal community, patients and their advocates, management, and funding agencies to work together towards the goal of providing both appropriate, adequate and future proofed haemodialysis infrastructure, staffing and funding/regional arrangements to meet patients' needs. In doing so, the survey aims to enable management and funding agencies to actively engage with issues experienced by patients/whānau and the staff who care for them.

STUDY DATA

Statistical plan/method

- A questionnaire (56 questions; see Appendix A) to be completed by each independent renal service. The questionnaire comprises both free text descriptive elements, as well as fixed quantitative elements.
- The questionnaire will be sent 2 weeks prior to a mutually convenient virtual meeting with the unit, to navigate any issues in answering the questionnaire.
- The time period the questionnaire refers to is the immediate preceding week (7 day period) from when the survey is first started.
- The reference population for each contributing renal service will be derived from publicly-available resources (Stats NZ for general population level data, ANZDATA for haemodialysis population level data).

Methodology

The study was conducted as an observational audit, involving "the systematic evaluation of aspects of health or disability support service delivery by considering measurable indicators of performance and/or quality."^{xiv}

The report is provided to the National Renal Advisory Board - Manatū Hauora Ministry of Health to enable "cycles of change that are linked to measurable assessment, with the goal of improving the experience, process, equity, safety and efficiency of healthcare, assessing the current situation and systematically implementing or testing evidence-based knowledge within a local organisation". Delivery of the report, and the collection timeframe, were adapted to minimise potential additional burdens on health care professionals to take part. Data curation and report presentation was conducted to avoid identification of individuals through the way that data is used or made available.^{xv}

Participant recruitment

All dialysis unit managers and Heads of Department (HOD) in New Zealand will be invited to participate. Dialysis unit managers and Heads of Department will be contacted through existing clinical networks.

Justification of sample size

The aim for every renal unit within New Zealand to participate, in order to give the most comprehensive understanding of the total national dialysis Capacity situation.

Timeline

Months Project procedures

Task	Projected date*	Notes
Survey concept advisory to National Renal Advisory Board (NRAB)	August 2021	NRAB minutes 11.08.2021, item 3g.
Survey development under auspices of the Official Information Act	August 2021	See refs (8), (9).
Pilot survey completion	October 2021	Pilot survey with 1 metro and 1 regional dialysis service.
Revision of pilot survey to final form for national survey	March 2022	Development of final format for quantitative and qualitative aspects of survey.
Engagement with Dialysis Unit Managers and NTA scheme managers	May 2022	Contact through existing clinical networks
National survey responses	June 2022*	Survey delivery through mutually-agreed interviews (<i>COVID-19 pandemic permitting</i>)
Data analysis	July 2022*	Responsibilities shared between project leads
Report development	August 2022*	Approval by project leads and key personnel
Report delivery to NRAB	August 2022 [#]	Oral presentation and draft report review at NRAB meeting 08.03.2023
Draft report delivery to Te Whatu Ora – Renal Service leads	March 2023	Feedback on draft gathered from clinical renal leadership teams across NZ
Final report delivery to Kidney Health New Zealand	April 2023	

*National survey responses were received until February 2023, hence data analysis and report development were also delayed to February 2023.

[#]Consequently report to delivery was deferred to March 2023, initially in draft form.

Data Characteristics

Population Data

Population data used in the calculation of per 'at risk' patient data points was derived from data set provided by the Ministry of Health to the Hauora a Toi Bay of Plenty, Data analyst, Medical Cluster on 10/1/2023.

The population year utilised refers to 2022. The population projections were generated in 2021 as part of an update and are based off census data from 2018.

The 'At risk' population data refers to those age 18 and older, who would be eligible if needed to be cared for by the Adult Nephrology services of the given region.

Geographic regions are specified by previous health district boundaries for service provision. Some geographic regions do not have dedicated renal centre, but come under the care of neighbouring tertiary services. As such the populations have been combined according to 'areas of responsibility'. These regions include

- Wellington Renal Service - Capital & Coast, Hutt, Wairarapa
- Canterbury Renal Service - Canterbury, South Canterbury, West Coast
- Mid central Renal Service – Midcentral, Whanganui

To aid in the macro-analysis of the data, the 3 units which make up the Northland Renal Service (Te Tai Tokerau (Northland) Te Whatu Ora) which include Te Tai Tokerau Bay of Islands, Te Tai Tokerau Kaitaia, Te Tai Tokerau Whangarei Renal Unit were combined into a single renal centre. Where relevant, individualised comment about each unit will be made to provide more specific context to responses regarding the wider Northland unit.

Excluded in the scope of this survey is an analysis of paediatric infrastructure/capacity.

Haemodialysis staff data

Based on 2020 NZNO MECA arrangement^{xvi}, senior staff have been grouped together (renal manager, charge nurse manager, associate charge nurse manager, clinical nurse specialist, Clinical coordinator, renal educator, specialty nurse), whilst haemodialysis floor staff describes registered nurses, haemodialysis physiologists and enrolled nurses. Health care assistants (HCAs) are included as described. Administration staff were not included in final numbers of haemodialysis staff. Further details are provided in Appendix B.

Statistical model

Survey responses are tabled using Microsoft Excel in a format which allows the working group to review the responses according to both question number, broad theme (e.g. staffing), or at an individual centre level.

Qualitative analysis of free text answers was undertaken using a thematic/common word approach.

ETHICS

Whilst each renal centre can be identified by name within the survey, no patient or staff identifiable characteristics are captured.

The Official Information Act 1982 (OIA) helps New Zealand Citizens, permanent residents and anyone in New Zealand access information held by Government organisations and Ministers. This promotes openness and transparency and enables greater public participation in government ^{xvii}. Information that is confidential (e.g., information related to, or linked to, identifiable individuals or an individual's privacy) will not be sought^{xviii}.

Each renal centre can be identified by name within the survey; however, no patient or staff identifiable characteristics are captured with the survey answers. Owing to the nature of the survey, it will not be formally published in any journal.

This survey will be presented at the National Renal Advisory Board. Each individual contributing unit will receive a copy of their own summarised information. The Head of Renal Service for each contributing unit will receive a copy of the final report, with their individual centre identified, whilst all other centres will have their names anonymised.

ACKNOWLEDGEMENT

The working group acknowledges the significant additional impact on delivering healthcare in the context of the COVID-19 pandemic, winter illness pressures and health system changes on the ability of units to participate in this audit. The ability of a dialysis unit and wider renal team to cope with these many competing demands depends greatly on the good will of the staff to work above and beyond their scheduled responsibilities, whilst maintaining team work, collaboration and excellent/expert support for dialysis patients by all healthcare professionals. The working group expresses its gratitude for the time taken to complete the questionnaire, and for the care delivered by these teams.

The working group also acknowledges that this report may not meet the full needs of those providing haemodialysis services to their populations given the restricted focus of the survey. The working group hope that it may offer some initial recommendations on future work to meet these information gaps.

The working group acknowledges the significant negative impact of capacity constraints in haemodialysis services in Aotearoa New Zealand on patients and staff who have been treated by / worked in haemodialysis services, both past and present. The group acknowledges the challenges faced by patients and whānau requiring dialysis support, and the privileges afforded to healthcare professionals in caring for these patients and whānau. We acknowledge that this survey is one small aspect of the work that patients and staff undertake together to improve lives and wellbeing for affected individuals/whānau, and hope that this survey exercise is one part of the pathway to optimising haemodialysis services for New Zealanders in the future.

RESULTS

A total of 15 renal units/centres contributed submissions; spread throughout New Zealand and encompassing both small regional and large centre units. As such, this survey encompasses all haemodialysis renal service provision for the total adult New Zealand population.

Responses were received over a period of months – June 2022 to Feb 2023, immediately following the release of the survey, through to their period immediately prior to production of this report. Each survey reflected on the immediate 7 day period, the ‘snap shot’ essentially spread over time.

Some survey responses were incomplete or limited. Where appropriate, data has been acknowledged as missing or obtained from publicly available data with acknowledgement where this has occurred.

Haemodialysis Provision

15 haemodialysis centres around New Zealand reported that in the 7 days prior to survey completion, that haemodialysis, in all settings, was provided to 2499 patients.

Haemodialysis treatments in dialysis facilities were provided to 2037 patients (including 1555 receiving haemodialysis in-centre, 57 receiving interim haemodialysis, 362 receiving assisted haemodialysis, 57 receiving training for home haemodialysis, and 6 receiving haemodialysis as inpatients).

437 patients were established on home haemodialysis. A further 25 patients received haemodialysis treatments categorised as “other”.

1 patient receiving plasma exchange was not included in the total number of patients receiving haemodialysis treatments.

Provision of acute (outside-schedule) haemodialysis:

Haemodialysis treatments for inpatients admitted to general medical/renal/intensive care wards in the hospital were provided by 12 of 15 units.

2 of these units reported dedicated inpatients dialysis areas where acute haemodialysis sessions can be delivered to inpatients. The remaining units reported bedside plumbing/facilities to enable haemodialysis sessions for inpatients in these specific bed spaces.

In these 12 units that provide haemodialysis treatments for inpatients, 10 units were able to comment on whether provision of dialysis in these inpatient areas (i.e., away from the main outpatient dialysis facility) reduces capacity to provide business-as-usual (BAU) outpatient dialysis service. In 9 of these 10 units, business-as-usual outpatient dialysis services were negatively impacted by this delivery of haemodialysis treatments to inpatients.

10 of the 12 units providing acute treatments reported a total of 114 acute haemodialysis sessions delivered in the preceding 7 days. For the 2 remaining acute delivery units, one reported 6-8 sessions per day (hence about 50 sessions per week), and one reported 10 regional inpatients receiving acute treatments (hence about 30 sessions per week). In total, acute haemodialysis sessions delivered were estimated at 194 sessions per week.

Given 2499 patients receiving haemodialysis, and assuming delivery of 3 sessions per week for these individuals, a total of 7497 sessions would be anticipated. Acute haemodialysis sessions therefore appear to constitute a small fraction of haemodialysis sessions delivered (194/7497, ~2.6%)

Despite this relatively small fraction of haemodialysis sessions delivered as acute sessions, in all but one unit provision of dialysis for inpatients away from the outpatient dialysis unit reduced the availability of staff to provide outpatient haemodialysis treatments.

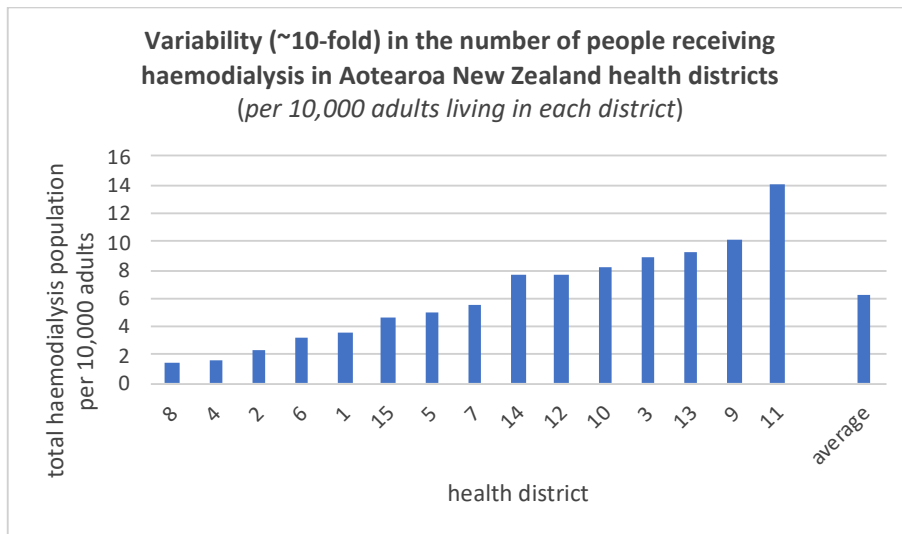
Many units reported that high staff : patient ratios were required for inpatient dialysis on the general medical/renal/critical care wards, and various work-around solutions were adopted to cope with this consequent loss of FTE capacity to staff outpatient dialysis facilities, including

- Alternative treatments provided (e.g. CVVHD vs HD)
- Staff covering additional outpatients at lower staff : patient ratio
- Re-arrange staffing roster
- Staff working overtime
- Locum/casual staff called in
- Non-clinical staff (educators etc) called in
- Cancel non-clinical activities for staff
- Restrict shift times for these inpatient dialysis session
- Reduce patient treatment hours
- Delay patient treatments

Number of HD patients – Population

Allowing for comparison between centres, the number of total HD patients per 10,000 population (18+ population), is highly variable – from 1.42 per 10,000 (unit 8) to 13.96 per 10,000 (unit 11), with the national average being 6.22 haemodialysis patients per 10,000 adults (Total HD population / Total adult population).

Restricting the HD population to those receiving dialysis in facilities (rather than being established on home haemodialysis), the national average drops to 5.02 facility-based haemodialysis patients per 10,000 adults, with a range from 0.60 per 10,000 (unit 2) to 12.19 per 10,000 (unit 11).



Overall, there is a notable variation between the South and North Islands in terms of total HD populations per 10000 adults; South Island 1.42 – 2.38 per 10,000, as compared with the North Island range 3.27 – 13.96 per 10000. Unit 11 (13.96), Unit 9 (10.22) and Unit 13 (9.21) have the 3 highest total HD populations per 10,000 adults.

Provision of home haemodialysis

In total, 13 of 15 centres reported that home haemodialysis patients constituted part of their total dialysis population; it is acknowledged that in some centres responsibility for home haemodialysis is deferred to a regional centre. 437 patients were reported as established on home haemodialysis, constituting 17% of all adults receiving haemodialysis in New Zealand in the 7 days prior to survey completion. This percentage increases to 19% when patients training for home haemodialysis are included in the total.

Renal centres reported a significant range of their haemodialysis population to be on stable chronic home haemodialysis, from 9% to 75%. Two centres demonstrate a strong shift towards patients established on home haemodialysis – 75 % (unit 2) and 40% (unit 3).

When established and in-training home haemodialysis patients are combined into the home haemodialysis population, then unit 8 also demonstrates a strong shift towards home haemodialysis (47%).

The remaining centres all reported that home haemodialysis patients (whether established or in-training) constituted <30% of their total haemodialysis population (range 0 – 27%).

There was significant variation amongst centres in the number of funded home haemodialysis training spaces; four of the centres surveyed were at or over their funded capacity with their training resources at the time the survey was administered.

Four of the centres reported needing to use their home haemodialysis facilities for overflow chronic haemodialysis patients in the past seven days

Provision of dialysis to patients from another health district

A significant number of units (8; 53% of units) report provision of chronic haemodialysis to individuals who are resident in another health district.

4 units report providing chronic haemodialysis to 5 or more individuals from another health district. In all four of these cases, there are formal arrangements for dialysis services in a “hub” renal centre with variable models of dialysis provision in the relational “spoke” health districts.

4 units (units 1,7,11,13) without the formal ‘regional renal service’ relationships also report providing dialysis sessions to chronic haemodialysis patients who are resident in another health district. Three of these four centres (units 1,7,11), provided haemodialysis treatments to at least 1 resident of another health district in the preceding seven days, with one large centre (unit 13) providing treatment to 1 resident of another health district each day. This provision of haemodialysis sessions to residents of another health district that falls outside agreed regional renal service relationships therefore constitutes about 10 of 2499 reported individuals i.e. 0.4%.

Outside the formal relationships for chronic haemodialysis provision from a regional renal service, there is very little haemodialysis capacity (~4:1000 sessions) that is used to provide haemodialysis treatments to individuals who reside in another health district.

Dialysis units report that the major reasons why chronic haemodialysis patients need to travel outside the health district for their regular dialysis include:

Medical	To receive medical care not available in local health district. This can be dialysis related (e.g. vascular access) or co-morbidity related (e.g. cancer or cardiology treatment)
Family	tangi/ wedding / holidays etc.
Capacity	No capacity/facilities to provide business-as-usual, scheduled chronic haemodialysis locally
Structural	No local specialist/ renal physician support, no clinical nurse specialist / nurse practitioner available for clinical support No acute set up (e.g. satellite unit designed for chronic stable patients: cannot fit in beds)

The relative frequency of these reasons was not quantified.

Provision of away-from-home dialysis

A vast majority (11 of 14, 79%) of responding units reported that they were unable to provide holiday / away-from-home dialysis sessions on request. One of the 3 units able to offer this service noted that *“Mostly do our best”* and another of these 3 offering units noted *“Only for home trained patients on [a specified haemodialysis machine]”*.

Comments from centres unable to provide away-from-home dialysis are exemplified by the following statements: *“We provide the most in NZ but have had capacity issues... so none over past year”* and *“Unfortunately this is not something that we have been able to provide for visitors for quite some time”*

Provision of new-start haemodialysis

Of the 13 units who were able to provide information about a planned start onto haemodialysis (no information available from one large (*unit 14*) and one small (*unit 15*) centres), a total of 318 patients were reported to have had a planned start onto haemodialysis in the preceding 12 months. It is unclear whether this figure includes those who started dialysis acutely, or transitioned from another renal replacement therapy (RRT) modality acutely.

Of these 13 units, 6 units reported that they lacked capacity to start new patients onto chronic haemodialysis via a planned start. A 7th unit reported that capacity constraints meant that new patients were starting haemodialysis with 2 sessions (rather than 3 sessions) per week.

Of the respondents, a clear regional pattern was evident in one region where none of the 4 smaller renal centres who provided reports (units 1, 6, 10, 15) were able to start new patients via a planned start. All patients starting on HD were therefore deferred to the regional renal service (unit 14) to start haemodialysis before waiting for capacity to transfer their established haemodialysis treatments back to their local unit.

In addition to these 4 small centres, 2 large units reported that they lacked capacity to start new patients onto chronic haemodialysis via a planned start (units 7, 8), with one further large centre (unit 5) reporting that a lower number of haemodialysis treatments were used for patients starting haemodialysis to accommodate challenges with staffing resources. For these units, there is no deferral mechanism to another/regional renal service to enable a planned start onto haemodialysis.

In keeping with this assessment that a number of haemodialysis units in New Zealand lack capacity to start haemodialysis in a planned fashion, 4 units reported that *“in the last 12 months, patients that you think would have benefited from haemodialysis had a significantly delayed start / remained on an alternative and suboptimal RRT modality because of lack of capacity to provide haemodialysis in your units”*. The number of patients affected was 23, with numbers of affected patients in each unit ranging from 2 - 10. This cohort of 23 patients represents ~ 7% of new patients starting haemodialysis in a planned fashion in the 13 units that were able to report on this question.

A number of units reported delayed dialysis initiation because of lack-of-capacity to provide haemodialysis. In some cases, units reported that this led to acute hospitalisation and crash-start haemodialysis rather than the originally-planned elective start. In another unit, 6 of 35 patients remained on peritoneal dialysis as a result of haemodialysis capacity restrictions.

For those who remained on a suboptimal RRT, it is unclear is whether these patients were on HHD, PD or failing transplant, and to what extent the alternative RRT modality was suboptimal.

Units unable to start new patients in a planned fashion cited a variety of reasons, most often related to the lack of physical haemodialysis infrastructure or staffing capacity. Units also commented on the need to start new patients on *“2 x sessions per week, moving to 3 x sessions if clinically indicated”*. Other comments included the *“presence of physical space... yet insufficient FTE/nursing resource to adequately staff”*, leaving resource underutilised. One unit reported that *“the delays were never too long as to warrant another RRT. Maximum time of delay would have been about 2 weeks.”*

From these responses, it appears that 46% of the New Zealand adult population live in districts in which there are constraints on structural or human resources to provide a planned start onto chronic haemodialysis close to home/within the individual’s home health district, requiring travel to a regional centre or adaptations to enable haemodialysis treatments to start in a planned way (e.g. modifications to dialysis regimes, or acute-start rather than planned-start).

Outpatient haemodialysis treatment attendance

In the 7 days prior to survey completion, New Zealand units reported that 102 of the planned 4322 haemodialysis sessions (2.4%) were not attended. Information on reasons for this non-attendance were not sought.

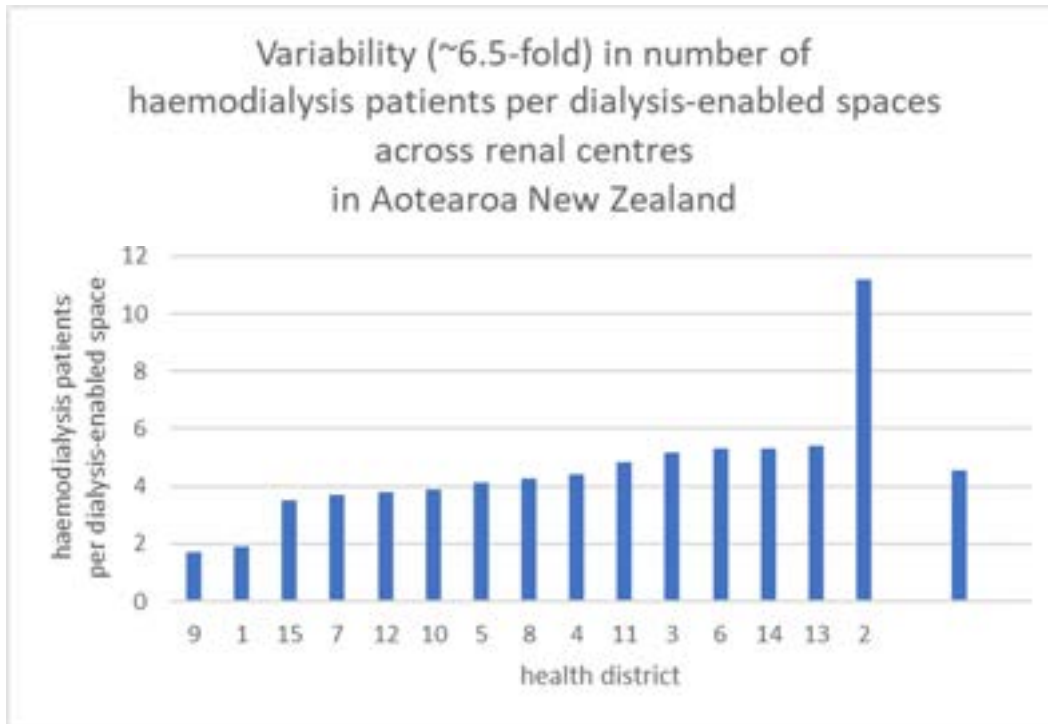
Haemodialysis Capacity

Capacity: physical/infrastructure

Across the motu, renal centres report that there are 603 total available physical spaces which can be used to provide haemodialysis, provided there are no other resource constraints to utilisation such as staffing or funding. 244 physical spaces are classified as ‘in-centre’ spaces, 164 spaces are “satellite unit” spaces, 52 are “acute” spaces, 55 are home haemodialysis training/respite spaces, and 33 are “assisted care” spaces. 17 spaces were reported as community (14) or self-managed (3) settings. 17 spaces were reported in Intensive Care units and 21 spaces were reported on inpatient wards.

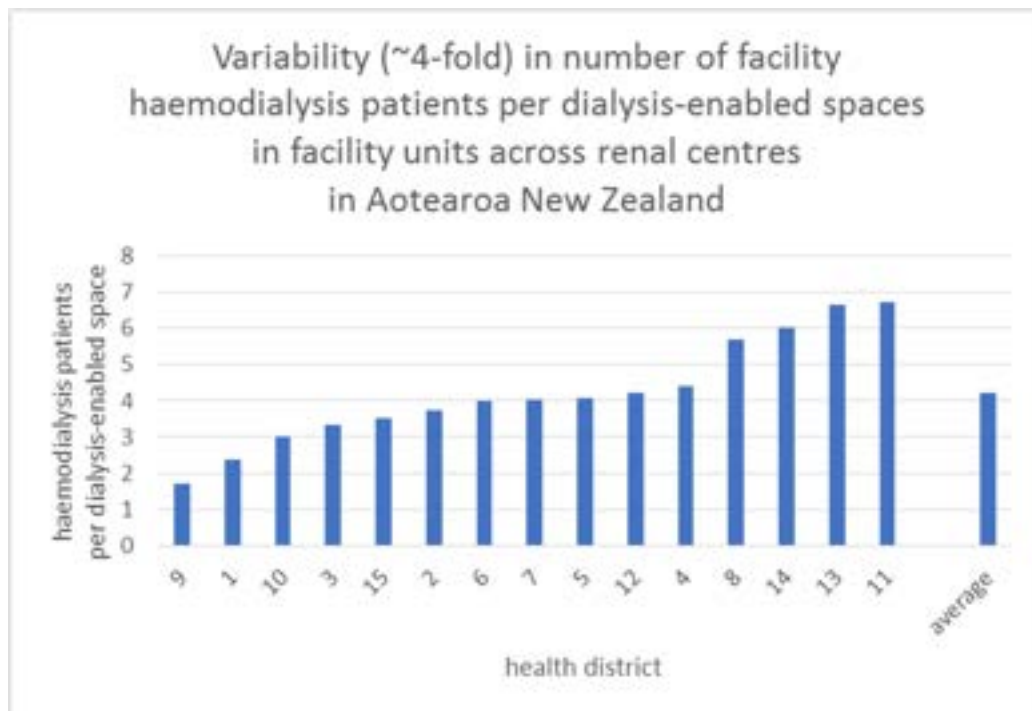
Notably, information on the number of dialysis-enabled spaces on inpatient wards was not available for the majority (>75%) of reporting units, and this total of 603 haemodialysis-enabled spaces is therefore likely an underestimate of the total number of physical spaces in Aotearoa New Zealand in which haemodialysis could be provided.

A patient:space ratio can be calculated for each renal centre, on the basis of the number of spaces per unit and the number of patients per unit. The average number of haemodialysis patients per dialysis-enabled spaces is 4.56. There is significant variability of spaces: patients across Aotearoa New Zealand, from 1.73 patients per space (unit 9) to 11.17 patients per space (unit 2).



More specifically, a ratio of facility-based haemodialysis patients (1980 HD patients: 2,037 dialysis facility patients less 57 receiving training for home haemodialysis) per spaces in facility units (441 In-centre, Satellite and Assisted) can also be calculated for each unit, and averages 4.22 facility-based haemodialysis patients per facility unit haemodialysis space. One centre (unit 8) reported that in-centre dialysis patients are dialysed in an “acute dialysis unit located in ... hospital” and this has been classified as a facility-based unit (rather than an inpatient unit). This means that, on average, centres need to provide more than 2 treatments per day, or treatments on more than 6 days per week, or offer some patients fewer than 3 haemodialysis treatments per week, or provide some treatments in inpatient/HHD spaces, in order to meet the needs of Aotearoa New Zealand’s current facility-based haemodialysis population within current haemodialysis facilities.

9 of New Zealand’s 15 renal centres (60%) had facility-patient:facility-space ratios at/above 4, indicating that more than half of Aotearoa New Zealand’s renal units are, on average, delivering or exceeding at least 2 treatments per day per space, with treatments on 6 days per week and 3 treatments per week for each facility-based patient. Three of Aotearoa New Zealand’s renal units had ratios of facility-based haemodialysis patients per spaces in facility units at/above 6, indicating that these centres are providing an average of 3 treatments per day per space, or delivering treatments in these spaces on more than 6 days per week, or treating facility-HD patients in other spaces (e.g. inpatient or HHD training/delivery spaces), or that a cohort of patients receiving treatment in these spaces are receiving fewer than 3 treatments per week.



Renal centres reported a broad range of issues with Aotearoa New Zealand’s current physical haemodialysis infrastructure, including:

“6 official bed/chair spaces. 8 patients squeezed into the space”

“Our Home training unit has been operating from the incentre for the past two years due to space constraints and safety concerns in the home training unit.”

“Ongoing pressure... to increase our dialysis capacity. Currently working on a building plan for expansion”

“isolation dialysis unit recently completed. 4 stations. Not currently operational due to staffing resources”

“We do not have a safe space to dialyse more than one patient at a time in isolation. In the event of recurrence of COVID-19 transmission..., we do not have adequate facilities to safely deliver dialysis with appropriate infection control, putting a high-risk population at risk of healthcare-associated transmission.”

Capacity: staffing

Haemodialysis workforce capacity: staff roles

Survey responses highlight a diverse workforce of staff providing haemodialysis in each dialysis facility. To provide a standard comparison, all reported numbers are presented based on FTE, with 1 FTE equivalent to 40 hours per week. Across the 15 haemodialysis units, the following staffing FTE was reported:

Staffing role	Role FTE	Role groupings	Total FTE
Registered nurses	341.8		
Dialysis physiologists	49.2		
Enrolled nurses	6.7		
		Total Haemodialysis-Delivering Clinical Workforce	397.7
*Healthcare assistants	42.2		
		Total Haemodialysis Unit Clinical Staff (*)	439.9
Senior nurses (non-clinical roles / not delivering HD sessions)	69.9		
		Total All Haemodialysis Unit Staff	509.8

Registered nurses therefore constitute 78% of all clinical staff in haemodialysis units. Dialysis physiologists constitute 11%, and HCAs constitute 10%, with the remaining 1% comprised of enrolled nurses.

9 of 15 units, including both larger and smaller centres, reported a dialysis-delivery model in which the dialysis-delivering workforce comprised exclusively registered nurses. In the remaining units, registered nurses constituted 57-93% of the dialysis-delivering workforce.

The maximum percentage of dialysis physiologists in an individual unit's dialysis-delivering workforce was 43%, and the maximum percentage of enrolled nurses was 33%.

Two units reported all 3 dialysis-delivering roles (registered nurses, enrolled nurses and dialysis physiologists) in their centre's workforce

12 of 15 units reported healthcare assistants within their haemodialysis clinical staff workforce. For those 12 units, HCAs constituted between 2 – 17% of the haemodialysis clinical staff workforce.

Considering all haemodialysis unit staff (509.8 FTE), senior nurses in non-clinical roles (/not routinely delivering haemodialysis sessions) constitute 14% of the dialysis unit workforce.

Haemodialysis workforce capacity: number of staff

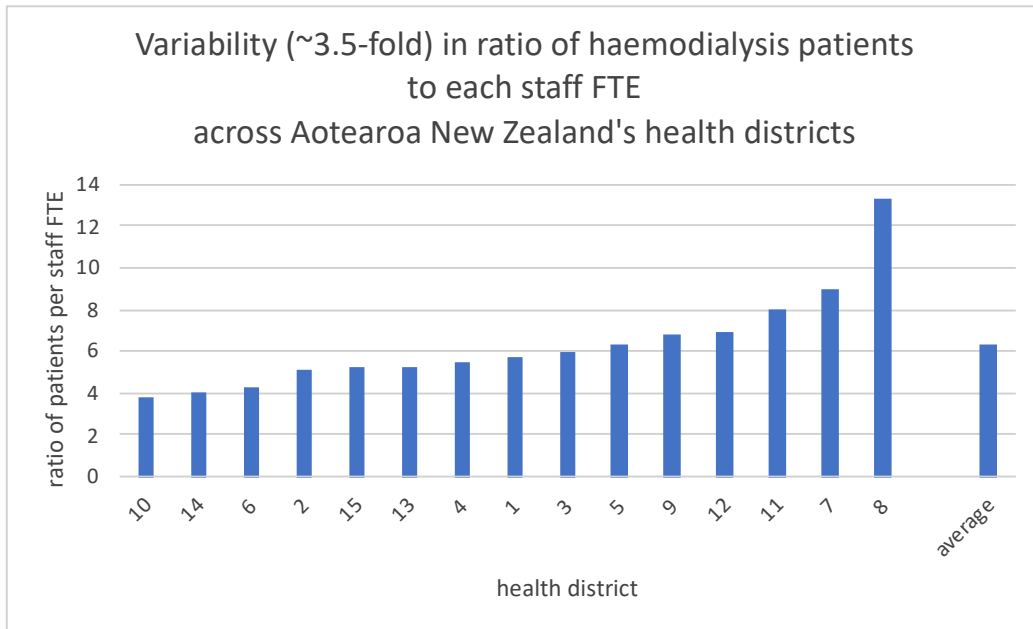
13 of 15 units were able to provide details on the number of staff contributing to this dialysis workforce FTE. In these 13 units, the total dialysis workforce FTE (including dialysis-delivering, clinical and non-clinical roles) was 414.8 FTE. A total of 562 individuals were employed in these 13 units to constitute this workforce. Simplistically, on an average basis, these 562 individuals would need to work an average 0.74 FTE (~29.6 hours per week) each to provide the 414.8 FTE reported for the current workforce in these 13 units. A more detailed breakdown of part-time/full-time working patterns for individual staff/roles was not sought.

Haemodialysis workforce capacity: patient : staff ratio

2499 individuals receiving haemodialysis across New Zealand's 15 renal centres received their dialysis treatments from 397.7 full-time equivalent dialysis-delivering staff (registered nurses, enrolled nurses and dialysis physiologists). The number of patients for each full time equivalent of

dialysis-delivering staff in New Zealand is therefore 6.28. This ratio varies across the country, from 3.83 to 13.28, with these extremes representing a smaller centre delivering haemodialysis in a satellite unit remote from the regional centre, and a larger unit with a strong shift towards home haemodialysis (repectively). The 2nd lowest patient:staff ratio was 4.02, and the 2nd highest patient:staff ratio was 8.97.

Alternative average patient:staff ratios for these 2499 patients can be calculated if HCAs are included in the haemodialysis unit clinical workforce (average 5.68 patients per staff FTE, ranging from 3.41 to 13.28), and if all clinical and non-clinical haemodialysis unit staff are included (average 4.86 patients per staff FTE, ranging from 2.93 to 9.17).



Units reported different staffing ratios for different models of dialysis delivery. For example, some centres report delivering dialysis in-centre as requiring a 1:3 ratio that can be adapted to 1:4 if needed, with a 1:2 ratio for acute patients and 1:5 ratio for assisted care. Other units report different ratios, and this variability in locally-accepted staff : patient ratios is noteworthy. These ratios may be dependent on staff skill-mix, physical spread of dialysis spaces across the hospital campus, and/or other local factors.

Overall, more than half of units (8 of 15) reported that with their current staff, not all physical spaces were staffed to an appropriate staff ratio. In one example, one unit (unit 7) reported the need to employ an additional 3.6 FTE simply to operate at appropriate patient:staff ratios for the current haemodialysis population.

Capacity for flexibility: providing “outside schedule” haemodialysis

The ability to provide ‘out of schedule’ haemodialysis describes a unit’s ability to provide acute dialysis treatments to inpatients and outpatients with acute issues, in addition to maintaining scheduled, business-as-usual chronic haemodialysis treatments.

Of New Zealand’s 15 renal centres, only 2 units do not provide dialysis to inpatients (units 10, 15). Another smaller unit provides a limited facility for inpatients to receive their chronic haemodialysis treatments whilst an inpatient, depending on the clinical condition of the individual patient and

whether they are already established within the chronic outpatient haemodialysis programme of the unit (unit 6).

Of the 13 units providing haemodialysis to inpatients, 2 have “separate inpatient facilities away from the outpatient dialysis setting” for this provision:

- a 3-bedded unit staffed 10.30-19.00 with 2 staff members (unit 3)
- a 10-bedded unit (unit 14)

Of the 13 units providing haemodialysis to inpatients, 12 units reported that they provide ‘out of hours’ haemodialysis treatments (*information was not available from 1 unit*). Services report that provision of ‘out of hours’ haemodialysis creates issues with providing sufficient breaks to nurses between shifts whilst maintaining the same staff: patient ratio and/or dialysis session length during the subsequent haemodialysis shift.

Of the 13 units providing haemodialysis to inpatients, 10 units provided information about whether providing dialysis away from the main outpatient dialysis facility reduced capacity to provide business-as-usual outpatient dialysis services.

9 of these 10 units reported a significant impact of acute inpatient haemodialysis session delivery on business-as-usual outpatient dialysis services.

Only 1 unit (unit 14) reported that providing dialysis away from the main outpatient dialysis facility did not reduce capacity to provide business-as-usual outpatient dialysis services: this centre has a dedicated acute haemodialysis inpatient unit.

Despite the clear evidence of strain on New Zealand haemodialysis unit capacity, 10 out of 14 responding units reported that they have capacity to provide additional haemodialysis sessions to patients for medical reasons (e.g. for fluid overload). Units reported that this may be achieved through shift manipulation, provision of glide shifts, or reliance on DNA’s in order to offer a given session. Whilst these adaption mechanisms allowed this additional service provision in these units, these mechanisms may not be a reliable way to provide these medically required treatments.

The three smaller centres who were unable to provide these additional haemodialysis sessions in the local unit for medical reasons are all located within the ... Region and have established linked to a regional renal centre, requiring patients to travel between districts in order to obtain additional haemodialysis sessions for medical reasons. One large New Zealand centre (unit 13) was also unable to provide additional haemodialysis sessions for medical reasons.

It is clear from the survey responses that dialysis units are developing mechanisms to provide the flexibility to fit dialysis schedules into other commitments in patient’s lives (medical and social) despite these capacity constraints. For example, *“Social requests note: Generally, all requests can be accommodated if they are made in advance of the weekly treatment schedule being put together. There is a spreadsheet to record all patient requests that are made. RNs add to this as the requests come through. Requests are then reviewed by the ACNM doing the patient schedule. Requests at short notice for tangihanga/funerals are accommodated”*

Capacity: funding

Over half (60%, 9 of 15)) of the renal centres surveyed provide more dialysis sessions than they are funded for.

Some examples reported by haemodialysis teams included

- providing dialysis six days a week whilst only being funded for five days a week,

- or permanently running a Saturday dialysis shift despite not being funded for this.
- The provision of sufficient chronic HD sessions to meet demand was reported by some units
- *'to be at the expense of home dialysis training chairs or repurposing clinic rooms/ CNM office space within the facility'*

Units reported that additional physical infrastructure was required to meet current dialysis needs. These units reported a series of work-around solutions for this lack of physical haemodialysis infrastructure, including; installing additional chairs and machines in existing units, converting non-clinical spaces (offices) into haemodialysis areas, provision of dialysis on the wards for space rather than clinical reasons, and transporting patients requiring chronic, scheduled haemodialysis sessions to another renal unit.

Most centres (9 of 15, or 60%) did not feel confident in their future proofing for providing additional dialysis sessions, responding that they did not have additional physical resources to expand into or install.

In total, every one of New Zealand's 15 dialysis services reported one or more capacity constraints resulting in an inability to meet current dialysis needs, including insufficient staffing FTE, insufficient funding/haemodialysis arrangements, or insufficient physical space.

Impacts of dialysis capacity issues

Dialysis units also reported a series of changes over time that had an increasingly negative impact on their ability to sustain dialysis services provision for their patient population:

Patient population	<p>Increasing transitions between kidney disease treatments (e.g. CKD-to-start-dialysis; delayed graft function requiring bridging dialysis; unstable phase forcing change from satellite unit/home dialysis therapy to in-centre/dependent dialysis; outpatient-to-inpatient dialysis; out-of-hours treatments)</p> <p>Increasing patient acuity</p> <p>Increasing patient dependency</p> <p>Increasing inpatient admission rates</p> <p>Reducing proportion of patients suitable for satellite unit dialysis or home dialysis therapy</p>
Staff	<p>Increasingly difficult to retain staff</p> <p>Increasingly difficult to recruit to existing FTE</p> <p>Lack of adequate staffing contributing to burnout</p> <p>Impact on important non-frontline staffing FTE e.g. educator roles</p> <p>Additional staff training required to provide high-acuity care and/or home therapies care</p>
Dialysis unit facilities	<p>Increasing need for bed space (rather than chair space) for providing dialysis</p> <p>Increasing need for mobility facilities e.g. hoists</p> <p>Increasing need for isolation facilities</p> <p>Increasing range of patients needs</p>
Healthcare environment	<p>Inadequate financial resources to meet growing needs</p> <p>COVID-19 and associated facility requirements</p> <p>Changing training schedule requirements for satellite unit/home dialysis e.g. shortening or splitting training schedules</p>
Modality planning	<p>Reduced ability to achieve comprehensive kidney failure treatment modality planning</p>

The consequence of an insufficient growth in haemodialysis capacity impacts both dialysis patients and dialysis teams.

In 2022, dialysis units reported adopting a significant array of strategies to continue to provide dialysis for their patient population on a day-to-day basis:

Dialysis Unit strategies	<p>Decline away-from-home dialysis requests</p> <p>Convert offices to HD stations</p> <p>Open dialysis units at additional times (inc Sundays)</p> <p>Double book dialysis slots (anticipating non-attendance will enable dialysis for those who attend)</p>
Staffing strategies	<p>Reduce staff:patient ratios</p> <p>Short-notice staffing roster changes</p> <p>Overtime work</p> <p>Double-shifts</p> <p>Cancel non-frontline activities</p> <p>Non-clinical staff (educators etc) called in</p> <p>Combine managerial + clinical workloads</p>

Individual patient strategies	Alter outpatient treatments to meet acute inpatient dialysis demand Reduce machine cleaning Shorten treatment hours Change treatment location Delay treatment start time Skip treatment day Re-arrange treatment schedule Delay initiation of dialysis Use incremental dialysis start regime
Service-level strategies	Follow-on impacts for training for treatment modalities requiring lower staff:patient ratios (training for satellite unit dialysis and home dialysis)

Within the scope of the survey, the working group were unable to establish if these strategies, in each instance, mitigated the inability to meet capacity partially or completely.

Patient experience

Travel for haemodialysis

From the 13 of 15 units that were able to provide a response, 75 patients travelled between 50 – 100 kms to receive their usual haemodialysis, whilst 34 patients travelled between 100 – 200 kms to receive their usual haemodialysis

The locations of 10 haemodialysis units within the given district of the responding 13 renal teams meant that travel distances of >100km were required on a regular basis, taking between 1.5 – 2 hours (each way) to complete.

The maximum travel distance to a dialysis unit within that person’s health district was 169km (unit 6)

Acknowledging that time taken and distance travelled is unique to a geographic region, 97 patients travelled between 60-120 min to receive their usual haemodialysis, whilst 17 patients travelled > 120 min to receive their usual haemodialysis.

The locations of 6 dialysis units within the given district of the responding 13 renal teams meant that travel times of >2hrs were required on a regular basis.

The maximum travel time to a dialysis unit within that person’s health district was 2.5 hrs (one way).

Those travelling outside their district had to travel one-way between 232km to 373km, which was reported to take 3.5 to 5 hrs.

Transition to home haemodialysis

A number of centres reported that capacity constraints were impacting their ability to train patients for home haemodialysis. This inability to access home haemodialysis was highlighted in free-text survey responses and not quantitatively surveyed. Renal centres reported that *“Home dialysis training centre [and acute dialysis unit] are full”*; *“considerable difficulty to get [patients] started on home training”*; *“The increasing number of in centre respite care, inability to move ‘stuck’ patients etc are causing considerable impact upon ability to train and get patients home”*; *“Although there is space in home training for extra shifts there is no nursing resource”*; *“home training unit has been operating from the in-centre for the past two years due to space constraints and safety concerns”*; and *“Delay getting in to home training”* affecting *“likely 20”* individuals.

In addition, these capacity constraints not only act as service-related barriers to home haemodialysis, but create new and additional barriers to home haemodialysis service delivery:

“Erosion of home dialysis philosophy: The whole philosophy and purpose of Home training dialysis is to promote self-care and independence, however being exposed to in-centre patients cared for by staff may undermine this philosophy and demotivate individuals to pursue training to enable them to dialyse independently. Witnessing adverse events in the in-centre unit (such as hypovolaemic shock intra dialysis, cardiac arrest and severe cramping) creates fear, which becomes a barrier to a safe learning environment”

Conservative care

In a small number of centres (2), it was considered possible that “patients opted for conservative care because there were no haemodialysis facilities available close to their home”. The number of affected individuals was unclear to one unit and reported in one instance in the other unit.

9 of 15 units (60%) of units stated that it was unknown whether “patients opted for conservative care because there were no haemodialysis facilities available close to their home”. Results suggest that the majority of renal teams don’t have existing facilities to monitor or track patient priorities that inform decisions about conservative care / RRT modality choices.

DISCUSSION

This survey has highlighted significant dialysis capacity issues which span the motu. These issues affect the ability to care for existing haemodialysis patients, and to provide haemodialysis to those starting dialysis or transitioning from another renal replacement therapy.

These issues are not isolated to small regional units or large metropolitan centres. Whilst each renal centre reports their own challenges related to dialysis capacity, all experience at least one of the three, at times all the key constraints – inadequate physical space, inadequate staffing, or insufficient funding/regional arrangement.

Haemodialysis is a life-preserving service. As such, renal services must find ways to continue to provide haemodialysis treatments, no matter how many capacity constraints they experience, and no matter what impact mitigating measures have on patients, staff and teams: there is no option not to cope. Services report a wide range of measures being used to cope with multiple capacity constraints.

The renal workforce cannot sustain these measures indefinitely. Renal centres already report a “*mass exodus*” of staff and many negative impacts for patients, including an inability to receive care close to home.

Many of New Zealand’s haemodialysis units do not have the capacity to start new patients on chronic haemodialysis in a planned fashion. A number of units reported that patients remained on an alternative and suboptimal RRT modality for longer than clinically appropriate. When able to start new patients, some units are forced to reduce treatment hours for patients (less than initially prescribed) or start them on 2 shifts per week (instead of 3) as a direct way to managed to capacity.

A significant majority of centres felt that they did not have staffing levels required to provide haemodialysis services to meet demand, nor additional physical resources to expand into, and did not feel confident in their future proofing for providing additional dialysis sessions. Whilst this is an alarming situation – these findings are of even more substantial concern in the knowledge of predictions that the haemodialysis population may expand by 30% by 2031/2032^{xix}.

To cope with demand, units regularly repurposed home dialysis training or assisted care chairs or took over and repurposed clinic rooms and nursing office space within their facilities. Despite units employing mitigation measures, limitations on service provision extend to the inability to provide additional medically required HD sessions (e.g. to address overload or hyperkalaemia) or to offer holiday/visiting patient or shift swaps for non-medical reasons.

Haemodialysis teams report that repurposing staffing/facilities to delivery day-to-day haemodialysis services limits or denies a patient’s ability to pursue a pathway towards home independent therapy. This only serves to perpetuate issues around in-centre facility capacity; patients become stranded in hospital haemodialysis facilities and unable to access haemodialysis at home. Repurposing limits a services ability to ‘look beyond’ business as usual, to address patients’ chronic health issues or to focus on initiatives to reduce hospital-based haemodialysis demand through transplant assessment/investigation or to transition towards home based modalities.

As a direct result of lack of capacity – patients are accommodated at other centres; away from whanau and whenua, have their treatment delayed; heightening the risk of an emergency dialysis start or held on inferior treatments.

The impact of these haemodialysis capacity issues on the experience of patients and whānau has not been comprehensively or systematically measured in this report. Long travelling distances, barriers to accessing training for haemodialysis treatment at home, and inability to receive away-from-home dialysis are three of potentially multiple areas of impact on patients and whānau that are highlighted here.

This survey confirms that notion that we risk NOT being able to deliver on the whakato^{xx} –

E kore tēnei whakaoranga e huri ki tua o aku mokopuna.
Our mokopuna shall inherit a better place than I inherited.

Aims of the Survey

Survey responses were received from all renal centres in New Zealand at either local or regional level, providing information about haemodialysis services available to the entire adult population of Aotearoa New Zealand.

Survey responses were provided about multiple aspects of haemodialysis services, including:

- current demand for haemodialysis services
- current staffing within haemodialysis units, particularly in relation to demand for haemodialysis services
- the ability of infrastructure and staff to adapt/flex/mitigate issues with current demand, including acute treatments, away-from-home treatments, home haemodialysis training, and the ability to accommodate future demand
- the impact of dialysis capacity constraints on the patient experience.
- the comparative state of dialysis units, allowing local teams to review their individual situation within a regional/national context
- highlighting areas/activities which could serve as templates for change for those centres/districts looking to adapt their local services

As such, the survey report is designed to provide relevant data and analysis to empower the multidisciplinary renal community, patients and their advocates, management and funding agencies to work together towards the goal of providing both adequate and future proofed haemodialysis infrastructure, staffing and funding/regional arrangements to meet patients' needs.

The aims of the survey report are therefore designed to meet intentions laid out in Te Pae Tata: Interim New Zealand Health Plan 2022^{xxi}:

- Everyone will have equitable access to high quality emergency and specialist care when they need it, wherever they live
- Collaborate with our workforces and their representatives, including unions, professional bodies, education institutions and training organisations, to grow and support our workforce, both rural and urban, to deliver what is needed.

Overall haemodialysis “capacity”

This survey has reinforced the notion that at its core, the clinical care provided by a renal dialysis service is much more than simply a unit of infrastructure. Instead, haemodialysis service capacity is the cumulative effect of a nursing infrastructure, allied health provision, clinicians and engaged patients with enduring treatment needs, coupled with appropriate & sustainable funding, with service philosophies that meet the emerging needs of local population, facilitated by effective treatment delivery models.

In its purest form, capacity may be defined by some commentators as the utilisation of plumbed stations (with a dialysis machine) and the resulting shifts which may be undertaken. Full capacity may be seen as the utilisation of all available plumbed stations, their machines, for maximum haemodialysis session delivery. These metrics are easily definable and comparable between units and can be translated to a business case.

This reductionist approach fails to consider sustainable staffing models, equitable service delivery to rural and remote areas, the patient experience, and patient engagement in service design and delivery.

We note further quotes from the HQSC report [A window on quality 2022 (Part 2) | Whakarāpopototanga matua: He tirohanga kouniga 2021 (Wāhanga 2)] that “*appropriate funding of health services must be balanced with a focus on efficiency and equity*”.

During the planning of renal services provision, the focus must not solely be on the ‘number’ in front of us, a ‘unit of work’, a number to be ‘dialysed’. The raw number of dialysis chairs as a marker of a unit’s capacity is too crude and not an appropriate measure. Instead, service planning needs to consider the patient as whole, with a lived experience which is often rich, diverse and deeply felt; and is often spread across multiple generations of the same family, and across the whānau and community of the individual receiving haemodialysis treatment.

The impact of capacity constraints on a single individual or a single generation of patient, may have deep and meaningful implications of how future generations interact with healthcare services. It may embed multigenerational distrust, trepidation and fear.

He aha te mea nui o te ao?

What is the most important thing in the world?

He tāngata, he tāngata, he tāngata

It is the people, it is the people, it is the people

In undertaking this survey and analysing the data, the working group reflected that whilst the number of physical spaces or chairs is crucially important, the ultimate ability to utilise a given infrastructure resource, and hence the true capacity of a service, is often more dependent on other variables.

These include nursing capacity, shift patterns, provision of self-care or HHD training facilities and the requirement to adapt these resources to meet the needs of haemodialysis patients e.g. through provision of haemodialysis away from a scheduled chronic haemodialysis shift, be that as an inpatient or in another region/unit.

Survey responses illustrate that capacity is also a subjective expression; a marker of staff’s experienced assessment of their own ability to cope with existing and new demand, to adapt and flex. A unit’s relative capacity in this holistic sense is therefore more challenging to define, to

document – changing from shift to shift, week to week. It is often felt or described in terminology differently by different members of the service.

The structure of each renal service is also unique, often a by-product of its geographic and demographic makeup, its partnership with allied services like vascular and urology teams, and its underlying historic dialysis modality philosophy. Those units who have historically focused on home-haemodialysis provision are not easily comparable with those who have needed to have predominantly in-centre based facilities. Similarly, regional units that offer satellite haemodialysis services to outpatients without local medical and nurse specialist/practitioner support are not easily comparable with regional referral centres that offer haemodialysis sessions to inpatients, outpatients and those under the care of an allied tertiary referral service.

Whilst each renal centre is different, this survey has highlighted that dialysis capacity is a problem across Aotearoa New Zealand.

Recommendation:

Te Whatu Ora, Te Aka Whai Ora and local health district funders acknowledge that haemodialysis services across Aotearoa New Zealand are constrained by lack of capacity to meet current demands, that current services do not recommended standards or principles for service design and delivery, and that these capacity constraints are having a significant and negative impact on patients, staff and renal service teams.

Te Whatu Ora, Te Aka Whai Ora and local health district funders acknowledge that constraints in the capacity of haemodialysis services arise from lack of capacity in staffing, in physical infrastructure, in funding/haemodialysis arrangements, and (in a number of units) from constraints in multiple/all of these capacity domains. These capacity constraints take time to resolve, and patients, staff and renal service teams experience the negative impacts of capacity constraints before and during the process of addressing these issues.

Te Whatu Ora, Te Aka Whai Ora and local health district funders acknowledge that each regional centre is unique, with haemodialysis services that were designed to meet the needs of their specific local population, and currently with a particular combination of constraints in any/all capacity domains (staffing, physical infrastructure, funding/haemodialysis arrangements) that is impacting local patients, staff and renal teams. Resolving local capacity issues requires local solutions that meet the needs of the local population.

Te Whatu Ora, Te Aka Whai Ora and local health district funders acknowledge the risks to patients (*including inability to exert rangatiratanga, unable to access treatments close to home, receiving delayed and suboptimal renal replacement therapies*) and staff (*burn-out, resignations, erosion of philosophies enabling patient-centred care*) that follow the lack of capacity to meet current demands for haemodialysis services.

Te Whatu Ora, Te Aka Whai Ora and local health district funders acknowledge that services across Aotearoa New Zealand that lack capacity to meet current demand, coupled with the consistent historical and anticipated future growth in haemodialysis services demand, represent a situation that requires an immediate response.

Haemodialysis demand

The total of 2499 patients receiving haemodialysis in Aotearoa New Zealand's renal units is modestly higher (+154) than the latest available chronic haemodialysis data available from ANZDATA ^{xxii} of 2345 individuals.

Notably however, the two methodologies capture different patient populations

- ANZDATA captures haemodialysis delivery to individuals receiving haemodialysis for at least 3 months
- This survey captures all haemodialysis treatments delivered to individuals receiving chronic haemodialysis AND to individuals requiring acute haemodialysis within a 7 day period

The implications of these similarities in the number of individuals receiving haemodialysis according to these two data sources include:

1. These similarities provide a degree of confidence in the methodology and results of this survey.
2. Dialysis populations continue to grow each year, by an average of 46 patients per year over the last 5 years in New Zealand^{xxiii}. It would therefore be anticipated that data collected over the 2nd half of 2022 would be higher than 2021 data, as observed, but this year-on-year growth in the haemodialysis population is unlikely to account for all 154 additional patients identified in this survey
3. The current survey will identify people with acute kidney injury who are receiving haemodialysis treatment. Cases of acute kidney injury (AKI) treated with haemodialysis for less than 90 days are not captured in ANZDATA registry. This AKI-receiving-haemodialysis group likely also makes up a fraction of the additional 154 patients identified here.
4. It is also possible that some cases of chronic haemodialysis have been "double-counted": for example, a patient receiving chronic, fixed-schedule haemodialysis in a regional satellite unit who has been transferred to a large renal centre (or the local district in-centre service) for acute haemodialysis during an intercurrent hospitalisation may be counted by both centres. It is not possible to quantify the extent to which this switch from fixed-schedule to flexible-schedule haemodialysis for patients with chronic haemodialysis needs has contributed to larger population numbers in this survey as compared with the latest ANZDATA registry results.

There are substantial regional differences in demand for haemodialysis service provision, and whether those demands are met through predominantly facility-based or home haemodialysis service delivery models. When demands are calculated per 10,000 members of the adult population in each district, there are substantial variations between regions, including between the North and South Islands of Aotearoa New Zealand. These variations may represent differences in demographics, differences in access to alternative treatments for end-stage kidney disease (such as kidney transplants), and/or other factors.

Notably, however, irrespective of the number of patients receiving haemodialysis services in each region or the dominant model for haemodialysis treatment delivery, every renal centre in Aotearoa New Zealand reported that delivery of haemodialysis services was constrained by capacity issues. These haemodialysis capacity issues therefore do not appear to relate to the prevalence of kidney failure in the local population, but rather to insufficient infrastructure (staffing, physical, funding/haemodialysis arrangements) available to renal services to meet the needs of their population requiring haemodialysis treatment.

Ability to provide planned starts onto haemodialysis

More than half of the responding renal centres in Aotearoa New Zealand reported that they lacked capacity to provide a planned start onto haemodialysis locally, or had to reduce the number of treatments provided in order to enable a planned start onto haemodialysis

In some cases this inability to start haemodialysis in a planned fashion locally was part of an agreed regional plan, therefore requiring patients to travel to the regional centre to start haemodialysis. Once patients had started dialysis at a regional centre, then lack of capacity in local dialysis units meant that patients were unable to return home to continue maintenance dialysis close to home in their local unit, requiring long-term, burdensome travel for the individual to continue maintenance dialysis in the regional centre, as well as adding to capacity issues for the regional centre. In other cases, this inability to arrange a planned start reflected a lack of local capacity, requiring patients to delay treatment, start with a reduced treatment plan, or remain on an alternative to haemodialysis that the team perceived was suboptimal.

These reports of lack of capacity constraining the ability of patients to start haemodialysis do not meet recommendations outlined in international guidelines and in Aotearoa New Zealand's health system:

UK Renal Association Clinical Practice Guideline

5. Planning, initiating & withdrawal of RRT (Initiating RRT 5.1 – 5.5)^{xxiv}

5.1 We recommend that patients known to nephrology services for 3 months or more and who are planned to have renal support should start renal replacement therapy in a controlled manner, without the need for hospital admission

5.3 We recommend that once a decision has been made to start dialysis in a patient with established access there should be no delay in starting treatment i.e. no waiting list to start dialysis

Te Aka Whai Ora Māori Health Authority | Our work and priorities | The key system shifts^{xxv}:

Everyone will have equal access to high quality emergency and specialist care when they need it

Recommendations

Te Whatu Ora, Te Aka Whai Ora and local district funders:

Enable equal access to planned starts onto haemodialysis without delay, in a format that matches funder and patient priorities and local/regional options

Ability to provide haemodialysis for patients living in another health district

A number of renal centres participate in regional models that enable provision of haemodialysis services to patients living in another health district. Examples include

- the 3 health district model with comprehensive haemodialysis services managed by Wellington,
- the Te Manawa Taki model, where a large central service (Waikato) manages all acute, flexible haemodialysis services and new-start haemodialysis services across the region, and manages variable proportions of fixed-schedule outpatient haemodialysis services in conjunction with local renal teams
-

Reports from these and other regional models of haemodialysis service delivery demonstrate capacity constraints in both the regional centre and the local renal team that impacts the ability of

the model to meet the needs of the population who are served by these models. Capacity issues reported include constrained ability to employ staff in existing or newly-constructed satellite dialysis units, adding additional physical infrastructure to home haemodialysis units and “*juggling staff*” to meet demands, and difficulties in supporting patients to meet their needs when travelling to the regional centre. Teams reported multiple impacts of these capacity constraints in regional service delivery models ranging from lengthy and burdensome travel for patients to access their haemodialysis treatments, to anxiety or aggression for patients having to book accommodation at regional centres away from home without sufficient financial means, to flow-on impacts on the ability to transition these and other patients to home dialysis therapies and therefore create space in the local haemodialysis centre.

These responses highlight that capacity constraints in all of the regional centre, or the local haemodialysis centre, and the support networks required to travel between the two, are creating pressures on services and patients that then act as further barriers to potential solutions to these situations (e.g. enabling haemodialysis close to home)

In renal centres without these regional models, provision of haemodialysis services to patients who live in another district appears infrequent (estimated at ~4:1000 treatments), and these treatments are largely provided to inpatients in large hospitals with tertiary/quaternary services. As such, these treatments for patients from other districts exert impact renal teams by contributing to the existing pressures on renal services that result from providing acute, flexible haemodialysis treatments to inpatients alongside routine, fixed-schedule sessions to chronic haemodialysis outpatients.

Ability to provide flexible (out-of-schedule) haemodialysis

Most renal centres are responsible for providing haemodialysis services:

- On a fixed outpatient schedule to chronic haemodialysis patients;
- Acutely on a flexible basis, to both new patients with acute kidney injury requiring acute haemodialysis and to chronic haemodialysis patients requiring a change in their fixed outpatient schedule for a variety of reasons (e.g. acute admission to hospital or intercurrent illness forcing a change in their fixed outpatient schedule)

From this survey, acute haemodialysis sessions constitute a small fraction of haemodialysis services delivered, and yet have a substantial impact on the capacity of teams to meet all of the fixed and flexible demands for haemodialysis services.

Acute dialysis session delivery, particularly away from the main outpatient dialysis unit, poses a multiplicative problem for dialysis unit teams. Units reported that staff who would have been able to provide care to 3 – 5 patients on an outpatient haemodialysis shift are required to provide acute inpatient dialysis to 1 (or maximum 2) patients at a high staff : patient ratios (1:1, 2:3 or 1:2). Acute dialysis session delivery away from the main dialysis unit therefore has a disproportionately large impact on overall dialysis unit capacity in the context of staffing capacity constraints.

Overseas reports^{xxvi} also acknowledge the high-acuity of patients discharged from acute inpatient dialysis facilities to chronic outpatient units, but do not focus on models of care for ensuring that both acute inpatient dialysis care and scheduled chronic outpatient dialysis care can proceed without the former impacting business-as-usual in the latter.

It is noteworthy that only one unit had a large (10-bed), dedicated acute inpatient facility away from the main outpatient dialysis facility, and this was also the only facility to report no impact of inpatient dialysis provision away-from-base on business-as-usual outpatient dialysis services. This model may serve as a conversation-starter to consider how acute, flexible inpatient dialysis care can

be provided alongside scheduled chronic, fixed-schedule outpatient dialysis care without a significant negative impact on the latter.

Units consistently report a significant impact of acute dialysis delivery on business-as-usual chronic haemodialysis services. Understanding whether this impact represents haemodialysis treatment delivery to

- a large number of acute kidney injury patients requiring short-term 'interim' haemodialysis,
- or to chronic haemodialysis patients requiring changes in their planned, fixed-schedule outpatient treatments to flexible acute haemodialysis treatments because of high hospitalisation rates and multi-morbidity (see Appendix C for distinct circumstances under which this flexibility may be required).

requires further consideration. This survey was not designed to distinguish these options; data on the reason for this demand of these impactful, flexible-schedule acute haemodialysis sessions is likely to be valuable to those planning sustainable delivery of both flexible and fixed haemodialysis sessions.

Recommendation:

ANZDATA expands data capture to include information on:

- haemodialysis treatments delivered as both fixed-schedule outpatient service and flexible, acute inpatient service,
- reasons for, & recipients of, acute haemodialysis treatments.

Recommendation:

Renal units consider:

- establishing separate rosters for fixed-schedule chronic outpatient haemodialysis services, and flexible acute inpatient haemodialysis services
- providing flexibility for the acute inpatient service roster through including roles with deferrable tasks (quality assurance, education, rostering etc)
- creating sufficient flexibility to cover the maximum demand anticipated for acute, flexible haemodialysis service requirements (including acute kidney injury cases requiring haemodialysis, admission of chronic haemodialysis patients to inpatient areas, requests for shift changes, transfer between renal centres etc)

FTE, patient:staff ratios and staffing skill-mix

In 2009, the Australia and New Zealand Dialysis Workforce survey sought information from dialysis units in New Zealand about the "dialysis workforce"^{xxvii}. Potential categories were Registered Nurse, Enrolled Nurse, and dialysis professionals (patient care technicians). The overall patient:staff ratio in New Zealand in 2009 was 6.3 patients for each full-time equivalent staff member^{xxviii}. This ratio represented the highest number of patients per staff member across all of Australia and New Zealand (Australian average 4.2).

This updated 2022 survey captures data on individuals in these same roles that provide frontline haemodialysis care (haemodialysis nurses and physiologists). The ratio of patients to these staff is unchanged since 2009, currently 6.3 patients per full-time equivalent dialysis-delivering staff member.

This assessment of staffing ratios enables direct comparison of the number of staff per patient despite the growth in the total number of patients in the intervening years.

Health Care Assistants

There is no mention of healthcare assistants in the 2009 ANZ Workforce survey reported by Polaschek and colleagues in 2009. It is not clear whether there were additional HCA staff in dialysis units in 2009 whose role in the patient : staff ratio was not captured in the 2009 survey, or whether HCAs have been newly employed at significant levels across New Zealand dialysis units since 2009. The report in 2009 analysed staff capable of delivering haemodialysis treatments (6.3 patients per staff FTE), and therefore comparison with the dialysis-delivering workforce in 2022 (also 6.3 patients per staff FTE) appears most appropriate.

HCAs perform vital functions in haemodialysis units, and enable dialysis-trained staff to allocate a greater proportion of their time to supporting haemodialysis patients to receive their haemodialysis treatments. A similar phenomenon of relative skill mix/roles enabling different aspects of haemodialysis service delivery was noted in 2009. Even if included in patient : staff ratios in dialysis units, however, HCAs appear unlikely to participate in the high-ratio (1 to 1) care for acute dialysis session delivery (recommended in the Tier 2 document^{xxix}) when this care is delivered away from the main dialysis unit (on wards, in intensive care facilities etc). In other words, HCA staff are likely invaluable in supporting chronic HD patients to receive their usual, fixed-scheduled dialysis care in dialysis facilities, but are less likely to be able to mitigate the requirement for 1 to 1 dialysis-trained staff care when delivering acute dialysis treatments to inpatients away from the main dialysis centre.

In addition, this updated 2022 survey captures data on an additional and broader range of healthcare professionals associated with dialysis units, including senior nurses with non-clinical roles (nurse manager and associate nurse manager, clinical nurse specialists, educators etc). In total, these individuals in senior specialist roles represent 14% of the total dialysis unit workforce in Aotearoa New Zealand, with HCAs representing 10% of the total clinical workforce in dialysis units. Registered nurses represent 78% of clinical staff that provide deliver haemodialysis treatments; notably this proportion is also essentially unchanged since 2009 (~80%)^{xxx}.

Limitations of using staff FTE : Patient ratio

When reviewing the patient : staff FTE ratio, there are inherent limitations when comparing units. The survey did not categorise FTE allocation by in-centre vs assisted-care haemodialysis sessions/patients, as this division is not always clear in practice, and may flex from shift to shift depending on patient need and acuity. For example, a patient who becomes acutely unwell during an assisted-care haemodialysis session may require more than 1:4 nursing input. In addition, renal centres often reported that senior staff or specialist PD/transplant nurses took a patient load/filling in gaps in the dialysis-delivery roster where needed, but this clinical work is specifically excluded from the dialysis-delivering FTE calculation. As such, the required FTE/physical number of nursing staff required to maintain clinically safe dialysis is likely underestimated in this audit.

FTE also fails to describe the true demands of the job: glide treatments, additional hours undertaken following a shift in order to delivery clinically-appropriate care. It may be routinely accepted that staff work in excess of their FTE time allocation simply to cover business as usual clinical demands. Whilst adequate care may be provided under this model, service delivery occurs is at the expense of working consistently above the scope of contract. We did not quantitatively explore the extent to which this additional and unrecognised work occurs, but renal centres noted multiple mitigating strategies that are being employed simply in an attempt to meet clinical need.

In 2009, it was acknowledged that a large proportion of the dialysis workforce was working part-time (<30 hours per week), and that this arrangement provides an opportunity to call in staff for

overtime work. In Aotearoa New Zealand renal units currently, the average staff calculates at 29.6 hours per week, leaving very little room for the flexibility to call in part-time staff for over-time work that was noted as the primary mitigating strategy in 2009. This loss of workforce flexibility in terms of part-time work patterns may be one reason why so many more mitigating measures are now required to deliver clinically-appropriate care in 2022.

The utility of comparing patient : staff FTE ratios between units to discuss issues of capacity generates important considerations. Full time equivalent staffing levels should not be viewed in isolation, since additional factors such as skill-mix, experience, corporate knowledge and diversity are also important: caution must be exercised when viewing FTE in isolation from the clinical or regional context. It is also important to highlight that a higher patient : staff FTE ratio could reflect either a strong home haemodialysis programme or an under-staffed facility-based programme. Likewise, a lower patient : staff ratio may represent a large cohort of patients requiring high-intensity care (e.g. lots of inpatients) or a very stable population of chronic haemodialysis outpatients in a satellite unit without medical cover for whom care delivery can be planned with the benefits of efficiencies enabled by stable care needs.

At a renal service level, considering the patient:staff ratio and the number of staff required to provide that FTE, gives an individual centre the ability to benchmark their current capacity/staffing levels. It may be used to 'job size' their unit as their population/ESRD population increases, aiming to retain or improve on the patient:staff ratio when submitting business case applications to Te Whatu Ora. A comparison between current FTE (real life staffing) vs total funded for FTE (Business case) vs required FTE (to ensure clinical need + workforce wellbeing) may be important to review going forward to highlight where deficits may lie for each individual centre.

Impact of lack of staffing capacity on different sized units

Reflecting on the theme of staffing capacity and ability to meet escalating demand, smaller units (those with small total numbers of staff or those with a greater proportion of full time positions) are highly vulnerable to staff shortage pressures. These units may have a smaller pool of nursing staff to draw additional shifts from, and may be limited as to how double shifts are used/funded and/or how extra shifts are filled to ensure that nursing staff get mandated and adequate break hours between shifts. Likewise, large units may be forced to call on non-clinical staff on a regular basis to provide acute inpatient treatments, consistently providing an unrecognised/under-counted clinical workforce that is necessary to deliver haemodialysis treatments at safe patient: staff ratios. There are few deferrable elements to haemodialysis treatments, and there is little/no opportunity to defer the activities of staff members who are rostered to provide clinical haemodialysis care; as such, impacts of insufficient staff capacity are likely to fall on other areas of a service that are more easily deferred (e.g. educational and quality assurance/improvement activities).

The utility of providing a national overview and average ratio of current patient : staff levels, may simply serve as a prompt units with higher ratio's to ensure their model of care remains clinically safe within their individual unique clinical demands. The comparative national data also provides a template with which centres can discuss their practice similarities/differences with a national snapshot, and look at exemplar models elsewhere that might support local change to enable service change.

Safe patient : staff ratios

Staffing ratios are adapted across units according to local facilities and patient demographics. For example, units with dedicated inpatient areas for delivering acute dialysis sessions reported ratios of 2 acute patients per staff member, or 3 patients per 2 staff members. These ratios contrast with the

1:1 patient : staff ratios reported for inpatient acute haemodialysis treatment delivery in units without these dedicated inpatient facilities.

Acknowledging the value and importance of these and other examples of local adaptations, the latest version of the “Specialist Medical and Surgical Services - Renal Services. Nationwide Service Framework” Appendix A: Workforce standards for renal units) (TIER 2 document, Reviewed November 2022) provides guidance in this regard, and acknowledges the high patient : staff ratio required for provision of acute haemodialysis treatments:

Nature of dialysis treatment	Staff to patient ratio	Minimum requirements
Dependent haemodialysis	1 to 3	n/a
Assisted care haemodialysis	1 to 4	2 staff (6 stations)
Independent haemodialysis	1 to 6	2 staff (min 10-20 patients)
Acute haemodialysis	1 to 1	n/a
Home haemodialysis training	1 to 2	2 patients at a time
Home haemodialysis support	1 to 25 (urban), 1 to 12 (rural)	
Peritoneal dialysis	1 to 25 (urban), 1 to 12 (rural)	
Technical	1 to 40 machines	

Importantly, the document also states:

“We suggest the minimum workforce provided is at the level described in the 2004 workforce document (Appendix A) however we recommend that the renal workforce document is reviewed. The previous work does not account for changes in the service requirements, including increase in prevalence and incidence of ESRD, increase in average age, increase in co-morbidities and increasing proportion on facility based dialysis (Prevalence 2004: 665pmp, 2020:1022pmp, Incidence 2004: 119pmp, 2020:139pmp). The 2004 document does not cover the complexities of nurse led services and nurse practitioner roles and this should be considered in future work.”

Estimates in the required degree of staff FTE growth required to meet the needs of the New Zealand Haemodialysis population can be interpreted from the shift in the proportion of NZ patients requiring low-ratio dialysis patient:staff ratios (e.g. home haemodialysis) and the relative growth in NZ patients requiring higher-ratio dialysis patient:staff ratios (dependent-care dialysis) between 2009 and 2020 (ANZDATA reports).

In contrast to the static overall patient:nursing staff ratios in New Zealand between 2009-2022 (patient:staff ratio 6.3 in 2009 and 6.28 in 2022), the relative number of total haemodialysis treatments delivered in facilities (requiring 1:3 care) has grown, and the relative number of total haemodialysis treatments delivered at home (requiring 1:12 care or 1:25 care) has reduced.

		hospital	satellite	home	total	growth 2009 - 2020
2009	number of patients	681	420	369	1470	
	recommended patient : staff ratio	3 to 1	4 to 1	12 to 1		
	staff needed per treatment	227	105	31	363	
2020	number of patients	1232	541	391	2164	47% (HD patient growth)
	recommended patient : staff ratio	3 to 1	4 to 1	12 to 1		
	staff needed per treatment	411	135	33	579	59% (required staff growth)
Growth	number of patients	81%	29%	6%		

It can be seen that whilst the total haemodialysis population has grown significantly (by 47% between 2009 and 2020), by far the greatest growth has been in the proportion of the haemodialysis population that requires the greatest patient:staff ratio (hospital-based haemodialysis) (81% growth). The degree of growth in the home haemodialysis population (6%) has been considerably lower than the total population growth. The consequences of this shift in the haemodialysis population towards a population that has significantly higher dependency/staffing needs in 2022 means that staff growth needs to exceed total population growth in order to continue to provide safe patient:staff ratios for this increasingly dependent population. Whilst the total haemodialysis population growth is 47%, staff growth needs to be an additional 1.25-fold higher than this 47% (i.e. 59%) to achieve the necessary growth in haemodialysis staff in order to continue to provide safe patient:staff ratios. If this necessary 1.25-fold increase in the haemodialysis staff workforce had occurred on the basis of this increasing dependency, the ratio of patients to staff should have fallen by a corresponding amount (i.e. by $1/1.25 * 6.3$ ratio) to a new patient:staff ratio of 5.04 to meet the needs of this increasingly dependent population. However the current patient:staff ratio in 2022 (6.3) is unchanged from 2009, indicating a very significant shortfall in the growth of the dialysis-delivering workforce. The current dialysis-delivering workforce in Aotearoa new Zealand is 397.68 FTE: to achieve the necessary 1.25-fold increase in FTE requires an additional ~100 FTE of dialysis-delivering staff (to 497.1 FTE). With 497.1 FTE, care delivered to 2499 haemodialysis patients would be provided at the appropriate, safe 5.04 patient:staff ratio required for Aotearoa New Zealand's current and largely dependent haemodialysis population.

Given that 562 individual dialysis unit staff members were required to provide the 414.8 FTE employed by the 13 units providing information about both FTE and staff numbers (i.e. 1.35 physical staff members per FTE), it could be estimated that the number of individuals needed to provide this additional 100 FTE positions across Aotearoa New Zealand would be (1.35 staff members per FTE * 100 new FTE) i.e. ~135 individuals capable of delivering dialysis.

These overall numbers for dialysis-delivering staff growth, based on Aotearoa New Zealand's haemodialysis workforce and patient population, almost certainly mask **regional differences in the acuity of need to fill the staffing capacity shortfall**. The range of patient:staff ratios seen across Aotearoa new Zealand's renal centres, particularly when examined alongside examples of the impact of capacity limitations on care delivery and patient experience, may highlight regions/centres where there is the greatest gap in current staffing capacity.

Importantly, **this 25% growth in the dialysis-delivering workforce is likely a significant underestimate** of the degree of growth required in staff needed to meet the changing demographics of Aotearoa New Zealand's haemodialysis population.

- It is anticipated **that more acute/inpatient haemodialysis treatments have been required** as the New Zealand haemodialysis population has included more older individuals^{xxxix}, and as survival on dialysis has improved, leading to individuals living and receiving haemodialysis for longer with multi-morbidity and associated healthcare needs for longer^{xxxix}. There is no reliable information available to assess this supposition that more acute/inpatient haemodialysis treatments have been delivered over time, nor information on **the proportion of haemodialysis shifts that are delivered according to a fixed outpatient schedule compared with those that are delivered on a flexible basis** (e.g. to inpatients, or to chronic haemodialysis outpatients requiring a change in their usual dialysis schedule for one of multiple potential reasons). Definitions of fixed and flexible sessions (see Appendix C) and regular capture of the relative frequency of these shifts in regular serial snapshot surveys (e.g. alongside routine ANZDATA collection) could provide valuable information on the staffing needs required to deliver flexible dialysis sessions alongside the more predictable fixed haemodialysis schedule.
- the assumed **growth in inpatients requiring haemodialysis treatment** at the highest level of patient:staff ratio (typically 1:1 ratio). Given that acute inpatient haemodialysis treatments are recommended at 1:1 patient:staff ratios, it is likely that the 25% staff growth estimate (based on a shift from 1:12 care to 1:3 care, with no reliable information on the increased need for 1:1 acute care) is an underestimate of need. Again, serial snapshot surveys, and/or retrospective audits, may be informative.
- there is no information on **changes in patient frailty of the Aotearoa New Zealand haemodialysis population**, which may require further reductions in patient:staff ratios in order to meet the needs of frailer patients (e.g. assistance with transfers, nursing input for cardiovascular instability during haemodialysis, transfer documentation/handover for hospitalisation etc). The single snapshot study by Bloomfield and colleagues could serve as a benchmark for repeated analysis of the proportion of haemodialysis patients living with frailty in Aotearoa New Zealand.
- As Aotearoa New Zealand's haemodialysis services have experienced increasing capacity constraints with the need to adopt multiple mitigating measures with significant impacts on patients and staff, renal centres reported *"mass resignations and exodus of nurses & physiologists"*. Another centre reports *"Since Jan 2022 a loss of 8.3 FTE in the dialysis nursing team"* Centres reported the need for solutions to haemodialysis staffing capacity *"so as not to burn-out the permanent staff"*. The consequent high turnover and sickness of the haemodialysis workforce imposes further stressors in terms of training/orientation requirements and additional overtime.
- Centres also reported a loss of experienced staff from the haemodialysis workforce. As units noted *"we need: - More experienced staff that are able to look after acute patients"*. Replacing this experienced component of Aotearoa New Zealand's dialysis workforce requires more than a consideration of staff growth in purely percentage terms: consideration also needs to be given to ensuring that experienced members of haemodialysis teams are attracted, valued and retained.

Recommendation:

Te Whatu Ora, Te Aka Whai Ora and local district funders:

- enable an immediate 25% increase in the dialysis-delivering workforce in Aotearoa New Zealand, with regional reviews to ensure allocation to health districts experiencing the most significant staffing capacity shortages
- facilitate the necessary solutions to this significant skills shortage in the dialysis-delivering workforce, via advocating for enabling visa/immigration policies and ensuring sufficient training programmes/positions to fill and sustain these positions.
- plan for further increases in the dialysis-delivering workforce, based on the expected growth of the haemodialysis population + additional factors (inpatient treatments, flexible service delivery models, dialysis population frailty, staff skill mix and turnover)

Recommendation:

National Renal Advisory Board commissions reports/research/serial surveys on other factors that will inform calculations of the necessary size and skill mix of Aotearoa New Zealand's haemodialysis workforce session, including:

- proportion of haemodialysis shifts that are delivered according to a fixed outpatient schedule compared with those that are delivered on a flexible basis
- numbers of, and growth in, inpatients requiring haemodialysis treatment
- changes in patient frailty of the Aotearoa New Zealand haemodialysis population
- staff experience,
- staff skill-mix,
- staff turnover metrics.

Physical spaces available for haemodialysis treatments

603 haemodialysis-enabled physical spaces are reported in Aotearoa New Zealand.

Using a reductionist, average approach to these 603 spaces (based on an average of 6 treatment days per week, 2 treatments per day for each space, and 3 treatments per patient per week), these 603 spaces provide capacity for $[(603 \text{ spaces} * 6 \text{ days} * 2 \text{ treatments per day}) / 3 \text{ treatments per patient per week}] = \text{space for } 2412 \text{ patients}$. On balance, this suggests that Aotearoa New Zealand's physical haemodialysis infrastructure is at or below the necessary levels for service provision to Aotearoa New Zealand's current 2499 haemodialysis patients

It therefore appears likely that, on average, a more intensive use of haemodialysis-enabled spaces (more than 2 sessions per day or more than 6 days per week), or a greater use of currently under-counted inpatient dialysis-enabled spaces, or fewer than three treatments per patient per week, must be in use in order to provide treatments to Aotearoa New Zealand's current 2499 patients. Any or all of intensively modifying options may be in current use: for example, some centres run 3 sessions per day per dialysis machine and offer treatment on 7 days per week; contrawise, it appears unlikely that all inpatient haemodialysis-enabled spaces are in use for 2 sessions per day and 6 days per week.

This report of 603 spaces likely includes an underestimate of hospital-based facilities, as responses from the majority of units (>75%) did not include a quantitative breakdown of all potential inpatient dialysis-enabled spaces. Many centres that provide acute dialysis to inpatients reported a number of locations in which inpatients can receive dialysis, including ICU, other critical care areas (e.g. CCU and step-down wards), inpatient renal bed spaces and dialysis-enabled spaces on other wards. This

flexibility enables delivery of haemodialysis in locations that are best suited to an individual's co-morbidities. On the other hand, this large number of dialysis-enabled space may mean that demand can vary significantly from day-to-day (with consequent rostering difficulties and impacts on routine outpatient chronic haemodialysis session delivery). Each acute inpatient dialysis sessions *delivered in a discrete location* will require 1:1 patient : staff ratio, in accordance with 1:1 patient : staff ratios outlined in the latest New Zealand Service Recommendations. Multiple geographically isolated inpatient haemodialysis spaces therefore require a significantly greater workforce for service delivery, in contrast to lower workforce requirements for co-located inpatient acute haemodialysis facilities (as reported by 2 renal centres).

Recommendation:

National Renal Advisory Board, local renal teams and ANZDATA, in future capacity surveys:

- [Audit the total number of physical spaces in which haemodialysis can be provided by a renal service, and the use of each of those spaces on a repeated snapshot-audit basis](#)
- Accurately audit the number of patients receiving haemodialysis sessions in each physical haemodialysis-enabled space, and the patient : staff ratio for each haemodialysis treatment in each space, using a repeated-snapshot model for data capture that provides information about variable use of each space

Recommendation:

Local health district funders and renal centres consider establishing an acute inpatient haemodialysis centre with dedicated staffing, to take advantage of the benefits of improved patient : staff ratios that are enabled by physical co-location of inpatient haemodialysis spaces.

A number of centres described constrained capacity in terms of physical spaces. The issues reported ranged from over-crowding in current units, continuing to deliver services in current under-resourced facilities whilst creating business cases for expansion or waiting for construction, and waiting for staffing recruitment to open recently-constructed units. Whilst all of these phases of infrastructure expansion are underway, staff and patients are working in/receiving care in physically constrained conditions.

Recommendation:

[Local health district funders and renal centres define whether physical infrastructure of staffing capacity are the major factor impacting local haemodialysis service delivery.](#) Where physical infrastructure constraints exist or are impending, teams should set an interim plan for service delivery during the long-lag between identification of this infrastructure constraint and implementation of an effective solution, and accommodate population growth/dependency requirements in the physical infrastructure solution.

COVID-19 and haemodialysis facilities

A number of units reported the impact on COVID-19 on their staffing (sick-days, staff turnover, patient:staff ratio requirements) and facilities (lacking dialysis spaces with isolation facilities).

Despite some surveys being completed during periods of high COVID-19 prevalence, COVID-19 was not mentioned regularly. Instead, reporting centres noted long standing deficiencies and pressures.

Some commentators may suggest that the capacity levels and constraints documented in the responses are a consequence of the ‘timing of the survey’, following the COVID-19 pandemic. We note the report from HQSC “A window on quality 2022 (Part 2) | Whakarāpopototanga matua: He tirohanga kounga 2021 (Wāhanga 2)”, and in particular comments that *“the arrival of the Omicron variant exposed long-standing, fundamental weaknesses in our system, the first being the increasing mismatch between the demand for health services and the ability to meet that demand”*. *“Weaknesses exposed included entrenched inequities in health status, health care quality and outcome experienced by Māori, Pacific and disabled peoples.”*

The working group acknowledges and agrees with the HQSC that the COVID-19 pandemic *“exposed long-standing, fundamental weaknesses in our system, the first being the increasing mismatch between the demand for health services and the ability to meet that demand”*

Reviews of the impact of COVID-19 on the dialysis community^{xxxiii} acknowledge *“the risk that in-centre dialysis poses for patients, particularly with airborne diseases, must be addressed. Early in the pandemic, providers rightly recognized that facilities could quickly become hubs for widespread infection”*.

Pandemic preparedness for dialysis communities must include ensuring appropriate isolation facilities and their required staffing capacity for haemodialysis delivery.

In addition, enabling patients to dialyse at home and therefore limit exposure to infectious agents is another safeguard for dialysis patients.

Recommendation:

Local health district funders and renal teams [review pandemic preparedness in haemodialysis facilities](#), including [1] adequate access to home haemodialysis opportunities, training and support, [2] sufficient infrastructure (including isolation rooms), and [3] sufficient staffing to meet emergency plans

Centre philosophy and accessing home haemodialysis treatment

Each dialysis centre has generated solutions for facility-based and community-based haemodialysis delivery based on the needs of their local population, the demographics and geography of their patient population, and the philosophy and resources available over time.

The impact of these regional differences on variations in staffing ratios, haemodialysis populations, and required facilities must be acknowledged.

In some cases, units report that these philosophies are coming into conflict with the demand being placed on their services. Under these circumstances, engineering change to respond to the changing needs of their population is challenging.

For example:

“Our Home training unit has been operating from the incentre for the past two years due to space constraints and safety concerns”

“The increasing number of in centre respite care, inability to move ‘stuck’ patients etc are causing considerable impact upon ability to train and get patients home”

“The whole philosophy and purpose of Home training dialysis is to promote self-care and independence, however being exposed to incentre patients cared for by staff may undermine this philosophy and demotivate individuals to pursue training to enable them to dialyse independently.”

Witnessing adverse events in the in-centre unit (such as hypovolaemic shock intra dialysis, cardiac arrest and severe cramping) creates fear, which becomes a barrier to a safe learning environment”

Access to home haemodialysis therefore requires *both*

- well-functioning facility-based haemodialysis services
- *and* sufficient home training resources

in order to provide patients with the choice of haemodialysis therapy at home.

Beyond addressing capacity constraints, innovations in dialysis service design can also support home haemodialysis rates alongside improving a range of other outcomes for patients living with kidney failure. For example, transitional care units for adults starting haemodialysis in-centre increased the likelihood of receiving home dialysis by 2.5-fold, and increased referral rates for transplantation by 42%^{xxxiv}.

Recommendation:

Local health district funders and renal teams review:

- [solutions to home haemodialysis and facility-based haemodialysis capacity constraints in tandem, since capacity issues in both areas are inter-twined and self-perpetuating](#)
- [options for creating transition units, to enable patients to access home haemodialysis treatments without impacting on/being negatively affected by the experience of in-centre haemodialysis](#)

Impacts of dialysis capacity issues

It is clear from this survey that access to haemodialysis treatment is being hindered by insufficient overall capacity in Aotearoa New Zealand's haemodialysis services.

Between 2009 and 2022, New Zealand haemodialysis workforce surveys have identified a vastly expanded array of strategies to continue to provide dialysis for New Zealand's haemodialysis patient population on a day-to-day basis:

	2009	2022
Dialysis Unit strategies		<ul style="list-style-type: none"> Decline away-from-home dialysis requests Convert offices to HD stations Open dialysis units at additional times (inc Sundays) Double book dialysis slots (anticipating non-attendance will enable dialysis for those who attend)
Staffing strategies	<ul style="list-style-type: none"> Overtime work Call in staff 	<ul style="list-style-type: none"> Overtime work Short-notice staffing roster changes Reduce staff:patient ratios Double-shifts Cancel non-frontline activities Non-clinical staff (educators etc) called in Combine managerial + clinical workloads
Individual patient strategies		<ul style="list-style-type: none"> Alter outpatient treatments to meet acute inpatient dialysis demand Reduce machine cleaning Shorten treatment hours Change treatment location Delay treatment start time Skip treatment day Re-arrange treatment schedule Delay initiation of dialysis Use incremental dialysis start regime
Service-level strategies		<ul style="list-style-type: none"> Follow-on impacts for training for treatment modalities requiring lower staff:patient ratios (training for satellite unit dialysis and home dialysis)

The range of mitigating measures reported in 2022 is in stark contrast to the two mitigating measures adopted by dialysis units as reported in 2009. It is unclear whether changes in haemodialysis patient acuity/dependency, and/or increased delivery of haemodialysis to inpatients requiring higher staff : patient ratios, and/or increases in the proportion of patients dialysing at a dialysis facility rather than at home, and/or additional tasks/burdens on haemodialysis staff related to changes in the healthcare environment between 2009 and 2022, are responsible for the requirement for mitigating measures that are now required to maintain haemodialysis service delivery in 2022.

Patient experience:

Whilst the underlying reasons are unclear and a matter for conjecture, a comprehensive assessment of the impact of these mitigating measures on the patient experience is also unclear in the absence of regular, formalised reviews of the patient experience. To our knowledge, the patient voice on the

experience of receiving haemodialysis services in Aotearoa New Zealand is not systematically captured or systematically enabled to guide provision of haemodialysis services to Aotearoa New Zealand's haemodialysis population.

The working group acknowledges that the latest version of the "Specialist Medical and Surgical Services - Renal Services. Nationwide Service Framework" (TIER 2 document, Reviewed November 2022) states:

*"We expect services to work with communities in service design and development to improve knowledge and work towards equity
Value the voice of consumers and whanau in design, development, and delivery of services".*

The UK has adopted an annual patient experience survey that is facilitated by the UK Renal Registry^{xxxv}. This 38 item questionnaire, grouped into 13 themes, supports the collection of reliable information on patient experience that people with CKD consider relevant. In New Zealand, the Health Quality & Safety Commission conducts two national surveys to enable the collection, measurement and use of patient experience information on a regular basis. A synthesis of these approaches might enable a survey of the experience of accessing haemodialysis services in Aotearoa New Zealand.

Recommendation:

National Renal Advisory Board, Kidney Health New Zealand, ANZSN, ANZDATA and renal teams:
- create a local system for regular review of the patient experience of receiving haemodialysis services
- couple capacity assessments with impact assessments that consider patient experience, staff experience and holistic aspects of renal service care delivery

This survey of dialysis units was not purposefully designed to capture information about the experience of individuals receiving haemodialysis treatments from Aotearoa New Zealand's renal units. Nevertheless, some survey responses did provide information about issues that Aotearoa New Zealand's haemodialysis population may be experiencing.

Travel for dialysis treatment

The "Specialist Medical and Surgical Services - Renal Services. Nationwide Service Framework" (TIER 2 document, Reviewed November 2022) states:

- *"Dialysis services should be adequately resourced in terms of staffing, infrastructure, and financing to optimise outcomes and minimise unfair financial social and travel burdens".*

The "Access to Renal Replacement Programmes in New Zealand" report (NRAB, November 2016^{xxxvi}) states that:

- *14. Dialysis patients unable to undertake independent home-based therapy, due to medical problems, complications of their renal treatment, or for social reasons related to their family or housing situation, require dialysis provided by trained dialysis staff. This should be community-based where possible or provided within a reasonable distance from the patient's home. Lengthy travel can create difficulties for families and patients that may compromise the quality of life obtained with dialysis".*

What is missing from these guidance statements is quantification of "unfair travel burden", "reasonable distance" and "lengthy travel".

It is clear from this survey that some patients are travelling distances for dialysis that are "lengthy" and "unreasonable".

Travel distances above 100km were reported by 10 of 13 responding units, and travel times above 2 hours were reported by 6 of 13 responding units. These responses were noted by units located in both large centres (... ..) and smaller centres (... ..); 3 ...metro... units were notable exceptions. The three smaller units within ... highlighted the lack of dialysis infrastructure (*physical space or staffing*) as the main reason for patients travel to neighbouring centres.

Given the consistency and extent to which haemodialysis patients are required to travel for their regular haemodialysis sessions across Aotearoa New Zealand, multiple large and smaller renal centres do not appear to have the capacity (be that facilities and/or staffing) to “minimise unfair travel burdens”, provide dialysis “within a reasonable distance” or avoid “lengthy travel”.

Evidence from other countries indicates that individuals living at greater distances from their dialysis centre have higher non-attendance rates for dialysis^{xxxvii}; this facet was not examined in the current New Zealand survey.

As noted above (see: Centre philosophy and accessing home haemodialysis treatment), lack of haemodialysis capacity is reducing patient’s access to home haemodialysis therapies. Survey responses also indicate that many patients are unable to access facility-based haemodialysis services “within a reasonable distance”. These twinned problems indicate that capacity issues in Aotearoa New Zealand’s haemodialysis services are having significant negative impacts for people living rurally across New Zealand.

Addressing capacity issues within facility units, enabling home haemodialysis training and support facilities to function optimally, are critical steps available to support living rurally to access haemodialysis services without experiencing these unfair travel burdens.

Alternative models of remote haemodialysis service provision also need to be considered, potentially including:

- Self-care haemodialysis facilities in local primary/secondary care settings^{xxxviii}
- Establishing new community houses for localities with a cohort of haemodialysis patients able to provide self-care with their established local support networks^{xxxix}
- Models enabling home haemodialysis training in the home^{xl}

In all of these models, the ability to perform all aspects of home haemodialysis remains a requirement.

Alternative options for haemodialysis-dependent patients living remotely from dialysis facilities for whom independent home haemodialysis is not an option, other than building a new satellite haemodialysis facility, include:

- “Supported home HD using a health care worker or enrolled nurse to help with setting up and coming off dialysis to maintain an individual in the community” (...)
- “A plumbed 2 station HD standalone dialysis facility in the community centre at (... *community*) Hospital (...) for either fully home HD trained individuals to use out of hours. Also the community nurse providing dialysis more recently has supervised 2 individuals with assisted dialysis in this facility. Not truly a satellite centre.” (...)
- “Plumbed dialysis facilities in a hospital level rest home with an enrolled nurse dialysing 1 – 3 patients” (...)
- Adopt new haemodialysis technologies^{xli} that enable access to home haemodialysis treatment^{xlii}

Recommendation:

National Renal Advisory Board:

- provide definitions of “lengthy” and “unreasonable” travel burdens, to enable effective advocacy (between local services and local funders to create local solutions, and between Kidney health New Zealand and Te Whatu Ora to facilitate long-term solutions)

Recommendation:

Local health district funders and renal teams:

- consider local feasibility of novel options for local haemodialysis service delivery (see “illustrative service model” section) that bridge the gap between haemodialysis at home versus haemodialysis in a satellite unit

Recommendation:

Local health district funders and renal teams in areas where there is no local capacity to start haemodialysis in a planned fashion without unreasonable or lengthy travel burdens:

- create solutions to enable local delivery of planned starts to haemodialysis
- and/or ensure that capacity is available in the local haemodialysis unit so that those starting haemodialysis away-from-home can return home to dialyse at their local dialysis unit without delay

Patient choice – Rangatiratanga

Any renal service must aim to be structured in a way to allow person-centred and/or whānau-centred care; where patients and their whānau feel empowered and have the ability to make choices about their treatment. Units must have sufficient resources to provide patients/whānau with the outcome of their informed choice, i.e., the ability to undertake their dialysis modality of their choice - not be forced into a decision based on lack of facility. This report highlights concerns that centres have not been able to access the resources required to enable patients to exert rangatiratanga over their dialysis decisions.

Away-from-schedule vs away-from-home dialysis

From the survey responses obtained, it is clear that demand has exceeded an aspect of capacity to provide appropriate haemodialysis services in renal centres across New Zealand. Despite this capacity issue, most dialysis units in New Zealand are using a broad range of mitigating measures to continue to provide additional dialysis on a flexible basis where this is required for their population e.g. additional dialysis for medical issues such as fluid overload; re-arranging staffing to be able to provide haemodialysis treatments to inpatients despite the 1:1 patient: staff ratio required. In many circumstances, it is therefore often possible for chronic haemodialysis patients to receive “away-from-schedule” haemodialysis treatments within their own region i.e., away from their business-as-usual, fixed-schedule chronic haemodialysis treatments when required for medical reasons.

Where haemodialysis is required for patients resident in another health region, 50% of units were able to provide this service. In most of these cases this was through an agreed regional pathway, and in most other cases this provision was by large regional centres offering tertiary/quaternary services. According to the survey responses, the absolute number of patients in the 7-day survey period receiving away-from-region dialysis outside regional agreements was small (~10 cases).

However, one area in which this lack of haemodialysis capacity appears to be impacting patients is the inability to provide away-from-home dialysis for non-medical reasons. This away-from-home

dialysis is either foreseeable (e.g. for a wedding in another region of New Zealand) or unforeseen (e.g. for tangihanga).

In other words, solutions for adapting dialysis schedules have been developed within districts, between allied districts through agreed regional pathways, and across districts for planned or emergency medical care. However, adapting dialysis schedules between districts, including for patient-prioritised non-medical reasons, is no longer achieved on a wide scale.

Ability to travel, as well as Impact on family/friends, are highlighted as some of the 2nd-most important tier of priorities for patients and caregivers in the SONG-HD analyses^{xliii}.

In Aotearoa New Zealand, surveys of the experience of Māori patients with kidney disease have highlighted the following important factors:

Maintaining cultural identity: Spiritual connection to land

“For many participants, a marker of quality care was their clinician’s acknowledgement and appreciation of the importance of spiritual connections to their land and people. The importance of these connections was particularly spoken about by participants who lived in rural locations, who had contemplated having to relocate for dialysis.”

and

Maintaining cultural identity: Upholding inner strength/mana

“When considering choice of dialysis treatment, many spoke of making decisions to enable them to continue in their roles within the family and community, as this was seen as an important aspect of their personal and cultural identity. It was important to participants that clinicians recognised the significance of these roles.”

As regards away-from-home dialysis, the working group acknowledges the following comments in the “Specialist Medical and Surgical Services - Renal Services. Nationwide Service Framework” (TIER 2 document, Reviewed November 2022):

“Delivery of care should be determined by most appropriate patient centred approach without discrimination such as financial status, geographical location, cultural and language barriers, racial background, inadequate infrastructure”

“Healthcare providers must recognise the cultural values and beliefs that influence the effectiveness for services for Māori and Pacific people with renal conditions and must consult and include Māori and Pacific (people) in service design and delivery.”

The inability to access away-from-home dialysis for key life-events, such as family weddings, tangihanga, and key social responsibilities, is an area of concern that intersects with the right to dignity and independence enshrined as Right 4 in the Code of Health and Disability Services Consumer’s Rights.

The working group recognises the need for debate about whether the haemodialysis capacity issues highlighted in this document, and their negative impact on the ability of haemodialysis patients to receive haemodialysis services for patient-prioritised events in another geographical location, is congruent with the above statements/recommendations/rights, and whether Māori and Pacific (people) have been consulted and included in service design and delivery in this regard.

The importance of away-from-home dialysis for Aotearoa New Zealand’s haemodialysis population has not been formally surveyed. However, approximately 40% of all contacts with Kidney Health New Zealand Helpline relate to accessing away-from-home dialysis, providing some insight into the significant scope of this issue.

Incorporating this patient experience/voice into applications for business case support to meet the required growth (staffing, infrastructure & funding/haemodialysis arrangements) for dialysis units may be one way in which Kidney Health New Zealand and Te Whatu Ora dialysis teams could partner together to support applications for expanded resources to meet the needs of the patient population.

In Aotearoa New Zealand, according to Te Whatu Ora,
“Arranging dialysis treatment is informal - The renal unit where the patient is visiting will assess whether or not they can provide the service at that time. Their decision will be based on the needs of their existing patients and the capacity of the existing service.”

A number of countries (Australia, UK) have instituted formal programmes^{xliv, xlv, xlvii} which enshrine the right of individuals who need chronic haemodialysis to access this away from their usual base haemodialysis centre and provide explicit funding agreement statements to enable away-from-home dialysis.

Recommendation:

Te Whatu Ora, Te Aka Whai Ora, National Renal Advisory Board, alongside work to address capacity limitations in haemodialysis services across Aotearoa New Zealand and in partnership with patient advocacy organisations (Kidney Health New Zealand):

- establish a formal programme to enable away-from-home dialysis for patients, including expectations, national coordination and reciprocal agreements

A further concern in relation to away-from-home dialysis relates to accessing appropriate financial support for medically-necessary travel out-of-district. Surveyed centres noted:

“When renal pt travel to other DHB to await renal related services/ intervention etc- accommodation has always been a challenge for pts and support person. Most motels near hospital are always fully booked/ limited ability for patients. They have to top up excess amounts from \$100 NTA eligibility and book far away from hospital adding transportation cost as an issue. This causes anxiety or aggression from pts/ support person affecting decision making.”

The role of NTA funding in this and other aspects of the experience of haemodialysis for individuals in Aotearoa New Zealand has not been explored further in this survey.

Recommendation:

National Renal Advisory Board, Te Whatu Ora, Te Aka Whai Ora and Kidney Health New Zealand establish a working group with the National Travel Assistance Scheme to review whether current supports for haemodialysis patients in Aotearoa New Zealand are up-to-date and fit-for-purpose

Choice between dialysis and other treatment options for kidney failure

It is not clear from this survey whether/to what extent capacity constraints in Aotearoa New Zealand’s dialysis services are impacting patient choices about engaging with dialysis or opting for conservative care. A small number of units (two) acknowledge this possibility, but comprehensive information on conservative care management of end-stage kidney disease is not available in Aotearoa New Zealand.

The decision to opt for conservative care versus undertaking facility based haemodialysis (for those where home haemodialysis is not a feasible option) can be a complex one. Renal centres in Aotearoa New Zealand do not appear to have access to registries/databases that document priority-based

decisions that guide patient choices in these matters. Whether, and how frequently, individuals opt not to undertake haemodialysis on the basis of undue burden that is anticipated due to a lack of locally-available infrastructure, is unclear and potentially open to under-reporting bias. Comprehensive analysis of capacity issues in Aotearoa New Zealand's haemodialysis services should also include the patient perspective and experience on accessing haemodialysis (and other renal replacement therapy) services, and include information on accessibility of alternatives to haemodialysis care, such as conservative care^{xlviii} and access to transplantation^{xlix},¹ (acknowledging that peritoneal dialysis services are assessed through the PD registry and ANZDATA).

Recommendation:

National Renal Advisory Board and ANZDATA create registries of conservative care and advanced CKD / renal replacement therapy assessment programmes that include patient-prioritised decision-making information, to inform local service design to meet local population needs

Outpatient haemodialysis treatment attendance

Haemodialysis session non-attendance rates in Aotearoa New Zealand are higher than those reported in the literature (0.6 – 1.4%)^{li}. Increases in mortality and hospitalisation are observed after non-attendance for haemodialysis sessions (same reference). Information on reasons for this non-attendance were not sought, and the patient experience perspective on reasons for non-attendance would be informative in identifying solutions.

Whilst some centres utilise DNA sessions to accommodate medically required HD sessions, the regular use of this 'unused resource' to bridge wider capacity constraints is not a sustainable or practical mechanism.

Equity

Ethnicity

Since Māori and Pacific patients are disproportionately affected by CKD and kidney failure and have lower access to transplantation, the haemodialysis population has disproportionately high numbers of Māori and Pacific patients. Haemodialysis has impacts not only on the individual receiving haemodialysis treatment, but also on their whānau, caregivers, and support networks. Any negative impacts of haemodialysis service delivery will therefore disproportionately impact Māori and Pacific communities.

A number of concerns that may disproportionately impact haemodialysis patients from Māori and Pacific communities have been highlighted above. These negative impacts include:

- Inability to access away-from-home dialysis, of particular impact given the importance of spiritual connections to land and people
- Lengthy and burdensome travel to access haemodialysis treatments, further adding to the impact of haemodialysis on Māori whanau and Pacific communities
- Difficulties accessing planned starts to haemodialysis, consequently impacting well-being and the ability to maintain social and employment responsibilities
- Inability to access sufficient support from the National Travel Assistance Scheme, further contributing to anxieties and pressures imposed by haemodialysis treatments

Patient experience work highlights that Māori patients/whānau report a multigenerational fear of dialysis, and an awareness that clinicians are not aware of cultural considerations and values during decision-making^{lii}. Other issues reported by Māori patients/whānau impacted by haemodialysis

include “For men who had been always physically active and perceived as strong, the need to be dependent on others and a machine made them feel ashamed and often led to withdrawing from family and not participating in dialysis education and preparation.”^{liii}

Spiritual connection to land is also an important aspect of maintaining cultural identity that is challenged by capacity constraints within haemodialysis services. Moreover, burdensome travel distances/times, lack of financial support and inability to access away-from-home dialysis will challenge the “many [who] spoke of making decisions to enable them to continue in their roles within the family and community, as this was seen as an important aspect of their personal and cultural identity. ... Many participants preferred a treatment that would enable continued employment as this was a highly valued part of their identity; for some, this meant they retained their ‘mana’ inner strength and were still seen as a provider for their family.”

Whakamaua: Māori Health Action Plan 2020–2025 outlines 4 key intended outcomes:

- Iwi, hapū, whānau and Māori communities can exercise their authority to improve their health and wellbeing.
- The health and disability system is fair and sustainable and delivers more equitable outcomes for Māori.
- The health and disability system addresses racism and discrimination in all its forms.
- The inclusion and protection of mātauranga Māori throughout the health and disability system.

The Plan also outlines four objectives to guide the coordination of action and resources

- Accelerate and spread the delivery of kaupapa Māori and whānau-centred services
- Shift cultural and social norms
- Reduce health inequities and health loss for Māori
- Strengthen system accountability settings

The Plan calls for

- Review, design and expand effective Māori-Crown partnership arrangements across DHBs and all levels of the health and disability system.
- Require Crown health and disability organisations and larger non-governmental organisations in the health and disability system to publish their plans and progress in achieving equitable health outcomes for Māori.

In practice, “The Ministry, DHBs and other health Crown entities have strong active relationships with Māori in designing, implementing and monitoring health and disability services. The quality of Māori-Crown relationships at all levels of the health disability system are measured over time by both parties to drive improvements and accountability. Iwi and hapū have the resources and support to develop kaupapa Māori and whānau-centred services that meet the health aspirations of their own communities. The Ministry lifts health and disability system performance to better respond to Māori health issues and ensures that Tiriti commitments are upheld.”

In the context of haemodialysis service capacity constraints highlighted in this survey, practical arrangements to achieve these strong active relationships with Māori in designing, implementing, and monitoring health and disability services, and development/publications of plans and progress in achieving equitable health outcomes for Māori, require review.

Aotearoa New Zealand guidelines on kidney disease care for Māori would support optimisation of renal service delivery to meet the needs of the significant groups of Māori whānau impacted by haemodialysis care, and the working group acknowledge and welcome the forthcoming CARI Clinical Practice Guideline “Management of chronic kidney disease for Māori in Aotearoa/New Zealand”.

Haemodialysis service capacity constraints will also impact on the ability of renal services to meet the key outcomes outlined in Ola Manuia: Pacific Health and Wellbeing Action Plan 2020–2025:

- Pacific people lead independent and resilient lives
- Pacific people live longer in good health
- Pacific people have equitable health outcomes

System shifts to enable these outcomes include:

- Pacific leadership is prominent and accountable at all levels of the health system: Increase and support Pacific workforce participation in governance, leadership and management at all levels of the health and disability sector
- Organisational and infrastructural capacity is effective and efficient
- Collaborative commissioning that focuses on the needs of Pacific communities

Recommendation:

National Renal Advisory Board, ANZSN and CARI complete and disseminate guidelines on kidney disease care for Māori that would support optimisation of renal service delivery to meet the needs of the significant groups of Māori whānau impacted by haemodialysis care

National Renal Advisory Board and Kidney Health New Zealand work with partners in Māori and Pacific communities to develop leadership, governance and accountability frameworks that support optimisation of renal service delivery to meet the needs of Māori whānau and Pacific communities who are disproportionately impacted by haemodialysis care

Further points for discussion following the survey include:

- We expect that all services will actively engage in increasing / maintaining workforce diversity (“Specialist Medical and Surgical Services - Renal Services. Nationwide Service Framework” (TIER 2 document, Reviewed November 2022)

This aspect of the Aotearoa New Zealand haemodialysis workforce has not been surveyed here, and is an important area for inclusion in future studies.

Recommendation:

National Renal Advisory Board and ANZDATA include [haemodialysis workforce diversity metrics in future surveys](#)

Rurality

A number of concerns that may disproportionately impact haemodialysis patients living rurally have been highlighted above.

- Lengthy, burdensome travel distances to dialysis centres are reported by a number of units
- Increasing dependency of the Aotearoa New Zealand haemodialysis population in general, resulting in a greater proportion of patients having to travel to dialysis facilities for their haemodialysis treatments, rather than being able to dialyse at home. This shift away from significant home haemodialysis service provision, with consequent impacts on the capacity of the in-centre and satellite facilities of centres in these districts, is likely to impact patients living in districts with a high rural/remote populations
- Lack of access to home haemodialysis training, as a result of capacity constraints in haemodialysis services leading to use of home haemodialysis training areas/staff for fixed-schedule chronic haemodialysis session delivery, is reported by a number of units

- Lack of access to scheduled spaces in the local haemodialysis unit as a result of constraints in the capacity of physical infrastructure and/or staffing, resulting in patients continuing to travel long distances to regional centres, is reported by some centres
- Inability to staff newly-constructed dialysis units, resulting in patients living remotely from the regional centre having to continue lengthy and burdensome travel distances for their fixed-schedule chronic outpatient haemodialysis treatments
- Insufficient support for the National Travel Assistance Scheme for travel to regional centres, impacting access to spaces in local haemodialysis units, is reported by some units

All of these factors are likely to disproportionately impact patients living rurally.

New models of care are being developed to bridge the gap between facility-based haemodialysis (requiring travel by patients living remotely/rurally) and home haemodialysis (requiring appropriate housing, support and physical independence). These models of “assisted community dialysis”, with haemodialysis treatments delivered in community settings with assistance either in the form of physical infrastructure (e.g. community housing, dialysis-enabled spaces in primary/secondary care facilities in remote/rural healthcare service buildings) or staffing (e.g. community/district nurses providing assistance in some or all aspects of haemodialysis treatments) offer new options for people living remotely/rurally

Recommendation:

- Te Whatu Ora, local health district funders and renal teams address capacity issues for renal centres supporting patients living remotely/rurally through the recommended measures outlined above

- [Local health district funders and renal teams consider local feasibility of novel options for local haemodialysis service delivery \(see “illustrative service model” section\) that bridge the gap between haemodialysis at home versus haemodialysis in a satellite unit](#)

Timing of the Survey

Whilst the data reflects multiple centre-level ‘snap shots’ spread over months rather than a single point, it represents the most comprehensive review of the Aotearoa New Zealand Dialysis infrastructure and capacity. The working group felt there is greater value in a renal centre submitting a response regardless of the exact timing, rather than focusing intently on a single snap shot in time and missing large volumes of still relevant data.

The haemodialysis population of Aotearoa New Zealand continues to grow. The total number of haemodialysis patients has increased from 1470 in 2009 to 2164 in 2020, representing a 47% growth in 11 years. More recently, the haemodialysis has grown by an average of 46 patients per year over the last 5 years in New Zealand^{iv}. This growth has continued despite success in increasing kidney transplant rates in Aotearoa New Zealand by a significant degree, and in maintaining numbers of patients receiving home haemodialysis therapies despite the changing demographics of the population with end-stage kidney disease. It is anticipated that that the haemodialysis population may expand by a further 30% by 2031/2032^{iv}.

The survey is therefore timed to capture existing aspects and impacts of haemodialysis service capacity constraints, before these impacts on patients, staff and renal teams are exacerbated further by the expected ongoing growth in the haemodialysis population.

Duplication/Future Survey/Audit

During the data collection and analysis phase, the work group was keenly aware of a shared interest within other organisations to collect and comment on the 'current state of dialysis capacity and infrastructure'. Future efforts are likely best served by a coordinated and systematic approach within the wider nephrology community of multidisciplinary healthcare professionals and patients/whānau which streamlines data collection, avoids duplication and minimises burdens on units to contribute data for this purpose.

Future audits may be best served by utilising existing data capture tools and established relationships with renal centre leadership, such as those established by ANZDATA. This would require a shift in focus of ANZDATA away from pure patient centred metrics onto the collection of infrastructure and staffing metrics. This pivot, may be best undertaken in consultation with NRAB, the PQC and PREM's/PROM's workgroups of ANZSN, and the ANZDATA leadership team.

The annualised nature of the ANZDATA survey provides a potentially useful structure for future Aotearoa New Zealand haemodialysis services capacity surveys, giving units advanced notice of the need to complete additional questions. Partnering with the ANZDATA group may provide access to statistician support to inform appropriate analyses, and provide templates for standardised and carefully structured questions and an annual reporting structure that enables publication and informs quality assurance/improvement processes.

Recommendation:

Haemodialysis capacity surveys are repeated regularly, and incorporated with routine ANZDATA processes

Construct questions according to applicable recommendations (e.g. CARI/international guidelines, ANZSN KPIs, Tier 2 document etc)

CONCLUSION

Aotearoa New Zealand's haemodialysis facilities are significantly under-resourced with respect to current haemodialysis demands.

Every renal centre in New Zealand is affected by capacity constraints in terms of haemodialysis service staffing, physical infrastructure, funding and/or regional arrangements.

The findings of this survey indicate failure of sufficient staff growth, physical infrastructure growth, and adaptation of funding/regional arrangements to meet the volume and dependency of Aotearoa New Zealand's current haemodialysis population.

This is particularly concerning given the year-on-year growth in the haemodialysis population, the shift in the population towards more haemodialysis treatments delivered in dialysis facilities, and the absence of future-proofing for providing additional dialysis sessions.

These capacity constraints are impacting patients (*e.g. undue travel burdens, unable to achieve planned starts onto haemodialysis, unable to access away-from-home haemodialysis, unable to exercise rangatiratanga*), staff (*e.g. insufficient staff to meet current demand, services report "mass exodus" of staff*) and renal services (*unable to train individuals for home HD, converting offices into dialysis spaces, cancelling non-frontline activities*).

ILLUSTRATIVE HAEMODIALYSIS SERVICE MODELS

Capacity constraints in Aotearoa New Zealand's haemodialysis system have required renal teams to adopt a variety of measures to continue to deliver this life-preserving therapy. Whilst there are many negative impacts of these capacity constraints on patients/whānau and staff, there are some illustrative examples of practice that might serve as templates for discussion in other services facing similar challenges.

For example:

Addressing capacity constraints that limit planned starts onto haemodialysis

In one unit, new patients “start with 2 treatments /week [due to challenges with staffing resources]. If clinically indicated they move to 3 treatments/week”.

This practice is acknowledged as a suggested non-standard schedule in some international guidelines:

Renal Association Clinical Practice Guideline on Haemodialysis^{lv}

Guideline 2.2 - Incremental schedules

We suggest that lower haemodialysis dose targets may be optimal in patients with significant residual renal function.

“Optimal dialysis dose is therefore not fixed but dependent on the level of residual kidney function, and the prescribed schedule may therefore be reduced in frequency or dose in this setting. The practice of incremental haemodialysis is consistent with a concept of progressively increasing therapy over time”

“The non-inferiority of twice weekly schedules in selected patients has been further supported by more recent studies”

Addressing capacity constraints related to acute, flexible inpatient haemodialysis service delivery

In one unit, there is a large (10-bed), dedicated acute inpatient facility away from the main outpatient dialysis facility, and this was also the only facility to report no impact of inpatient dialysis provision away-from-base on business-as-usual outpatient dialysis services..

Addressing capacity constraints related to service delivery away from facilities where home haemodialysis is not an option:

1. Supported home HD using a health care worker or enrolled nurse to help with setting up and coming off dialysis to maintain an individual in the community
2. Plumbed dialysis facilities in a hospital level rest home with an enrolled nurse dialysing 1 – 3 patients.
3. A plumbed 2 station HD stand-alone dialysis facility in the community centre ... for either fully home HD trained individuals to use out of hours. Also the community nurse providing dialysis more recently has supervised 2 individuals with assisted dialysis in this facility. Not truly a satellite centre.
4. Community dialysis houses, for fully home HD trained individuals to use on an arranged schedule.

Addressing capacity constraints related to difficulty recruiting to staffing FTE

In one unit, dialysis is delivered in a facility unit by all 3 dialysis-delivering professional roles (Registered nurses, Enrolled nurses, and Dialysis Physiologists)

In one unit, a health care worker (or enrolled nurse) is allied to the renal centre and supports haemodialysis delivery in the community

Addressing capacity constraints related to difficulty rostering staff

One unit operates “glide shifts” every day. This means that instead of 2 patient treatments/day in 2 chairs, we schedule 4 patient treatments/day in 2 chairs. Patients on a glide shift do a 4-hour treatment. This is an option used to manage capacity and staff roster gaps.

These illustrative examples are not exhaustive, and there may be further opportunities for innovative practice that could be shared between renal centres in Aotearoa New Zealand to meet service delivery requirements.

LIMITATIONS

Category	Specifics	Limitation	Recommendation
Questions	capacity impacts	The full extent of haemodialysis capacity constraints on care delivered to patients with end-stage kidney disease has not been captured by this survey e.g. patient/whānau experience, impacts on resources available to ensure timely assessment for transplantation and preparation for other RRT modalities; education and continuing professional development for staff; staff turnover etc	Couple capacity assessments with impact assessments that consider patient experience, staff experience and holistic aspects of renal service care delivery
Questions	capacity	Survey questions need careful construction to avoid ambiguity, and may require free-text responses for clarification. For example, "do you have capacity to start new HD patients" depends on whether starting HD is planned or acute, whether modifying local environments to enable additional treatments beyond funding/haemodialysis arrangements/staffing/infrastructure is beyond capacity, whether the regional delivery model enables patients to start locally etc.	Construct questions according to applicable recommendations (e.g. CARI/international guidelines, ANZSN KPIs, Tier 2 document etc)
Questions	staffing	Survey questions need careful construction to avoid ambiguity, and need to include all potential categories for staff roles. A free-text box for a description of staff roles that enables the surveyors/surveyed to capture the full breadth of staff roles that are active in dialysis, and categorise these appropriately, is essential for calculating patient:staff ratios accurately	Construct questions according to all potential staff roles with clinical (e.g. HCA, enrolled nurse, district nurse, home haemodialysis staff) and non-clinical (e.g. research, education, quality assurance, managerial etc) activities, with an option for free-text responses to enable clarification

Category	Specifics	Limitation	Recommendation
Questions	staffing	Information about the full range of staff working with patients in haemodialysis units has not been captured (e.g. medical staff, allied health, cultural services etc). This comprehensive renal services workforce review has been undertaken in the UK through a multidisciplinary taskforce model , and informs the services required to provide holistic care for patients with kidney failure	Construct questions according to all potential staff roles working with patients receiving haemodialysis services. National Renal Advisory Board and ANZSN works alongside nursing and allied health colleagues/societies to update recommendations on patient:staff ratios for the multidisciplinary workforce required to provide holistic care for patients with end-stage kidney disease
Questions	staffing	Staffing ratios in use were not explicitly captured, and/or not coupled with number of patients allocated treatment regimes according to these ratios. In addition, whilst the patient : staff FTE is one metric, it does not necessarily reflect what occurs on the ‘shop floor’ during a given session – often referred to as a ‘staffing ratio’.	Construct questions according to patient:staff ratios for each treatment delivered, with an option for free-text responses to enable clarification
Questions	Infra-structure	The total number of physical spaces in which a renal service may be required to provide haemodialysis treatments, and the session-by-session/day-by-day use of each of those spaces, requires an explicit and comprehensive approach. The nomenclature used for each dialysis space varies between units, possibly based on ambiguous definitions/questions, or possibly because the same physical space may have a different use over a 7 day period depending on demand/patient acuity. For example, some units reported “assisted care haemodialysis” spaces, but whether these are physically located within In-centre units, satellite units etc is unclear.	Accurately calculate the total number of physical spaces in which haemodialysis can be provided by a renal service, and the use of each of those spaces on a repeated snapshot-audit basis

Category	Specifics	Limitation	Recommendation
Questions	Infra-structure	Variability in haemodialysis service delivery occurs for multiple reasons (proportion of sessions/days on which haemodialysis treatments are delivered in a given haemodialysis-enabled physical space; fixed vs flexible nature of haemodialysis treatment in that space; reason for (/acuity of) flexible treatment delivery	Accurately calculate the number of patients receiving haemodialysis sessions in each physical haemodialysis-enabled space, and the patient:staff ratio for each haemodialysis treatment in each space , using a repeated-snapshot model for data capture that provides information about this variability
Survey responses	Incomplete /delayed returns	Whilst the aim was to obtain a total national perspective, some survey responses were incomplete, or limited, or provided over an extended timeframe - hence affecting the ability to provide a comprehensive results and interpretation of particular sections. Some questions were not sufficiently well defined to offer comparable responses	Consider format of survey delivery to facilitate ease-of-responses e.g. couple capacity surveys with current ANZDATA surveys
Survey responses	Comparisons	There are differences between ANZDATA vs this survey (total NZ population vs NZ adult population, chronic haemodialysis patients vs all haemodialysis treatments delivered). These differences need to be considered in any comparisons between ANZDATA and this survey	Important caveat for "per population" and dialysis number comparisons between this survey and ANZDATA
Survey responses	Comparisons	There are differences between the previous New Zealand Dialysis Workforce survey (Bennett, JRenSocAus 2009) and this survey (e.g. no physical infrastructure or acute dialysis or capacity impacts review in 2009; no HCAs reported in 2009).	Important caveat for dialysis workforce comparisons between this survey and previous surveys (Bennett, JRenSocAus 2009)
Survey responses	Scope	This survey represents a comprehensive review of the capacity to provide haemodialysis services to the adult population of Aotearoa New Zealand. Capacity in paediatric services was not within the scope of this survey. Whether parallel, related or other concerns for paediatric end-stage kidney disease service delivery also exist is not known following this survey	Work with paediatric renal services in Aotearoa New Zealand to assess whether there are concerns about the capacity of paediatric renal services to meet current or anticipated future service demands

Category	Specifics	Limitation	Recommendation
Survey responses	Inaccuracies	There are potential inaccuracies in the number of dialysis patients treated over the timeframe recorded (preceding 7 days): 10 patients were classified as "other" category by one large centre (unit 14) data on home haemodialysis patients from a large centre (unit 14) was not available and the latest information from ANZDATA (2021 data) was substituted; only 6 inpatients were reported as receiving haemodialysis in the preceding 7 days (Q6), and yet 114 acute haemodialysis sessions were delivered in the preceding 7 days by 13 units (with incomplete data from one large centre (unit 13, reporting 6-8 acute HD sessions per days, and missing data from 1 further large centre: unit 14 with a free-text description of 10 patients from other health districts receiving haemodialysis treatments as inpatients) (Q25). These confounding factors run risks of double-counting patients (e.g. for regional patients) and under-counting patients (when inpatient sessions delivered and counted in one part of the survey (Q6) appear significantly lower than inpatient sessions delivered and counted in another part of the survey (Q25)	Follow-up surveys should be simplified: single day snapshot, capturing activity in every dialysis space, by every staff member that day, and counting / classifying every haemodialysis treatment delivered. Different questions in the survey should capture the full dialysis workforce

RECOMMENDATIONS

Whilst each renal centre has its own unique challenges, each in its own stage of development, the commissioning of this report by the National Renal Advisory Board in partnership with Kidney Health New Zealand, and the high completion rates for this survey by local and regional renal services despite the existence of significant capacity constraints affecting these teams, suggest a collective aspiration for a cohesive strategy going forward to address concerns about haemodialysis capacity in Aotearoa New Zealand, particularly in the new era of Te Whatu Ora and Te Aka Whai Ora.

Recommendation:

Te Whatu Ora, Te Aka Whai Ora and local health district funders acknowledge that haemodialysis services across Aotearoa New Zealand are constrained by lack of capacity to meet current demands, that current services do not recommended standards or principles for service design and delivery, and that these capacity constraints are having a significant and negative impact on patients, staff and renal service teams.

Te Whatu Ora, Te Aka Whai Ora and local health district funders acknowledge that constraints in the capacity of haemodialysis services arise from lack of capacity in staffing, in physical infrastructure, in funding/haemodialysis arrangements, and (in a number of units) from constraints in multiple/all of these capacity domains. These capacity constraints take time to resolve, and patients, staff and renal service teams experience the negative impacts of capacity constraints before and during the process of addressing these issues.

Te Whatu Ora, Te Aka Whai Ora and local health district funders acknowledge that each regional centre is unique, with haemodialysis services that were designed to meet the needs of their specific local population, and currently with a particular combination of constraints in any/all capacity domains (staffing, physical infrastructure, funding/haemodialysis arrangements) that is impacting local patients, staff and renal teams. Resolving local capacity issues requires local solutions that meet the needs of the local population.

Te Whatu Ora, Te Aka Whai Ora and local health district funders acknowledge the risks to patients (*including inability to exert rangatiratanga, unable to access treatments close to home, receiving delayed and suboptimal renal replacement therapies*) and staff (*burn-out, resignations, erosion of philosophies enabling patient-centred care*) that follow the lack of capacity to meet current demands for haemodialysis services.

Te Whatu Ora, Te Aka Whai Ora and local health district funders acknowledge that services across Aotearoa New Zealand that lack capacity to meet current demand, coupled with the consistent historical and anticipated future growth in haemodialysis services demand, represent a situation that requires an immediate response.

Recommendations

Te Whatu Ora, Te Aka Whai Ora and local district funders:

Enable equal access to planned starts onto haemodialysis without delay, in a format that matches funder and patient priorities and local/regional options

Recommendation:

ANZDATA expands data capture to include information on:

- haemodialysis treatments delivered as both fixed-schedule outpatient service and flexible, acute inpatient service,
- reasons for, & recipients of, acute haemodialysis treatments.

Recommendation:

Renal units consider:

- establishing separate rosters for fixed-schedule chronic outpatient haemodialysis services, and flexible acute inpatient haemodialysis services
- providing flexibility for the acute inpatient service roster through including roles with deferrable tasks (quality assurance, education, rostering etc)
- creating sufficient flexibility to cover the maximum demand anticipated for acute, flexible haemodialysis service requirements (including acute kidney injury cases requiring haemodialysis, admission of chronic haemodialysis patients to inpatient areas, requests for shift changes, transfer between renal centres etc)

Recommendation:

Te Whatu Ora, Te Aka Whai Ora and local district funders:

- enable an immediate 25% increase in the dialysis-delivering workforce in Aotearoa New Zealand, with regional reviews to ensure allocation to health districts experiencing the most significant staffing capacity shortages
- facilitate the necessary solutions to this significant skills shortage in the dialysis-delivering workforce, via advocating for enabling visa/immigration policies and ensuring sufficient training programmes/positions to fill and sustain these positions.
- plan for further increases in the dialysis-delivering workforce, based on the expected growth of the haemodialysis population + additional factors (inpatient treatments, flexible service delivery models, dialysis population frailty, staff skill mix and turnover)

Recommendation:

National Renal Advisory Board commissions reports/research/serial surveys on other factors that will inform calculations of the necessary size and skill mix of Aotearoa New Zealand's haemodialysis workforce session, including:

- proportion of haemodialysis shifts that are delivered according to a fixed outpatient schedule compared with those that are delivered on a flexible basis
- numbers of, and growth in, inpatients requiring haemodialysis treatment
- changes in patient frailty of the Aotearoa New Zealand haemodialysis population
- staff experience,
- staff skill-mix,
- staff turnover metrics.

Recommendation:

National Renal Advisory Board, local renal teams and ANZDATA, in future capacity surveys:

- Audit the total number of physical spaces in which haemodialysis can be provided by a renal service, and the use of each of those spaces on a repeated snapshot-audit basis
- Accurately audit the number of patients receiving haemodialysis sessions in each physical haemodialysis-enabled space, and the patient : staff ratio for each haemodialysis treatment in each space, using a repeated-snapshot model for data capture that provides information about variable use of each space

Recommendation:

Local health district funders and renal centres consider establishing an acute inpatient haemodialysis centre with dedicated staffing, to take advantage of the benefits of improved patient : staff ratios that are enabled by physical co-location of inpatient haemodialysis spaces.

Recommendation:

Local health district funders and renal centres define whether physical infrastructure and/or staffing capacity are the major factor impacting local haemodialysis service delivery. Where physical infrastructure constraints exist or are impending, teams should set an interim plan for service delivery during the long-lag between identification of this infrastructure constraint and implementation of an effective solution, and accommodate population growth/dependency requirements in the physical infrastructure solution.

Recommendation:

Local health district funders and renal teams review pandemic preparedness in haemodialysis facilities, including [1] adequate access to home haemodialysis opportunities, training and support, [2] sufficient infrastructure (including isolation rooms), and [3] sufficient staffing to meet emergency plans

Recommendation:

Local health district funders and renal teams review:
- solutions to home haemodialysis and facility-based haemodialysis capacity constraints in tandem, since capacity issues in both areas are inter-twined and self-perpetuating
- options for creating transition units, to enable patients to access home haemodialysis treatments without impacting on/being negatively affected by the experience of in-centre haemodialysis

Recommendation:

National Renal Advisory Board, Kidney Health New Zealand, ANZSN, ANZDATA and renal teams:
- create a local system for regular review of the patient experience of receiving haemodialysis services
- couple capacity assessments with impact assessments that consider patient experience, staff experience and holistic aspects of renal service care delivery

Recommendation:

National Renal Advisory Board:
- provide definitions of ‘lengthy’ and ‘unreasonable’ travel burdens, to enable effective advocacy (between local services and local funders to create local solutions, and between Kidney health new Zealand and Te Whatu Ora to facilitate long-term solutions)

Recommendation:

Local health district funders and renal teams:
- consider local feasibility of novel options for local haemodialysis service delivery (see “illustrative service model” section) that bridge the gap between haemodialysis at home versus haemodialysis in a satellite unit

Recommendation:

Local health district funders and renal teams in areas where there is no local capacity to start haemodialysis in a planned fashion without unreasonable or lengthy travel burdens:

- create solutions to enable local delivery of planned starts to haemodialysis
- and/or ensure that capacity is available in the local haemodialysis unit so that those starting haemodialysis away-from-home can return home to dialyse at their local dialysis unit without delay

Recommendation:

Te Whatu Ora, Te Aka Whai Ora, National Renal Advisory Board, alongside work to address capacity limitations in haemodialysis services across Aotearoa New Zealand and in partnership with patient advocacy organisations (Kidney Health New Zealand):

- establish a formal programme to enable away-from-home dialysis for patients, including expectations, national coordination and reciprocal agreements

Recommendation:

National Renal Advisory Board, Te Whatu Ora, Te Aka Whai Ora and Kidney Health New Zealand establish a working group with the National Travel Assistance Scheme to review whether current supports for haemodialysis patients in Aotearoa New Zealand are up-to-date and fit-for-purpose

Recommendation:

National Renal Advisory Board and ANZDATA create registries of conservative care and advanced CKD / renal replacement therapy assessment programmes that include patient-prioritised decision-making information, to inform local service design to meet local population needs

Recommendation:

National Renal Advisory Board, ANZSN and CARI complete and disseminate guidelines on kidney disease care for Māori that would support optimisation of renal service delivery to meet the needs of the significant groups of Māori whānau impacted by haemodialysis care

National Renal Advisory Board and Kidney Health New Zealand work with partners in Māori and Pacific communities to develop leadership, governance and accountability frameworks that support optimisation of renal service delivery to meet the needs of Māori whānau and Pacific communities who are disproportionately impacted by haemodialysis care

Recommendation:

National Renal Advisory Board and ANZDATA include haemodialysis workforce diversity metrics in future surveys

Recommendation:

- Te Whatu Ora, local health district funders and renal teams address capacity issues for renal centres supporting patients living remotely/rurally through the recommended measures outlined above
- Local health district funders and renal teams consider local feasibility of novel options for local haemodialysis service delivery (see “illustrative service model” section) that bridge the gap between haemodialysis at home versus haemodialysis in a satellite unit

Recommendation:

Haemodialysis capacity surveys are repeated regularly, and incorporated with routine ANZDATA processes

Construct questions according to applicable recommendations (e.g. CARI/international guidelines, ANZSN KPIs, Tier 2 document etc)

Recommendations:

Work with paediatric renal services in Aotearoa New Zealand to assess whether there are concerns about the capacity of paediatric renal services to meet current or anticipated future service demands

APPENDIX DOCUMENTS

APPENDIX A: Dialysis Unit Manager Survey questionnaire.

In-centre Dialysis Capacity in New Zealand
An infrastructure Survey
Questionnaire

To allow appropriate interpretation of the results – please use/refer to the following definitions of common terms.

IF you consider the following definitions to be inaccurate or used in a different context in your service, please outline the differences here

(Comment:)

Common definitions

In-Centre Haemodialysis Unit –

- This refers to your main dialysis hub. Typically, patients that receive dialysis in this unit will have medical or dialysis specific reasons for dialysing at this location. This unit will typically be located near or within a hospital that is a base hospital for renal services, and with closer access to medical, renal and dialysis specialist staff. Along with satellite dialysis units this unit will have high nurse to patient ratios (i.e., 1:3-1:5)

Satellite Dialysis Unit –

- These dialysis units have similar nurse to patient ratios to the In-Centre dialysis unit however are located away from the main dialysis hub. For example, these units may often be located in other suburbs or towns/ cities. Patients receiving dialysis at these units require assistance with most if not all their dialysis treatments.

Self-Care/ Assisted Dialysis Units:

- Nurse to patient ratios are typically lower and patients require minimal assistance with dialysis treatments. Patients receiving haemodialysis on in these units require limited assistance to carry out dialysis treatments independently. The inability to conduct haemodialysis independently may be due to physical reasons i.e., Rheumatoid arthritis preventing safe cannulation or social reasons i.e., overcrowded homes.

Home Training Unit:

- These units comprise patients being actively trained to enable them to carry out dialysis treatments independently (themselves or family member/ friend). These units often require high nurse to patient ratios to enable adequate training for patients.

Home Haemodialysis Patients:

- These patients carry out their routine haemodialysis treatments with complete independence. This includes in their own home or at a community dialysis house/facility.

Acute Dialysis Patient:

- These Patients have been dialysis-dependent for less than one month AND have anticipated recovery of renal function.

Chronic Dialysis Patient:

- These patients have EITHER been on dialysis for >1 month OR have been started on dialysis recently (i.e., <1 month) but are anticipated to remain dialysis dependent long term (e.g. inc. new planned dialysis starts)

Interim Haemodialysis patient:

- These patients are currently receiving haemodialysis for an “interim” (usually short) period for medical or social reasons, where there is a plan to transition to an alternative form of RRT in the foreseeable future.

Chronic Dialysis “as inpatient”

- Patient usually receives haemodialysis at a dialysis unit or at home, but is currently an inpatient in hospital and requires haemodialysis as an inpatient.

HAEMODIALYSIS UNITS

1) Please describe the structure of your haemodialysis facilities

(i.e. a main facility-based location with satellite locations)

Please feel free to draw a diagram/map if this helps to explain the structure.

2) Do you have a specific separate inpatient facility(ies) (away from the outpatient dialysis unit) to provide dialysis for inpatients admitted to renal/general wards in your hospital?

If yes, please describe how this area works within the service.

---Yes / No---

3) Do you provide dialysis 'on the ward' for inpatients admitted to renal/general wards in your hospital?

If yes, please state how this works with respect to impact on staff movement/ on call / short notice roster changes.

---Yes / No---

4) Does provision of dialysis away from the main outpatient dialysis facility (e.g. in a dedicated inpatient facility, or on the wards) reduce your capacity to provide your business-as-usual outpatient dialysis services?

If yes please explain

---Yes / No---

NUMBERS OF HAEMODIALYSIS PATIENTS	
In the Last 7 Days (Week)	
5) In the last 7 days how, many patients received one or more Haemodialysis sessions at your DHB (In total, across all locations/all settings – e.g. In-centre, Satellite, Assisted/self-care HD, Home training, & Home HD)	
6) In the last 7 days What was the total number of patients who received haemodialysis at your DHB at the following sites?	
- In-centre HD	
- Interim HD	
- Assisted HD	
- Home Training HD	
- Home HD	
- Other (<i>describe</i>) :	
- Other (<i>describe</i>) :	
7) In the last 7 days When considering Chronic HD patients - How many of these patients are resident/ belong to another DHB? <i>(Registered to normally live in another DHB, and either travel to undertake dialysis or live temporarily within your DHB simply to undertake dialysis)</i>	
Please state DHB, and number of patients from each DHB	
- DHB	
- DHB	
- DHB	
8) Do you currently have capacity to start new patients on haemodialysis dialysis (planned HD start)? <i>If no, what is the reason this is not possible?</i>	---Yes / No---
In the Last 12 MONTHS	
9) How many new patients had a planned start onto haemodialysis in your DHB?	
10) Please state (if known) how many patients that you think opted for conservative care because there were no haemodialysis facilities available close to their home? (if unknown, please state "unknown")	
11) Please state (if known) how many patients that you think would have benefitted from haemodialysis but had a significantly delayed start / remained on an alternative and suboptimal RRT modality because of lack of capacity to provide haemodialysis in your units? (if unknown, please state "unknown")	

STRUCTURE/CAPACITY - HAEMODIALYSIS CHAIRS	
In the Last 7 Days (Week)	
16) Are you delivering/providing more dialysis sessions than you are currently funded for? <i>If yes, by how many sessions on average? (if able to answer)</i>	---Yes / No---
17) <i>Future proofing-</i> Within your current unit/s physical space/resource – Do you have any additional physical resources e.g. plumbed stations/spaces/chairs (above your funded physical resources) that would you be able to install? <i>If yes, how many additional patients could this provide dialysis for each shift?</i>	---Yes / No---
18) Are ALL CURRENT physical spaces staffed to appropriate Nurse:Patient ratio? <i>If no, how much additional Nursing FTE do you require?</i>	---Yes / No---
19) To have ALL CURRENT + POTENTIAL FUTURE (<i>as per Q15</i>) physical spaces staffed to appropriate Nurse : Patient ratio – how many additional Nursing FTE do you require?	

STRUCTURE/CAPACITY - DIALYSIS SESSIONS	
In the Last 7 Days (Week)	
20) Please use free text comments to describe the overall capacity of your haemodialysis unit (s) <i>(This may include comment about particular parts of the HD dialysis service)</i>	
21) What was the total number of haemodialysis sessions routinely AVAILABLE to be utilised? (Excluding Home Haemodialysis training sessions)	
22) What was the total number of haemodialysis sessions that were planned to be delivered (for ALL patients including those who subsequently DNA'd)	
23) Of these planned sessions - How many sessions were considered DNA's?	
24) Did you have the capacity to offer additional sessions to patients for medical reasons (e.g. for fluid overload) <i>IF YES - how many additional sessions were undertaken.</i>	---Yes / No---

ACUTE PATIENTS	
In the Last 7 Days (Week)	
25) How many acute HD sessions were undertaken in your unit(s) <i>(i.e. how many dialysis sessions were provided to 'acute patient' or "chronic dialysis as inpatient", as per definitions above)</i>	
26) How many of these acute patients who received dialysis in your unit(s) did so because they required specialist intervention by an associated speciality <i>(e.g. vascular / urology / cardiology / cardiothoracics etc)?</i>	
27) How many of these acute patients who received dialysis in your unit(s) did so because they required to have a planned review whilst on dialysis <i>(e.g. target weight review etc)</i>	
28) How many of these acute patients who received dialysis in your unit(s) are from (RESIDENT IN) another DHB <i>(i.e., those who needed to travel to your DHB due to a medical need that could not be accommodated in their normal DHB, or due to lack of capacity at their normal DHB)?</i>	

OVERALL CAPACITY	
In the Last 7 Days (Week)	
29) How many chronic haemodialysis patients from your DHB received their dialysis in another DHB?	
30) What is the main reason why chronic dialysis patients need to travel outside the DHB for their regular dialysis?	
31) As of today - To accommodate ALL of your DHB resident patients - how many total additional dialysis spaces/chairs do you require on a regular basis?	

TRAVEL FOR DIALYSIS	
In the Last 7 Days (Week)	
32) To the best of your knowledge - How many of your patients travelled between 50 – 100 kms to receive their usual haemo-dialysis?	
33) To the best of your knowledge – How many of your patients travelled between 100 – 200 kms to receive their usual haemo-dialysis?	
34) To the best of your knowledge – How many of your patients travelled between 60 -120 min to receive their usual haemo-dialysis?	
35) To the best of your knowledge – How many of your patients travelled between > 120 min to receive their usual haemo-dialysis?	
36) To the best of your knowledge - What is the maximum distance AND OR TIME an outpatient dialysing in your unit(s) will have travelled (one-way) for their dialysis session?	
37) To the best of your knowledge how many kms do your patients have to travel to other DHBs to receive their usual dialysis session?	
38) To the best of your knowledge how many minutes/hours do your patients have to travel to other DHBs to receive their usual dialysis session?	

HOME HAEMODIALYSIS	
In the Last 7 Days (Week)	
39) How many patients are currently stable chronic home haemodialysis patients	
40) How many funded chairs/physical have you allocated for home training?	
41) How many patients are currently training for HHD	
42) What is the maximal number of patients that can undertake Home Haemodialysis training at any one time (course of a week)?	
43) How many 'overflow' treatment sessions for regular chronic dialysis patients that usually receive dialysis in one of your staffed In-Centre / Satellite / Self-Care / Assisted dialysis units were undertaken in your Home Haemodialysis unit?	

<u>DIALYSIS SCHEDULE</u>	
44) How many days of the week do you provide haemodialysis at your DHB?	
45) How many days of the week do you provide a "3rd dialysis shift" (e.g., evening, overnight) in any of your unit(s)?	
46) Do you <u>routinely</u> provide a "glide/bridge/extra day dialysis shift" in any of your unit(s)? <i>e.g. on a Sunday, or in an evening, so that some facility haemodialysis patients can receive 4 haemodialysis shifts per week</i>	---Yes / No---
47) Do you provide emergency/ out-of-hours haemodialysis at your DHB?	---Yes / No---
<u>IN THE LAST MONTH</u>	
48) - How many emergency/out-of-hours dialysis treatments did you provide <u>IN</u> ONE OF YOUR DIALYSIS UNITS?	
49) If you provide emergency dialysis away from the dialysis unit/Renal ward for inpatients admitted to CCU/ICU/HDU wards in your hospital, how many emergency/out-of-hours dialysis treatments did you provide <u>AWAY FROM YOUR</u> DIALYSIS UNITS / RENAL WARD?	

<u>CHANGING SESSIONS</u>	
<u>IN THE LAST MONTH</u>	
50) How many requests have your received from dialysis patients to change their dialysis shift this month <u>to meet medical requirements</u> (e.g., to enable a clinic visit or test or intervention etc)?	
51) What percentage of these requests from dialysis patients to change their dialysis shift this month to meet medical requirements (e.g., to enable a clinic visit or test or intervention etc) have you been able to meet?	
52) How many requests have your received from dialysis patients to change their dialysis shift this month <u>to meet social needs</u> (e.g., to attend tangihanga or wedding or hui or holiday etc)?	
53) What percentage of these requests from dialysis patients to change their dialysis shift this month to meet medical requirements (e.g., to attend tangihanga or wedding or hui or holiday etc) have you been able to meet?	
54) Do the above session changes for medical/social reasons usually involve a change/swap for other people's sessions?	---Yes / No---
55) Are you usually able to provide holiday / away-from-home dialysis sessions on request?	---Yes / No---

FURTHER INFORMATION

56) Please provide any other information regarding dialysis capacity you feel would be relevant.

Many thanks for your time and contribution.

APPENDIX B: Staffing Definitions

Based on New Zealand Nurses Organisation (NZNO) Nursing AND Midwifery Multi-Employment Collective Agreement (MECA) 1 August 2020-31 October 2022 (New version currently under negotiation). Staff covered in this collective agreement includes all staff who are members of the NZNO employed formerly by the District Health Boards (DHBs) now Te Whatu Ora Health New Zealand, who hold a nursing role and is required by the employer to be a qualified health professional. For this survey, Nursing roles include: Nurse Practitioners, Registered Nurses, Enrolled Nurses and Health Care Assistants.

- **Nurse Practitioners** – a person defined by the HPCA (Health Practitioners Competency Assurance Act 2003 and its successors) as a Nurse Practitioner.
- **Senior Nurses** are Registered Nurses who are appointed by a DHB into a Designated Senior Nurse position. As defined by the nursing MECA. Senior Nurses include all Specialty and Specialist nurses, Educators, Donor liaison nurses, Clinical Coordinators, Associate Clinical Nurse Managers, Clinical Nurse Managers and Unit managers.
- **Registered Nurses** are qualified for registration under HPCA (Health Practitioners Competency Assurance Act 2003 and its successors).
- **Enrolled Nurses** are qualified for enrolment under HPCA (Health Practitioners Competency Assurance Act 2003 and its successors).
- **Health Care Assistant (HCA)** means an employee who is an auxiliary to the nursing team and can perform tasks in the position description relating to patient care working under the direction of a registered nurse.
- **Clinical Renal Physiologists (referred to in previous workforce survey 2009 as Dialysis Patient Care technicians)** are independent health professionals. They perform all types of renal dialysis and other specialized extracorporeal therapies. Clinical Renal Physiologist work in collaboration with other health professionals, providing technical expertise in dialysis related equipment and water quality standards. Clinical Renal Physiologists are a self-regulating professional body – The New Zealand and Australia Society of Renal Dialysis Practice Incorporated (NZASRD). [New Zealand and Australia Society of Renal Dialysis Practice Inc. \(NZASRD\)](#)

For analysis purposes for the survey, we have classified Staff on floor (providing dialysis cares) includes Registered nurses, Enrolled nurses, Renal Physiologists and Health care assistants. Senior Nurses include all Specialty and Specialist nurses, Educators, Donor liaison nurses, Clinical Coordinators, Associate Clinical Nurse Managers, Clinical Nurse Managers and Unit managers. Senior nurses are not included in staffing on the floor as although they do step in to assist as need arises, results from the questionnaires indicate they do not take a patient load routinely. Nurse Practitioners are also excluded from the on 'the floor staff' due to the nature of their role and not taking a patient load.

1 FTE (Full time Equivalent/ Full time Employee) is based on an 80-hour working fortnight as stated in the nursing MECA.

APPENDIX C: Potential reasons for flexible haemodialysis treatment delivery

Scheduled (“fixed”) and outside-schedule (“flexible”) haemodialysis session planning

		Timeframe		Opportunities	Threats
Scheduled	Scheduled chronic haemodialysis sessions for health district-resident patient	Months	Business-as-usual scheduled outpatient haemodialysis sessions		
	Scheduled transition from one regime to another	Months/weeks	Home haemodialysis training		
		Months/weeks	Transfer to lower-dependency HD session (e.g. from dependent-care to assisted-care)		
		Months/weeks	Transfer of shift pattern (e.g. from morning to afternoon shift)		
		Weeks/days	Transfer for a scheduled procedure (e.g. elective surgery, new dialysis access, planned review)		
Outside schedule (with short-term planning possible)	Semi-scheduled transition from one modality to another	Days/weeks i.e. >48-72hrs or before the next HD session	Anticipated new-start HD (slowly deteriorating native kidney function or kidney transplant function or peritoneal dialysis adequacy)		
	Semi-scheduled transition from one regime to another	Days/weeks	Gradual change in health/functional status of an outpatient, requiring planned increase in dependency status of HD session (e.g. from assisted-care to dependent-care, or from HDD to facility-based HD)		
	Semi-scheduled transition from one region to another	Days/weeks /months	Transfer for a scheduled procedure (e.g. elective surgery, new dialysis access, planned review) or important scheduled event (wedding, graduation etc)		
Outside schedule (requiring immediate adjustment)	Unscheduled transition from one regime to another	Immediate (i.e. before next scheduled HD session)	Sudden change in health/functional status of an outpatient, requiring rapid increase in dependency status of HD session (e.g. from	Release space in lower-dependency HD shift	

			assisted-care to dependent-care)		
		Immediate	Admission of chronic haemodialysis patient to local hospital (in-district)	Release space in lower-dependency HD shift	Acute inpatient HD session delivery
		Immediate	Admission of chronic haemodialysis patient to another hospital (out of district)	Release space in lower-dependency HD shift	Impact on another renal service for acute inpatient HD session delivery
		Immediate	Vascular access failure (as outpatient), requiring HD session delivery in a unit capable of providing new vascular access		
	Unscheduled transition from one modality to another	Immediate	Crash new-start HD (suddenly deteriorating native kidney function or kidney transplant function or peritoneal dialysis adequacy)	Potentially transient need for HD sessions	
	Unscheduled non-HD treatments by dialysis service	Immediate	Plasma exchange		[1] Sufficient volumes to maintain trained staff skills; [2] remove staff from scheduled HD staffing roster

APPENDIX D: Potential future survey questions

If future surveys of haemodialysis capacity in Aotearoa New Zealand are considered, then a number of the survey questions used in this iteration could/should be adapted.

Examples include:

A snapshot table of haemodialysis treatment delivery in every dialysis-enabled physical space in a renal centres dialysis facilities on a single day, e.g.

Space	Location	Shift	Patient	Staff member	Staff ratio planned	Staff ratio used	Fixed/flexible session	Reason for flex
1	Satellite 1	AM	1	1	1:4	1:4	Fixed	
1	Satellite 1	PM	2	1	1:4	1:4	Flexible	Transfer for a scheduled procedure
21	In-centre	AM	42	11	1:3	1:3	Fixed	
31	Renal ward 1	EVE	61	16	1:1	1:1	Flexible	Admission of chronic haemodialysis patient to local hospital

Couple capacity assessments with impact assessments that consider patient experience, staff experience and holistic aspects of renal service care delivery

Construct questions according to applicable recommendations (e.g. CARI/international guidelines, ANZSN KPIs, Tier 2 document etc)

Construct questions according to all potential staff roles with clinical (e.g. HCA, enrolled nurse, district nurse, home haemodialysis staff) and non-clinical (e.g. research, education, quality assurance, managerial etc) activities, with an option for free-text responses to enable clarification

Construct questions according to all potential staff roles working with patients receiving haemodialysis services. National Renal Advisory Board and ANZSN works alongside nursing and allied health colleagues/societies to update recommendations on patient:staff ratios for the multidisciplinary workforce required to provide holistic care for patients with end-stage kidney disease

Construct questions that accommodate relevant aspects of staff roles: scope of practice, experience, turnover, FTE, care hours delivered

Construct questions according to patient:staff ratios for each treatment delivered, with an option for free-text responses to enable clarification

Accurately calculate the total number of physical spaces in which haemodialysis can be provided by a renal service, and the use of each of those spaces on a repeated snapshot-audit basis

Accurately calculate the number of patients receiving haemodialysis sessions in each physical haemodialysis-enabled space, and the patient:staff ratio for each haemodialysis treatment in each space, using a repeated-snapshot model for data capture that provides information about this variability

Clarify travel distances/times as one-way or return journeys

Follow-up surveys should be simplified: single day snapshot, capturing activity in every dialysis space, by every staff member that day, and counting / classifying every haemodialysis treatment delivered. Different questions in the survey should capture the full dialysis workforce

Consider optimal metrics that illustrate capacity constraints, acknowledging that capacity constraints and impacts vary between units and over time. Potential example metrics include:

- Staff turnover / flux metrics
- Number of times in a 3 month period that treatment times are shortened
- Number of patients on twice weekly haemodialysis schedules
- Number of times a planned haemodialysis start is deferred
- Episodes/Cumulative days of Inability to start new patients
- Percentage of time working > 95% of shift capacity
- Percentage of time a 1:3 or 1:4 nursing ratio is exceeded.
- Days within a 30 day period when staff with non-clinical / non-haemodialysis roles (educators, PD nurse specialists) deliver haemodialysis treatments

APPENDIX E: List of acronyms

ACNM:	Associate Charge Nurse Manager
AKI:	Acute Kidney Injury
ANZSN:	Australian and New Zealand Society of Nephrology
BAU:	Business As Usual
CCU:	Coronary Care Unit
CKD:	Chronic Kidney Disease
CNM:	Charge Nurse Manager
CNS:	Clinical Nurse Specialist
CVVHD:	Continuous Veno-venous Haemodialysis
DHB:	District Health Board
DNA:	Did Not Attend
ESKD:	End-Stage Kidney Disease
ESRD:	End Stage Renal Disease
FTE:	Full Time Equivalent
HCA:	Health Care Assistant
HD:	Haemodialysis
HDU:	High Dependency Unit
HHD:	Home Haemodialysis
HOD:	Head Of Department
HPCA:	Health Practitioners Competency Assurance
HQSC:	Health Quality and Safety Commission New Zealand
ICU:	Intensive Care Unit
KPI:	Key Performance Indicator
MECA:	Multi-Employer Collective Agreement
NRAB:	National Renal Advisory Board
NTA:	National Travel Assistance scheme
NZASRDP:	New Zealand and Australia Society of Renal Dialysis Practice Incorporated
NZNO:	New Zealand Nurses Organisation
OIA:	Official Information Act
PD:	Peritoneal Dialysis
pmp:	per million population
PQC:	Policy and Quality Committee
PREM:	Patient Reported Experience Measure
PROM:	Patient Reported Outcome Measure
RRT:	Renal Replacement Therapy (dialysis or kidney transplant)

REFERENCES

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- ⁱ Walker, R.J., Tafunai, M. and Krishnan, A., 2019, May. Chronic kidney disease in New Zealand Māori and Pacific people. In *Seminars in Nephrology* (Vol. 39, No. 3, pp. 297-299). WB Saunders.
- ⁱⁱ Walker, R.C., Abel, S., Palmer, S.C., Walker, C., Heays, N. and Tipene-Leach, D., 2023. “We Need a System that’s Not Designed to Fail Māori”: Experiences of Racism Related to Kidney Transplantation in Aotearoa New Zealand. *Journal of Racial and Ethnic Health Disparities*, 10(1), pp.219-227.
- ⁱⁱⁱ Irvine, J., Buttimore, A., Eastwood, D. and Kendrick-Jones, J., 2014. The Christchurch earthquake: Dialysis experience and emergency planning. *Nephrology*, 19(5), pp.296-303.
- ^{iv} Chan, C.T., Blankestijn, P.J., Dember, L.M., Gallieni, M., Harris, D.C.H., Lok, C.E., Mehrotra, R., Stevens, P.E., Wang, A.Y., Cheung, M. and Wheeler, D.C., 2019. Conference Participants. Dialysis initiation, modality choice, access, and prescription: conclusions from a Kidney Disease: Improving Global Outcomes (KDIGO) controversies conference. *Kidney Int*, 96(1), pp.37-47.
- ^v HQSC report [A window on quality 2022 (Part 2) | Whakarāpopototanga matua: He tirohanga kōunga 2021 (Wāhanga 2)]. Available at <https://www.hqsc.govt.nz/resources/resource-library/a-window-on-quality-2022-part-2-whakarapopototanga-matua-he-tirohanga-kounga-2021-wahanga-2/>
- ^{vi} NRAB Tier 2 Specification Document. Available at https://www.health.govt.nz/system/files/documents/pages/minutes_nrab_2nov2022.pdf
- ^{vii} Naqshbandi, M., Harris, S.B., Esler, J.G. and Antwi-Nsiah, F., 2008. Global complication rates of type 2 diabetes in Indigenous peoples: A comprehensive review. *Diabetes research and clinical practice*, 82(1), pp.1-17.
- ^{viii} Lawton P, et al. Survival of indigenous Australians receiving renal replacement therapy: closing the gap? *Med J Aust*. 2015;4:200–2005.
- ^{ix} Lawton P, et al. Survival of indigenous Australians receiving renal replacement therapy: closing the gap? *Med J Aust*. 2015;4:200–2005.
- ^x Jha, V., Garcia-Garcia, G., Iseki, K., Li, Z., Naicker, S., Plattner, B., Saran, R., Wang, A.Y.M. and Yang, C.W., 2013. Chronic kidney disease: global dimension and perspectives. *The Lancet*, 382(9888), pp.260-272.
- ^{xi} Grace, B.S., Clayton, P. and McDonald, S.P., 2012. Increases in renal replacement therapy in Australia and New Zealand: understanding trends in diabetic nephropathy. *Nephrology*, 17(1), pp.76-84.
- ^{xii} Palmer, S., 2015. *New Zealand dialysis and transplantation audit 20012–2013*. Board, Editor: NRA.

^{xiii} McDonald S, Hewawasam E, Hurst K, Irish G, Clayton P. ANZDATA Special Reports 1: Unit survey 2020. Australia and New Zealand Dialysis and Transplant Registry, Adelaide, Australia. 2021. ISBN: 978-0-6453621-0-7

Available at: https://www.anzdata.org.au/wp-content/uploads/2021/11/ANZDATA_Special-Report-HOU-Survey_20211115_7.0_final.pdf

^{xiv} Ethical Guidelines for observational studies, National Ethics Advisory Committee, Ministry of Health, NZ, 2012. Observational Auditor Training, Safe Surgery NZ Programme 2017, The University of Auckland and Health Quality and Safety Commission New Zealand;

Available at https://www.hqsc.govt.nz/assets/Our-work/Improved-service-delivery/Safe-surgery/Publications-resources/5._Observational_Audit_v1.5-1.pdf

^{xv} Health Quality and Safety Commission New Zealand, Ethics Guide;

Available at <https://www.hqsc.govt.nz/our-work/leadership-and-capability/quality-improvement-project-bank/ethics-guide/>

^{xvi} https://www.nzno.org.nz/groups/health_sectors/dhb

^{xvii} <https://www.ombudsman.parliament.nz/what-ombudsman-can-help/requests-official-information/your-ability-request-official-information>

^{xviii} <https://www.ombudsman.parliament.nz/sites/default/files/2021-11/Confidentiality.pdf>

^{xix} NZIER report to KHNZ 01.11.2021 – Transforming lives and saving money: Increasing access to kidney transplants in Aotearoa New Zealand.

Available at <https://www.nzier.org.nz/publications/transforming-lives-and-saving-money>

^{xx} Te Pae Tata Interim New Zealand Health Plan 2022

Available at

https://www.teakawhiora.nz/assets/Uploads/Publications/TePaeTata_Oct_2022_a5_A4s.pdf

^{xxi} Te Pae Tata Interim New Zealand Health Plan 2022

Available at

https://www.teakawhiora.nz/assets/Uploads/Publications/TePaeTata_Oct_2022_a5_A4s.pdf

^{xxii} 2022 ANZDATA report for 2021 data

Available at <https://www.anzdata.org.au/wp-content/uploads/2022/11/2021-ANZDATA-Summary-Infographic-NZ.pdf>

^{xxiii} ANZDATA Annual Report 2021 - Chapter 9 – Kidney Failure in Aotearoa New Zealand, Table 9.2

Prevalence of Kidney Replacement Therapy (pmp) in Aotearoa New Zealand 2016-2020

Available at https://www.anzdata.org.au/wp-content/uploads/2021/09/c09_aotearoa_2020_ar_2021_chapter_v1.0_20220608_Final.pdf

^{xxiv} Warwick, G., Mooney, A., Russon, L. and Hardy, R., 2014. Clinical practice guideline: planning, initiating and withdrawal of renal replacement therapy. UK Renal Association 6 th Edition, January 2014

Available at <https://ukkidney.org/sites/renal.org/files/planning-initiation-finalf506a031181561659443ff000014d4d8.pdf>

^{xxv} Ā mātou mahi | Our work and priorities. Te Aka Whai Ora.
Available at <https://www.teakawhaiora.nz/our-work/>

^{xxvi} Day, J., 2017. Inpatient dialysis unit project development: Redesigning acute hemodialysis care. *Nephrology Nursing Journal*, 44(3), p.251; Inpatient Dialysis Services: Nephrologist Leadership and Improving Quality and Safety Kalantar-Zadeh, Kamyar Landry, Daniel L. et al. *American Journal of Kidney Diseases*, Volume 78, Issue 2, 268 – 271; Inpatient Dialysis Medical Director Toolkit. Developed by the Forum of ESRD Networks' Medical Advisory Council (MAC). Available at <https://www.ajkd.org/cms/10.1053/j.ajkd.2021.03.011/attachment/18a4e5d5-ef5b-4c3f-acff-9698c43c8b77/mmc2.pdf>

^{xxvii} Polaschek, N., Bennett, P.N. and McNeill, L., 2009. The Australian and New Zealand dialysis workforce study in the international context. *Journal of Renal Care*, 35(4), pp.170-175.

^{xxviii} Figure 4, Polaschek, N., Bennett, P.N. and McNeill, L., 2009. The Australian and New Zealand dialysis workforce study in the international context. *Journal of Renal Care*, 35(4), pp.170-175.

^{xxix} NRAB Tier 2 Specification Document.

Available at
https://www.health.govt.nz/system/files/documents/pages/minutes_nrab_2nov2022.pdf

^{xxx} Figure 2 Polaschek, N., Bennett, P.N. and McNeill, L., 2009. The Australian and New Zealand dialysis workforce study in the international context. *Journal of Renal Care*, 35(4), pp.170-175.

^{xxxi} ANZDATA Annual Report 2021

(https://www.anzdata.org.au/wp-content/uploads/2021/09/c01_incidence_2020_ar_2021_v1.0_20211006_Final.pdf; Table 1.4 Incidence (pmp) of Kidney Failure with Replacement Therapy in Older Patients 2016-2020) and has individuals with more long-term co-morbidities (e.g. diabetes: https://www.anzdata.org.au/wp-content/uploads/2021/09/c02_prevalence_2020_ar_2021_chapter_v1.0_20211112_Final.pdf; Figure 2.11 - Diabetes Status at End of Year).

^{xxxii} Himmelfarb, J., Vanholder, R., Mehrotra, R. and Tonelli, M., 2020. The current and future landscape of dialysis. *Nature Reviews Nephrology*, 16(10), pp.573-585.

^{xxxiii} Geetha, D., Kronbichler, A., Rutter, M., Bajpai, D., Menez, S., Weissenbacher, A., Anand, S., Lin, E., Carlson, N., Sozio, S. and Fowler, K., 2022. Impact of the COVID-19 pandemic on the kidney community: Lessons learned and future directions. *Nature Reviews Nephrology*, 18(11), pp.724-737.

^{xxxiv} Blankenship, D.M., Usvyat, L., Kraus, M.A., Chatoth, D.K., Lasky, R., Turk Jr, J.E. and Maddux, F.W., 2023. Assessing the impact of transitional care units on dialysis patient outcomes: A multicenter, propensity score-matched analysis. *Hemodialysis International*.

^{xxxv} Hawkins, J., Wellsted, D., Corps, C., Fluck, R., Gair, R., Hall, N., Busby, A., Rider, B., Farrington, K., Sharma, S. and van der Veer, S.N., 2022. Measuring patients' experience with renal services in the UK: development and validation of the Kidney PREM. *Nephrology Dialysis Transplantation*, 37(8), pp.1507-1519.

^{xxxvi} National Renal Advisory Board – Manatū Hauora, Papers and Reports.

Available at <https://www.health.govt.nz/about-ministry/leadership-ministry/expert-groups/national-renal-advisory-board/papers-and-reports>

^{xxxvii} CH, C. and TL, L., 2012. Travel Distance and Compliance to Haemodialysis in an Urban Setting in Sarawak. *Journal of Surgical Academia*, pp.1-1.

^{xxxviii} Long-awaited haemodialysis units have arrived at Te Puia Springs Hospital. *Kidney Society News*, No. 229 January/February 2022.
Available at <https://www.kidneysociety.co.nz/wp-content/uploads/2022/11/234-KIDNEY-SOCIETY-News-JAN-FEB-22.pdf>

^{xxxix} Walker, R.C., Tipene-Leach, D., Graham, A. and Palmer, S.C., 2019. Patients' experiences of community house hemodialysis: A qualitative study. *Kidney Medicine*, 1(6), pp.338-346.

^{xl} Scholes-Robertson, N.J., Gutman, T., Howell, M., Craig, J., Chalmers, R., Dwyer, K.M., Jose, M., Roberts, I. and Tong, A., 2022. Clinicians' perspectives on equity of access to dialysis and kidney transplantation for rural people in Australia: a semistructured interview study. *BMJ open*, 12(2), p.e052315.

^{xli} The MacRobert Award, Royal Academy of Engineering.
Available at <https://macrobertaward.raeng.org.uk/2022-finalists>; Home (quantadt.com)

^{xlii} Scholes-Robertson, N.J., Gutman, T., Howell, M., Craig, J., Chalmers, R., Dwyer, K.M., Jose, M., Roberts, I. and Tong, A., 2022. Clinicians' perspectives on equity of access to dialysis and kidney transplantation for rural people in Australia: a semistructured interview study. *BMJ open*, 12(2), p.e052315.

^{xliii} Standardised Outcomes in Nephrology: SONG-HD.
Available at <https://songinitiative.org/projects/song-hd/>

^{xliv} Kidney Care UK Holiday and respite break grants
Available at <https://www.kidneycareuk.org/get-support/holidays-and-respite-breaks/dialysis-freedom/>

^{xlv} Away from Home Haemodialysis. Enable NSW, NSW Government.
Available at <https://www.enable.health.nsw.gov.au/services/afhh>

^{xlvi} Dialysis away from base. NHS England Commissioning 2023
Available at <https://www.england.nhs.uk/commissioning/publication/dialysis-away-from-base/>

^{xlvii} Away from Home Haemodialysis. Enable NSW, NSW Government.
Available at <https://www.enable.health.nsw.gov.au/services/afhh>

^{xlviii} Liu, C.K. and Tamura, M.K., 2022. Conservative Care for Kidney Failure—The Other Side of the Coin. *JAMA Network Open*, 5(3), pp.e222252-e222252.

^{xlix} ANZDATA Annual Report 2020 - Chapter 6 – Australian Transplant Waiting List
Available at https://www.anzdata.org.au/wp-content/uploads/2021/09/c06_waiting-list_2020_ar_2021_chapter_v1.0_202200331.pdf.

ⁱ Cutting, R.B., Webster, A.C., Cross, N.B., Dunckley, H., Beaglehole, B., Dittmer, I., Irvine, J., Walker, C., Jones, M., Wyld, M. and Kelly, P.J., 2022. Access and Equity in Transplantation (ASSET) New Zealand: Protocol for population-wide data linkage platform to investigate equity in access to kidney failure health services in New Zealand. *Plos one*, 17(8), p.e0273371.

ⁱⁱ Fotheringham, J., Smith, M.T., Froissart, M., Kronenberg, F., Stenvinkel, P., Floege, J., Eckardt, K.U. and Wheeler, D.C., 2020. Hospitalization and mortality following non-attendance for hemodialysis according to dialysis day of the week: a European cohort study. *BMC nephrology*, 21, pp.1-10.

ⁱⁱⁱ Walker, R.C., Walker, S., Morton, R.L., Tong, A., Howard, K. and Palmer, S.C., 2017. Māori patients' experiences and perspectives of chronic kidney disease: a New Zealand qualitative interview study. *BMJ open*, 7(1), p.e013829.

ⁱⁱⁱ Walker, R.C., Walker, S., Morton, R.L., Tong, A., Howard, K. and Palmer, S.C., 2017. Māori patients' experiences and perspectives of chronic kidney disease: a New Zealand qualitative interview study. *BMJ open*, 7(1), p.e013829.

^{liv} ANZDATA Annual Report 2021 - Chapter 9 – Kidney Failure in Aotearoa New Zealand, Table 9.2 Prevalence of Kidney Replacement Therapy (pmp) in Aotearoa New Zealand 2016-2020, Available at https://www.anzdata.org.au/wp-content/uploads/2021/09/c09_aotearoa_2020_ar_2021_chapter_v1.0_20220608_Final.pdf

^{lv} NZIER report to KHNZ 01.11.2021 – Transforming lives and saving money: Increasing access to kidney transplants in Aotearoa New Zealand. Available at <https://www.nzier.org.nz/publications/transforming-lives-and-saving-money>

^{lvi} Ashby, D., Borman, N., Burton, J., Corbett, R., Davenport, A., Farrington, K., Flowers, K., Fotheringham, J., Fox, A., Franklin, G. and Gardiner, C., 2019. Renal association clinical practice guideline on haemodialysis. *BMC nephrology*, 20(1), pp.1-36.