

Infection Control for Home Haemodialysis



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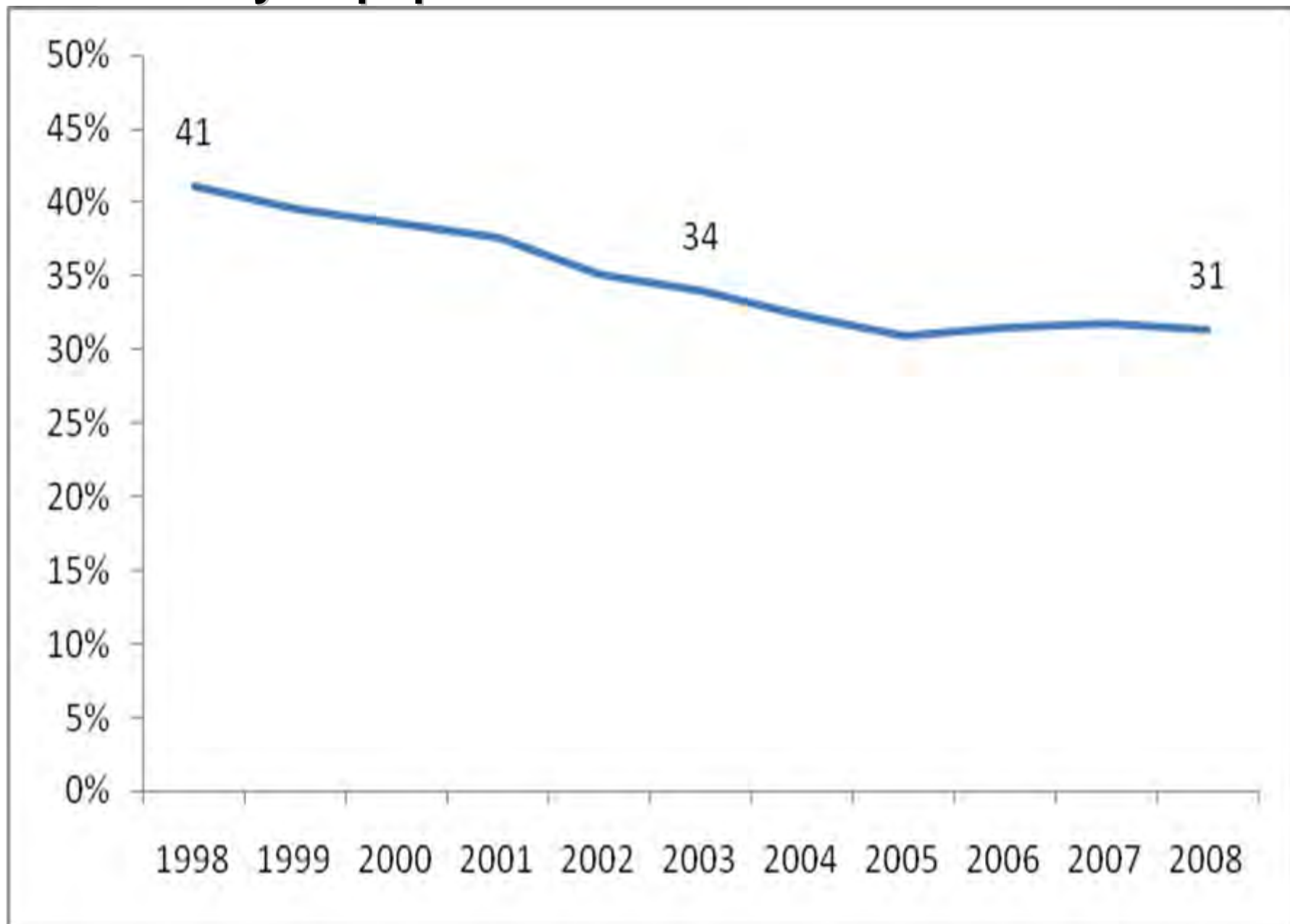


Objectives

- Discuss the **B**ackground of **H**ome **D**ialysis
- Discuss the **R**isk of **I**nfection for **H**ome **H**aemodialysis **P**atients
- Outline **S**trategies to **P**revent the above

Home dialysis (HPD and HHD) in Australia as a percentage of total dialysis population over time

Source: ANZDATA Registry Annual Reports



Advantages for Home Haemodialysis

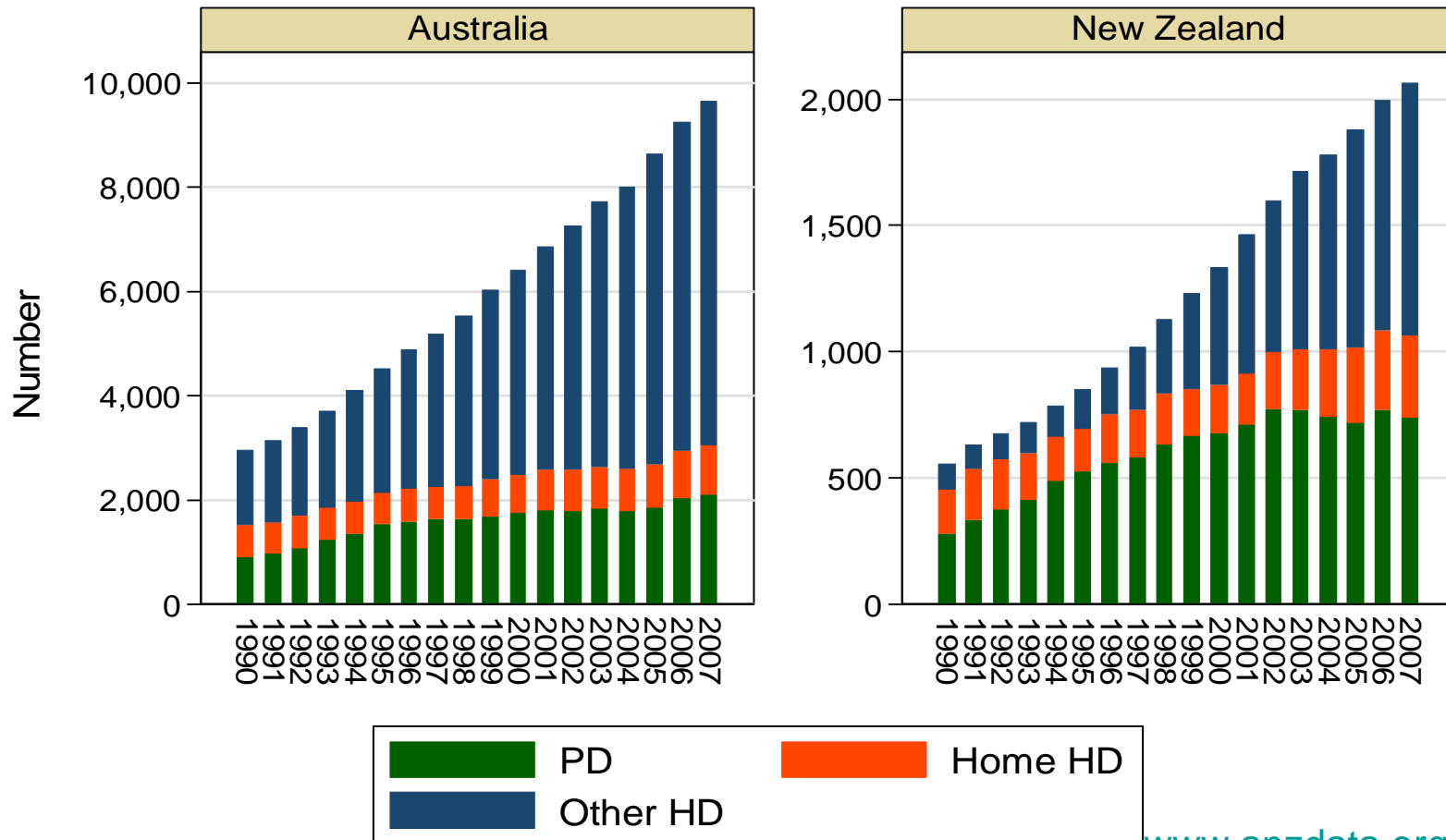
- Greater flexibility – time for dialysis
- Personal control, independence
- Better QOL
- Markedly improved survival rate
- More economical treatment option
- *Reduce risk of transmission of infections*

Barriers for Home Haemodialysis

- Attitude barriers
- Physical barriers
- Financial barriers

Trends in Home Dialysis in Australia & New Zealand

Home dialysis over time

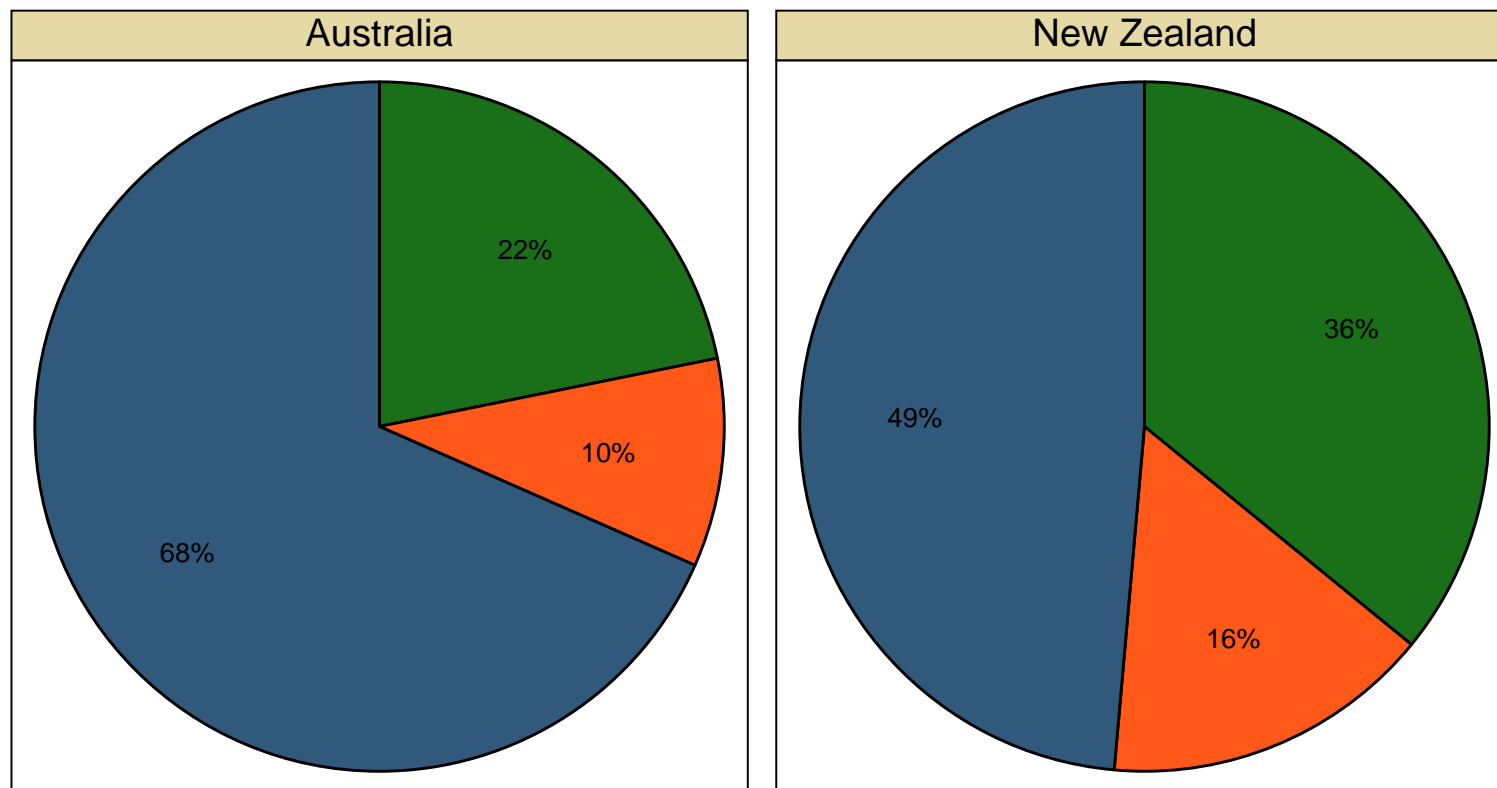


Prevalent numbers at year end 2007

www.anzdata.org.au

Home Dialysis

RRT by country



Modality at end 2007, dialysis only

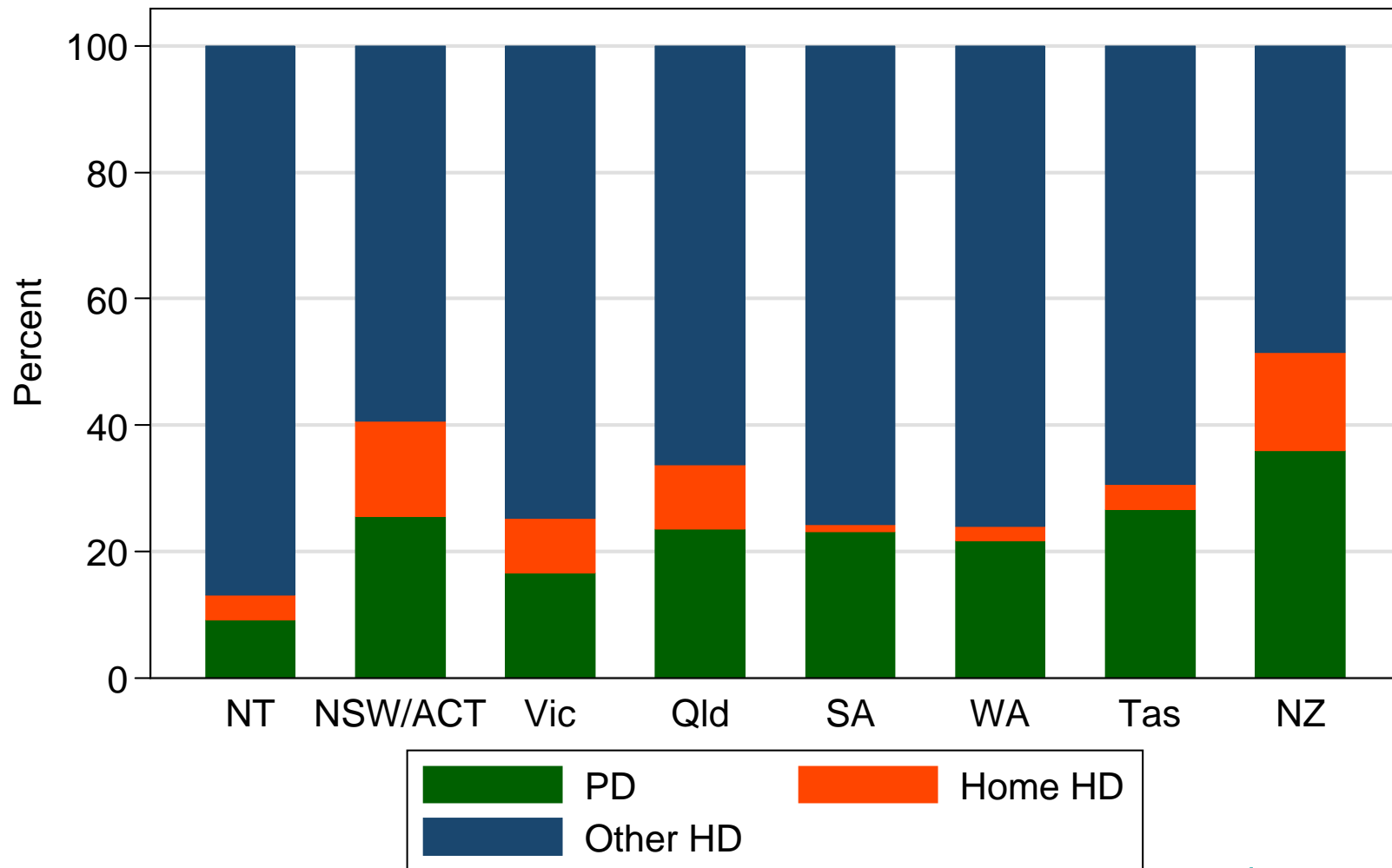
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Home Haemodialysis Schedules

- Conventional 3 x weekly, 3-4.5 hours per session
- Every other day, 3-4.5 hours per session
- Nocturnal (extended) dialysis 3 x weekly, 6-8 hours per session
- Frequent short dialysis, 2-3.5 hours 6-7 days per week
- Frequent nocturnal dialysis, 6-8 hours per session, 5-7 days per week

Home Dialysis by State

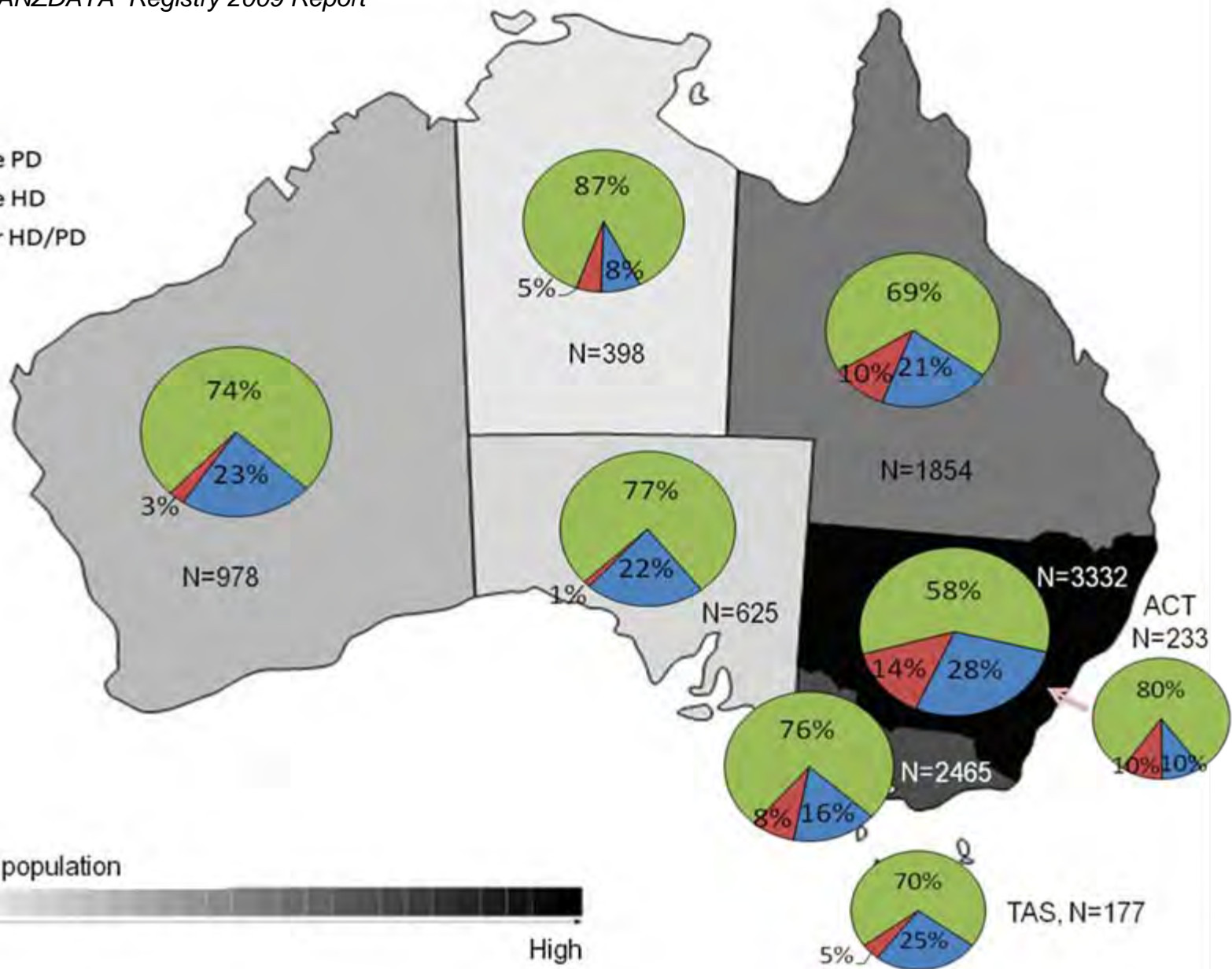
RRT modality by state
at end 2007



Proportion of home- versus facility-based dialysis by state 2008

Source: ANZDATA Registry 2009 Report

- Home PD
- Home HD
- Other HD/PD



Home Dialysis Data

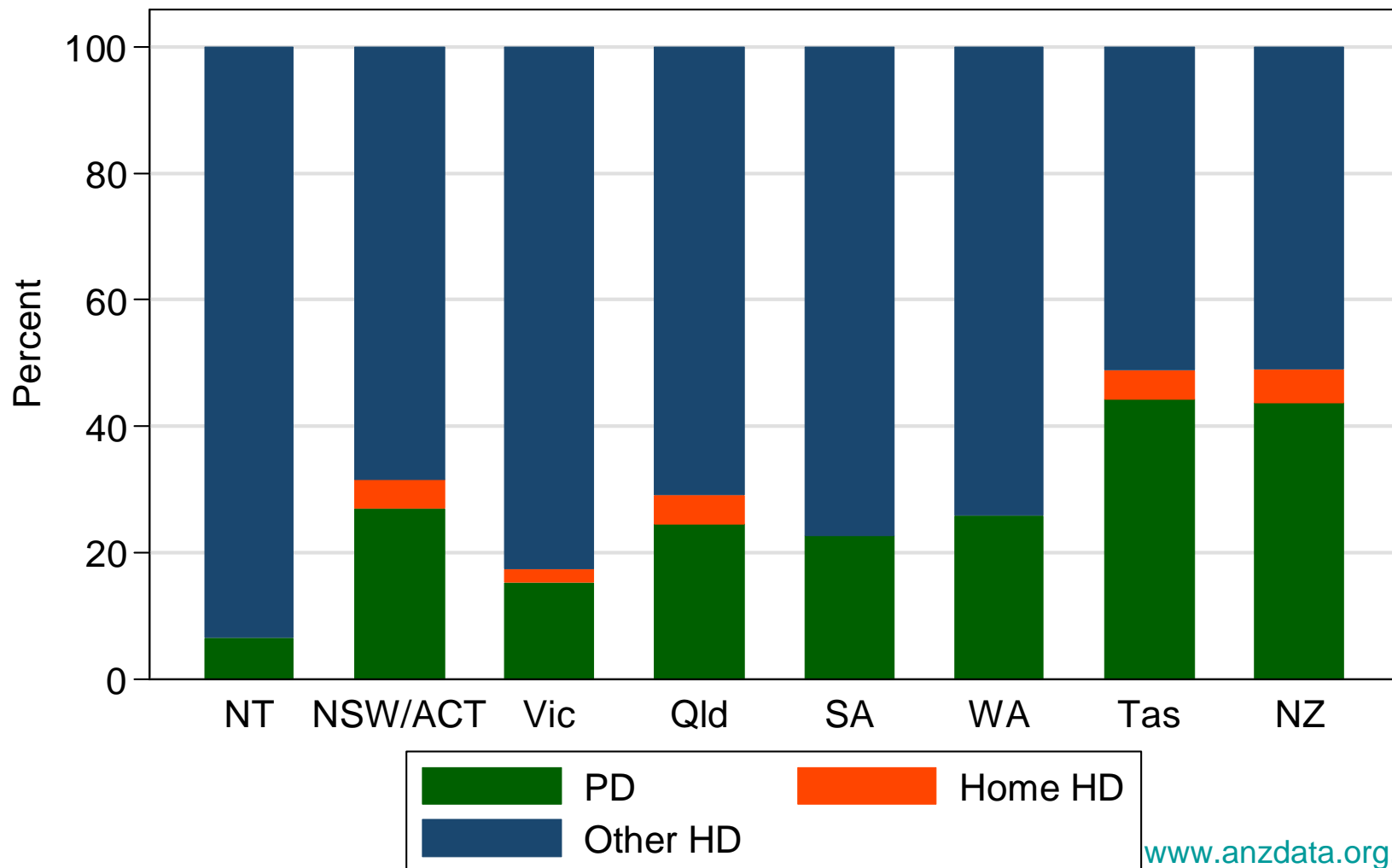
	Dialysis Number(%)	New patients 1-1-08 to 31-12-08	Home HD(%)	CAPD(%)	APD(%)
AUSTRALIA	10,062	2,476	948(9%)	939(9%)	1,235(12%)
NEW SOUTH WALES	3,332(33%)	792	467(14%)	373(11%)	553(17%)
SSWAHS TOTAL	854(26%)		157(18%)	140(16%)	196(23%)
Eastern Zone (RPAH)	355		97(27%)	69(20%)	69(19%)
State Wide Service (Rural)	55		25(45%)	20(36%)	10(18%)
Western Zone (Liverpool)	444		35(8%)	51(11%)	117(26%)

Risk of Infection for Home Haemodialysis Patients

- Dialysis Water
- Dialysis Access
- Other Infection Risk

Home Dialysis among Older People

RRT modality by state
at end 2007



www.anzdata.org.au

Proportion of dialysis modalities among 65-74 year olds, Dec 2007

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Risk of Infection - Dialysis Water

- **Endotoxin & bacterial contaminants**
- **Chloramines as disinfectants**
- **Extended time on dialysis**
- **Proinflammatory with exposure to dialysis membranes**

What Can Be Done?

- High quality water
- Home reverse osmosis machines
- Plumbing and electricity
- Advance in technology
- Ultrapure water
- Regular water testing

Water Pre-treatment Standards for Home Haemodialysis

- A **consensus** document, prepared by senior technicians from across NSW
- Describes the **minimum standards**
- Document submitted to NSW Health
- Publication on NSW Health website
- Guidelines based on the **AAMI** standards
- Use of more rigorous standards is acceptable
- Water shall be regularly **tested**
- Home Dialysis-related practices shall be regularly **audited**
- **1 micron filter, carbon filtration and reverse osmosis** must be used
- All servicing, maintenance, interventions and changes to the water pre-treatment plant shall be **recorded**

Planning

The design and installation of the water pre treatment system shall include:

- The quality of the **feed** water, including the source and availability of the water
- The **pressure** of the feed water
- **Space** required to safely install and operate the water pre-treatment plant
- **Drainage** required
- Water quality **monitoring** systems
- Non-public reticulated water **source** (e.g. Tank water)

B
Economique

 **POST**
PP DANMARK

Afs: **ATTRACTION** Jan Jensen, Guldsmèdevej 37, DK-2610 Rødovre.

Returneres ved varig adresseændring med oplysning om den nye adresse.



Additional Requirements

- Carbon **tank** for home use must be at least 21 Litres capacity
- At least 10 minutes **EBCT**
- Carbon must be **replaced** on a 12 monthly basis
- Regular **testing** of product water quality
- **Monitoring** of any trend in the results
- The **AAMI** maximum level for chlorine is 0.5 mg/L and for chloramines is 0.1 mg/L

Testing for **B**acteria & **E**ndotoxins

- **Regular** testing for bacteria and endotoxin is only undertaken **as requested** by the clinician.
- Sample shall be tested at the points where all haemodialysis equipment connects to the distribution piping system (post RO, post water loop)
- **Methodology** for sampling and testing for bacteria:
 - Bacteria levels shall not exceed 200 colony forming units/ml
 - Samples shall be assayed within 30 minutes of collection, or be immediately stored at a temperature between 1°C and 5°C and assayed within 24 hours of collection
 - Total viable counts shall be obtained using conventional microbiological assay procedures (pour plate, spread plate membrane filter techniques, commercial samplers including dip test devices etc.)
- **Methodology** for sampling and testing for Endotoxins:
 - Rotation among sites should assure that each is tested with a cycle of several months
 - Endotoxins can be tested using the Limulus Amoebocyte Lysate (LAL) assay
 - Endotoxin level shall not exceed 2 IU/ml

Testing Schedules

Test	Frequency	Collected By	Results or Procedure Recorded	Sample Sites And Instructions	Reported to	Response To Problems	Audited By
Chloramines	Each technical visit	By technician	Recorded in home dialysis record sheet	Pre and Post carbon tank	Reviewed by home haemodialysis training unit staff on home visits.	Technicians	Nursing staff of Home Haemodialysis Training Unit
Microbiology	Not practical for all home installations due to geographical locations	Technicians	In-patient records in Home Training Unit	Sample 1) Post portable RO unit. 2) Dialysis machine at venous port	Laboratory results to Home Haemodialysis Unit	If post RO CFU count > than 200 mls machine to be replaced or disinfected and re-sampled for CFUs	Nursing staff of Home Haemodialysis Training Unit
Endotoxins	Not practical for all home installations due to geographical locations	Technicians	In-patient records in Home Training Unit	Dialysis machine at venous port	Laboratory results to Home Haemodialysis Unit	If endotoxins positive Hi-flux dialysis to cease – return to standard dialyser. Technician to change U8000 filter and chemical disinfect machines.	Nursing staff of Home Haemodialysis Training Unit
Heavy metals & trace elements	Annually	Technicians	By home haemodialysis training unit staff in patient records	2 samples – Inlet supply and post RO unit	Results to go from laboratory to home haemodialysis training unit	Haemodialysis Training Unit. Nursing staff to inform technician and Clinical Director of Nephrology.	Technicians and Nursing staff of Home Haemodialysis Training Unit
Replacement of carbon filters	Annually or as determined by chloramines test results	N/A	By technician on service sheet	N/A	Reported by technician to Manager, Biomedical Services and nursing staff from Home Haemodialysis Training Unit. Nursing staff to inform Clinical Director of Nephrology.	Nursing staff of Home Haemodialysis Training Unit	Technicians and Nursing staff of Home Haemodialysis Training Unit

Risk of Infection - Dialysis Access

- AV fistula or access catheter
- Lead to blood borne infection
- Frequent dialysis, frequent cannulation

Dialysis Access Cont'd

The **Christchurch** New Zealand study

- 301 Home HD
- Fistula survival rates 90% (1 yr) 66% (5 yr)
- Button hole technique

Geelong Nocturnal HD program

- No publication on access-related infection
- Risk rate of fistula-related sepsis
- Alteration in patient technique

What Can Be Done?

- Strict adherence to protocols of needle **insertion** and **stabilisation**
- Use of **mupirocin** ointment or **MediHoney** to puncture site after needle removal

Buttonhole Cannulation

A technique to reduce AV fistula access complications in haemodialysis population

A Randomised Controlled Trial

A/Prof Josephine Chow

Ms Glenda Rayment & Ms Margaret Gilbert

Aims

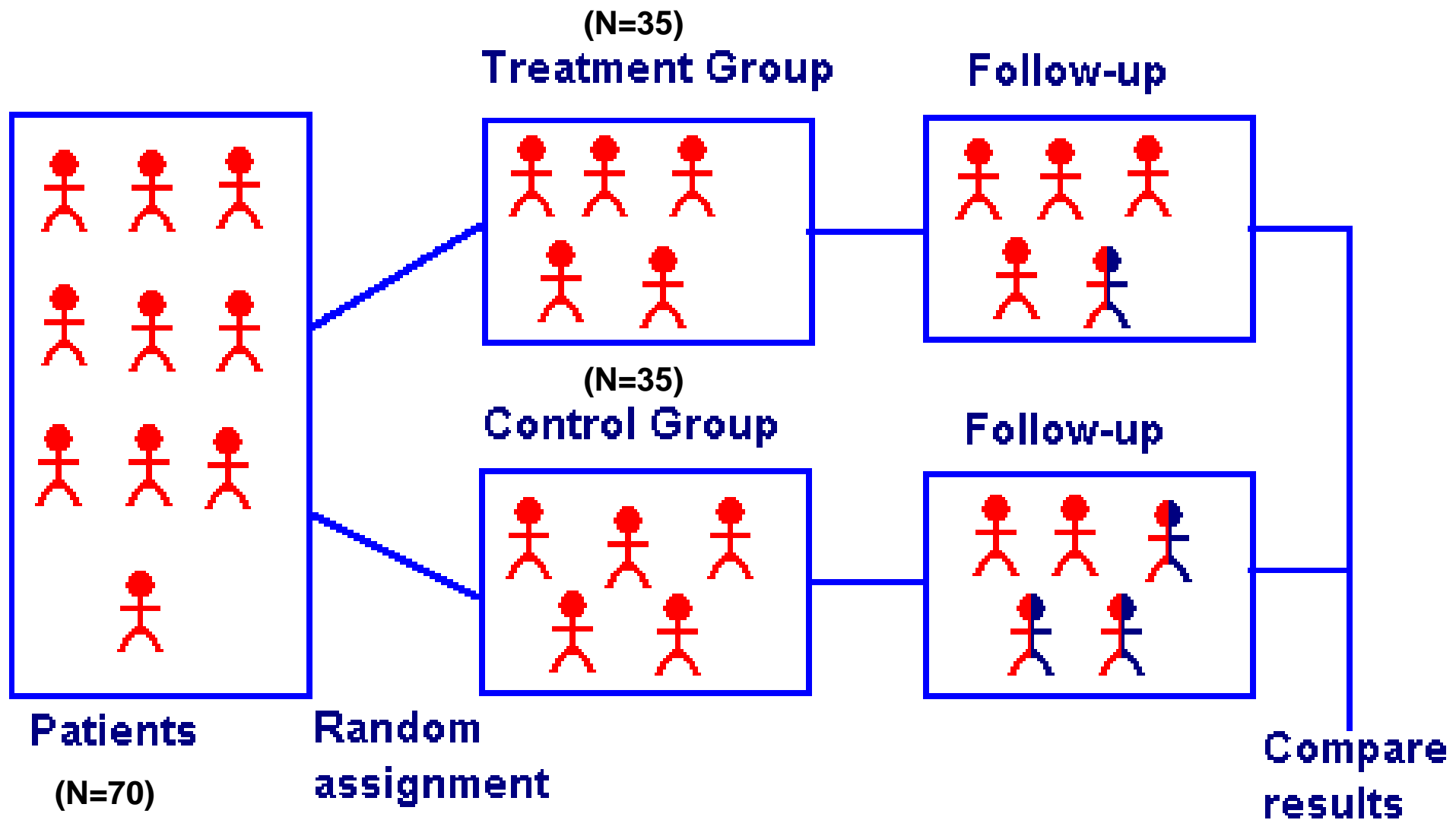
- To **examine** cannulation techniques comparing the buttonhole method to routine methods
- To **determine** a reduction in complications from vessel wall injury due to cannulation and longevity of the AVF and saphenous vein graft access

Study Design

- 6 month prospective, multicentre, RANDOMIZED CONTROLLED TRIAL
- Ethics Committee approval sought
- Recruited from all haemodialysis population
- Intervention group had their access cannulated by the same nurse for 2 weeks
- The needles used for the first cannulation were standard, sharp needles used for routine cannulation of all access



Study Design – RCT



Progress To-date

- June 2005 Working party established
- September 2005 Protocol finalised
- November 2005 Ethics submission
- May 2006 Ethics approval
- December 2006 First patient recruited
- November 2008 Last patient recruited
- June 2009 Last patient completion
- **December 2009** Completion of manuscript

Results

- Total of 4 episodes of infected AVF
- Buttonhole Group = 3/33
- Control Group = 1/35
- NS, $p=0.6$

Other Infection Risk

- Poor adherence of infection control guidelines
- Poor cleaning of machines post use
- Poor hand washing practice
- Poor quality of products

What Can Be Done?

- Patient **selection** process
- Patient **education**
- Ongoing assessment on **competency**
- Patient **carers**
- Environmental **audits**

Check List

HOME HEMODIALYSIS SELF- CARE TRAINING PROGRAM

Facility Name: _____ Nephrologist: _____

Patient Name _____ Initial: _____ Start Date: _____

Training Completed _____ Assistant Trained _____ Initial _____

Name of Instructor (Trainer) _____ RN Initial _____

INFECTION CONTROL INSTRUCTION PER FACILITY POLICY

Refer to internal Infection Control Manual

Checklist should be modified to reflect facility-specific instruction manual

CHECKLIST FOR HOME HEMODIALYSIS

UNIVERSAL PRECAUTIONS

	Date/Initial Demo By Trainer to Student	Date/Initial Return Demo by Students	Date/Initial Satisfactory Return Demo to Trainer by Student & Assistant
1. Demonstrates appropriate use infection control precautions Properly demonstrates appropriate hand washing technique			
2. Demonstrates and needle precautions and disposal of used supplies			
3. Recalls high risk procedure precautions specific to sterile technique			
4. Assistant demonstrates appropriate Emergency procedure to use (CPR) Resuscitation during cardiac and/or respiratory arrests.			
5. Properly demonstrates appropriate cleaning and disinfecting of surfaces and Equipment			
6. Demonstrate body fluids spill disinfection procedure			
7. Demonstrate disposes of contaminated or infectious waste			

Conclusion

- **More** patient can be dialysed successfully at home
- Appropriate patient **selection**
- Barrier for home HD can be **overcome**
- No **RCT** demonstrated survival benefit for any dialysis schedule
- Major **risk** of infections for Home HD – dialysis water & dialysis access
- The risk are **preventable**
- **Protocol**
- **Education**
- **Audit**

