THE GROWING BURDEN OF COMPLEX VASCULAR ACCESS AMONG END STAGE RENAL DISEASE PATIENTS.

A comprehensive clinical Analysis of interventional Burden, outcomes & Healthcare Economics.

Presented by Ancy Poonattu Varghese.

BEFORE WE BEGIN- A CLINICAL REALITY CHECK

- Vascular access is the "Achilles' heel" of haemodialysis- our weakest point determines patient's outcome.
- Not a rare complication- but a daily reality.
- Access issue are part of the daily reality of the haemodialysis care.

Ref- Riella & Roy-Chaudhury, 2013.

THE AIM OF THE COMPREHENSIVE DATA REVIEW.

- Is to quantify the clinical and economic burden associated with complex vascular access.
- Why access hierarchy matters clinically.
- Focus on intervention Burden.
- Rates of catheter dependence.
- Impact on patient's outcome and hospital.

THE AIM

- Equity Crisis- Indigenous and Māori/ Pasifika disparity data.
- Financial burden on the healthcare.
- Surveillance in practice – what meticulous monitoring looks like and its outcomes.
- Nine actions- The evidence-based recommendations for change.



VASCULAR ACCESS- THE LIFELINE.



Vascular access is predominantly described as the lifeline for dialysis patients.



The impact of comorbidity burden associated with vascular access among dialysis population is increasing and maintenance of this lifeline is never getting easier.



Clinical challenge with infections, multiple procedures for treating stenosis and reoccurrence of stenosis, and exhausted attempts for permanent access is a burden for our patients.



Patients been palliated due to exhausted vascular access is a real burden on dialysis patients and their family.

ESKD CRISIS: Background and Epidemiology
Data from Australia & New Zealand

AUSTRALIA

15,500+
Australians on dialysis (2022)

2×
Dialysis population doubled since 2003

$3.0B
AUD 62000 per patient per year.

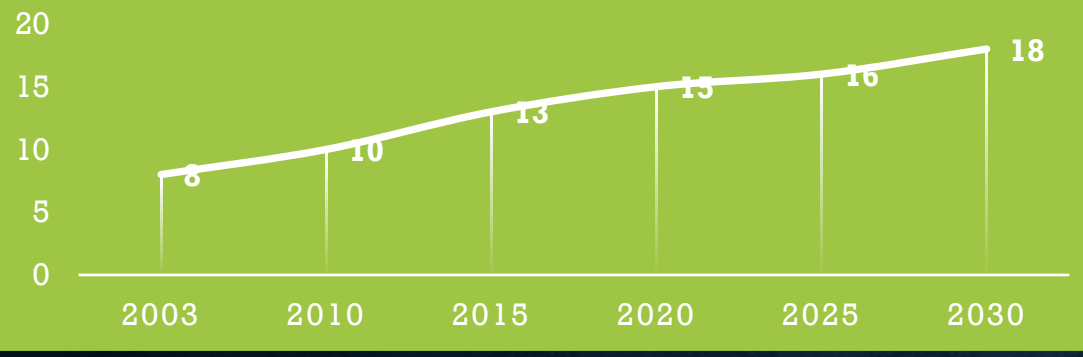
NEW ZEALAND

5000+
New Zealanders on dialysis (2021)

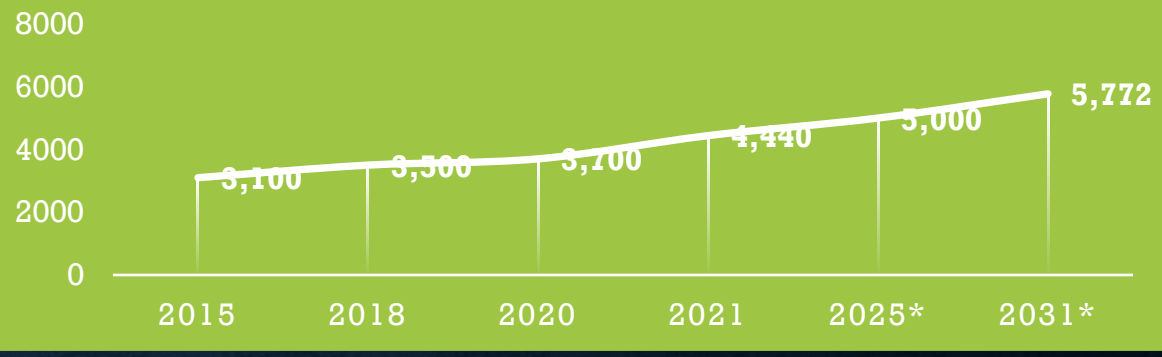
+24%
Dialysis patients grew in 6 years

$150M

DIALYSIS POPULATION GROWTH — AUSTRALIA (000S)



DIALYSIS POPULATION GROWTH — NEW ZEALAND



HAEMODIALYSIS AS THE DOMINANT TREATMENT MODALITY.

Haemodialysis remain the cornerstone of renal replacement therapy.

Despite the longstanding guidelines promoting fistula first approach, most patients initiating haemodialysis do so with central venous catheter (CVC).

This represents a critical failure point in the access care continuum.

A failure with compounding clinical and economic consequences that escalate throughout the patient's dialysis carrier.

VASCULAR ACCESS; TYPES, HIERARCHY, AND CLINICAL REALITY

01

The recognised hierarchy of haemodialysis vascular access as per kidney disease outcomes quality initiative

(KDOQI) guidelines, places AVF at the top, followed by AVG and tunnelled lines.

02

However, the clinical reality for complex ESRD patients is far removed from this orderly hierarchy.

03

The compounding crisis are - the AVF maturation crisis, central venous complications, access infections, superior vena cava syndrome, bloodstream infections.

AVF / AVG MAINTENANCE INTERVENTION BURDEN

Common AVF/AVG procedures are,

- Fistuloplasty for stenosis
- AVF revision surgery for non-maturation and dysfunction AVF.
- Superficialisation procedures
- Thrombectomy procedures
- Planned, longitudinal maintenance workload.

Incident Haemodialysis patients starting with CVC vs AV access

AUSTRALIA

~55-60%
HD via CVC (No AV access, 2022)

~40-45%
HD with AV access (ANZDATA 2022)

NEW ZEALAND

~65-70%
HD via CVC (No AV access, 2022)

~30-35%
HD with AV access (ANZDATA 2022)

Late Referral: ~18% late referral; higher in remote and under served populations.

PD to HD Transitions: ~65% use CVC at transfer.

CLINICAL IMPLICATIONS OF CVC-PROCEDURAL BURDEN

- Frequent unplanned procedures
- Line insertions and exchanges
- Infection-related to the interventions
- Thrombolysis / de clotting
- Recurrent and unpredictable intervention pattern
- Higher early adverse outcomes compared to AV access
- Drives hospitalisation and acute care utilisation

DISPROPORTIONATE EQUITY IMPACT



Maori & Pasifika = > 60% of dialysis population.



First nations ethnicity linked to higher CVC use and late referral.

DISPROPORTIONATE EQUITY IMPACT

- Higher CKD and dialysis burden.
- 2-5 X higher CKD prevalence.
- Up to 20 X higher kidney failure rates in remote areas
- ~5.3 X higher dialysis incidence vs nonindigenous Australians.

DISPROPORTIONATE EQUITY IMPACT

Disease trajectory	CKD occurs earlier (10-20 years earlier)
	Faster progression leading to earlier dialysis dependence

WHAT DOES THIS MEANS FOR VASCULAR ACCESS?

- Higher late referrals- increased CVC initiation.
- Limited pre- dialysis planning- fewer AVF creations
- Earlier disease onset- reduced time of fistula maturation.
- Remote location- reduced access to surgical services.
- Higher CVC dependence- increased infection, intervention and hospitalisation.

Ref- ANZDATA; AUHW;KDOQI 20019

PATIENT FACTORS

Age-Related Vascular Changes

Increasing age causes poor vessel quality, reducing elasticity and increasing calcification, impairing AVF maturation and blood flow.

Gender Differences in AVF Outcomes

Female patients often face poorer AVF maturation due to smaller vessel diameters and higher early access failure risk.

Impact of Comorbidities

Diabetes, hypertension, and cardiovascular diseases deteriorate vascular integrity, reducing AVF creation success and patency.

Other Patient Factors

Obesity complicates vein access and low health literacy impacts self-care, increasing risks of access failure and infections

Ref- Salih, S. Mohamed et al . 2025

THE TRUE COST OF ESKD & VASCULAR ACCESS IN AUSTRALIA

$1.9B

Annual CKD health expenditure

AIHW, 2020–21

24.5

CVC infections per 100 patient-years

REDUCCTION Study, MJA 2025

$30–50K

Est. cost per CVC infection admission

10-day stay @ ~$3–5K/day (AIHW)

CVC Infection Hospitalisation Burden

644

hospitalisations

CVC infection admissions across 3,943 dialysis patients

REDUCCTION Study (MJA 2025)

8.2%

of all infections

attributable to CVC bloodstream infection

REDUCCTION Study (MJA 2025)

15.7%

required ICU

adding ~$3–5K/day above ward rate

REDUCCTION Study (MJA 2025)

10 days

median stay

$30–50K estimated cost per episode

REDUCCTION Study (MJA 2025)

IMPACT ON QUALITY OF LIFE

The lived reality of complex vascular access in haemodialysis

Beyond survival statistics — vascular access complications strip patients of independence, dignity, and mental health.

🧠 Mental Health Burden

25–60%

of HD patients experience depression

CVC-dependent patients show significantly higher depression scores and lower health-related QoL at both 3 and 12 months compared to those with functional AVFs.

Yoo et al. PLOS ONE 2019; Psychological Interventions Meta-analysis, BMC 2024

🚿 Daily Life Disruption

2× more

difficulty bathing & showering — CVC vs AVF

CVC users report greater restriction in social activities, inability to bathe freely, and loss of spontaneity — compounding the psychological burden of life-sustaining treatment

Browne et al. CJASN 2022

📉 Mortality & Survival

26% vs 15%

2-year mortality: CVC vs AVF

Across 875,269 vascular accesses, CVC carried nearly double the 2-year mortality of AVF — yet patients report QoL impacts are rarely discussed during access planning

Arhuidese et al. J Vasc Surg 2016

SURVEILLENCE IN PRACTICE

What meticulous monitoring looks like — and what it achieves

What a Surveillance Programme Includes

① **Physical Examination — Every Session**

Auscultation, palpation, inspection of thrill & bruit; cannulation difficulty; prolonged bleeding

② **Access Blood Flow (Qa) Monitoring**

Quarterly Qa measurement; Qa <500 mL/min or >25% decline triggers fistulography referral

③ **Nurse-Led Escalation Pathway**

Trained nursing staff identify clinical markers of stenosis; structured referral to vascular access team

④ **Registry-Linked Outcome Tracking**

ANZDATA quarterly access-type reporting; unit-level CVC rates benchmarked against national cohort

⑤ **Timely Pre-emptive Intervention**

Angioplasty or surgical correction before thrombosis; avoids emergency CVC insertion

Outcomes: Australian Real-World Evidence

Western Health, Victoria — Nursing-Led Surveillance Programme
Forcey D et al. BMC Nephrology 2023;24:268

BEFORE programme → AFTER programme

AVF/AVG Thrombosis Rate

0.33 per 1,000 pt-days ↓ **0.15** per 1,000 pt-days

Cumulative Inpatient Stay

139 days (2.2 / 1,000 pt-days) ↓ **55 days** (0.69 / 1,000 pt-days)

"The majority of thrombosed vascular access can be predicted and averted with vigilant, well-practised routine clinical assessment by trained nursing staff."

RECOMMENDATIONS FOR ACTION

STRATEGIC INITIATIVES TO DRIVE PROGRESS



INITIATIVE

1. **Early Access Planning and CKD Pathway Optimisation**.

- The KDOQI 2019 guidelines emphasise an individualized End-Stage Kidney Disease Life-Plan, which includes early referral to vascular access services and timely access creation.
- Pre-dialysis education is a major part of this program.

This will help to reduce emergency dialysis starts and improved long-term access survival

INITIATIVE

2. **Indigenous Kidney Equity Pathways- Community CKD screening, culturally safe care.**

- Community CKD screening focuses on early identification of kidney disease within Indigenous communities, rather than waiting for patients to present in hospital settings.
- It involves delivering screening services in accessible, familiar, and trusted environments, such as community health centres, outreach clinics, and mobile health units.
- Telehealth services to reach remote and rural communities.
- Integration with primary health care services, including Aboriginal Medical Services.
- Risk stratification to identify high-risk individuals (e.g., diabetes, hypertension).

INITIATIVES

3. Vein Preservation Protocol- No PICC/subclavian CVC in CKD ≥3b

- Vein preservation is a critical strategy in chronic kidney disease to ensure that patients have suitable vessels for future arteriovenous fistula or graft creation.
- Save the veins for dialysis before dialysis is needed.

4. **Dedicated Vascular Access Nurses**

- This role focuses on preserving, creating, maintaining, and salvaging vascular access, ensuring optimal access function and reducing complications.
- Evidence shows that structured vascular access programs and specialised teams improve access survival and reduce complications.

INITIATIVES

5. CVC Minimisation Targets -Accountability, Benchmarks & Audits

- Is a strategic approach designed to reduce vascular access burdens and complications by ensuring these central lines are only used when necessary and removed the moment they aren't. *We shift the default mindset from "why should we remove it to why does this patient still needs it".*
- Benchmark the unit data with the national data, and we establish target gaols based on best practice.

INITIATIVE

6. **Hybrid Expertise Centres**

Hybrid Expertise Centres are designated tertiary-level facilities that provide advanced, integrated management of complex vascular access cases in patients with ESRD.

These centres combine- Surgical expertise, Interventional radiology, specialist nursing.

The “hybrid” model refers to the integration of open surgical and endovascular (minimally invasive) techniques within the same service.

INITIATIVE

7. Conservative Kidney Management & Palliative Integration- Advance Care Planning in Vascular Access Management

In vascular access management for dialysis patients, Conservative Kidney Management with early palliative integration plays a critical role in Stage 4 CKD decision-making.

Rather than automatically progressing to dialysis and vascular access creation, this approach ensures that,

-The need for dialysis is carefully evaluated.

-Vascular access interventions are appropriate and patient-centred.

-Advance care planning guides clinical decisions.

This is particularly important because vascular access procedures are burdensome and may not benefit all patients.

INITIATIVE

8. ANZDATA Complex Access Registry- Track outcomes & salvage

- The Complex Vascular Access Registry, is designed to systematically track, monitor, and improve outcomes in patients with difficult or failing vascular access.
- This registry focuses on: High-risk patients (failed AVF, multiple access sites, central venous stenosis)
- Access interventions and salvage procedures.
- Clinical outcomes and complications.

The goal is to create a data-driven framework to improve vascular access success and reduce complexity burden.

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THANK YOU