New Zealand

Dialysis Standards and Audit

2005

Report for New Zealand Nephrology Services on behalf of the National Renal Advisory Board

Kelvin Lynn
Chair, Audit and Standards Subcommittee

March 2007

Establishment of a national quality assurance framework to improve the delivery of dialysis services to the New Zealand dialysis population.

Members of the Standards and Audit Working Party

Kelvin Lynn, Chair
Anne de Bres (resigned Nov 2003)
Adrian Buttimore
Brenda Clune (resigned Nov 2004)
Mark Marshall
Jenny Walker
Tafale Maddren

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Acknowledgments

- **Associate Professor John Collins and the staff of the New Zealand Peritoneal Dialysis Registry**
- **Professor Graeme Russ, Dr Stephen McDonald of the Australian and New Zealand Dialysis Registry**
- **New Zealand Ministry of Health**
- **DHBNZ**
- **Clinical Directors, data collectors and staff of the Renal Units in New Zealand**
- **Peter Dini, Department of Nephrology, Christchurch Hospital**

Introduction

The National Renal Advisory (NRAB) is proud to present the second audit report of the New Zealand dialysis care standards. The background to this process is summarised in the 2004 report sent to you last year. It is regretted that you have not received this report earlier. The delay is the result of the ANZDATA Registry receiving renal unit data returns late and further delays in some data analysis. In addition, not all New Zealand Units have been able to provide information in regard to provision of vascular access before the start of dialysis treatment and the rates of vascular catheter related blood stream infections. This all reflects the difficulties that many units have in getting sufficient support for audit and practice improvement.

The Department of Nephrology at Christchurch Hospital provides support for the production of this report and I am indebted to the help of Peter Dini, Systems Manager.

Included in this report are the standards for dialysate and water and facilities which we hope will be of use to dialysis units and DHBs in planning and maintenance (See Appendix B).

The standards developed by the Working Party on Standards and Audit have been reviewed by the Service Specification Project Team for the DHB Funding and Performance Directorate of the Ministry of Health and now form an appendix of the Tier 2 Renal Service Specifications which can be found in the National Service Framework library URL.

www2.moh.govt.nz/nsfl

The ANZDATA Registry has recently published analyses of the effects of haemodialysis treatment duration and frequency, haemoglobin concentration and urea reduction ratio (URR, a measure of dialysis efficiency) on patient outcome. These analyses [1,2] showed that patient survival was worse if:

- The duration of individual dialysis treatments was less <4.5 hours/session

- Patients received less than 3 dialyses each week
- The haemoglobin concentration was <110 g/L
- The urea reduction ratio (URR), a measure of dialysis efficiency, was < 65%

This report includes information on the first three parameters. Data for URR have not been included because most units have incomplete data sets.

The International Society of Peritoneal Dialysis (ISPD) recommends that renal units aim to reduce the incidence of peritoneal dialysis related peritonitis to less than 1 episode every 18 months (0.67 episodes per year at risk)[3]. Peritonitis-free survival is another useful way to present the rates of peritonitis in peritoneal dialysis patients. Data in this format analysing the effects of age and ethnicity for the period 2001-2005 are included in this report courtesy of Associate Professor John Collins of the New Zealand Peritoneal Dialysis Registry.

The data for central venous catheter use in patients who had haemodialysis for up to 90 days before starting on peritoneal dialysis have been reanalysed by the ANZDATA Registry because of discrepancies noted between the 2004 and 2005 analyses. The aim of this audit standard is to identify poor planning of peritoneal dialysis catheter placement for patients intending to start peritoneal dialysis as their first dialysis treatment modality. The data for 2004 in this report differ from those presented in the previous report.

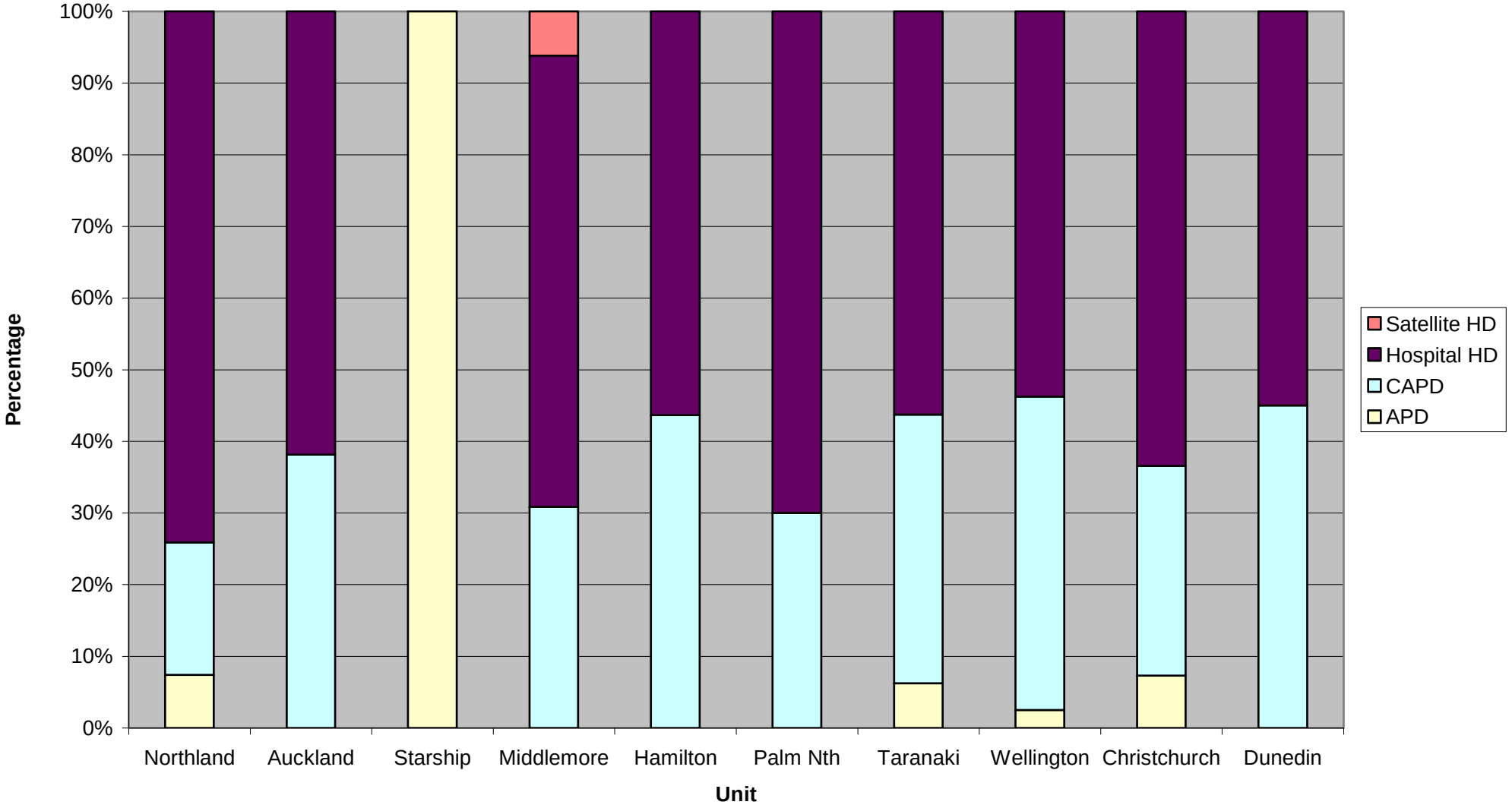
The process of data collection

The 2005 Report includes data from the 2005 ANZDATA and NZ PD Registry Reports and from some renal units' audit programmes. The timing of data collection and reporting for these two Registries means that the New Zealand Audit Report cannot be distributed until their work is completed in the second half of the year following original data collection. Once the ANZDATA Registry has complete unit data the reports of enquiries related to the New Zealand audit programme can be produced quickly.

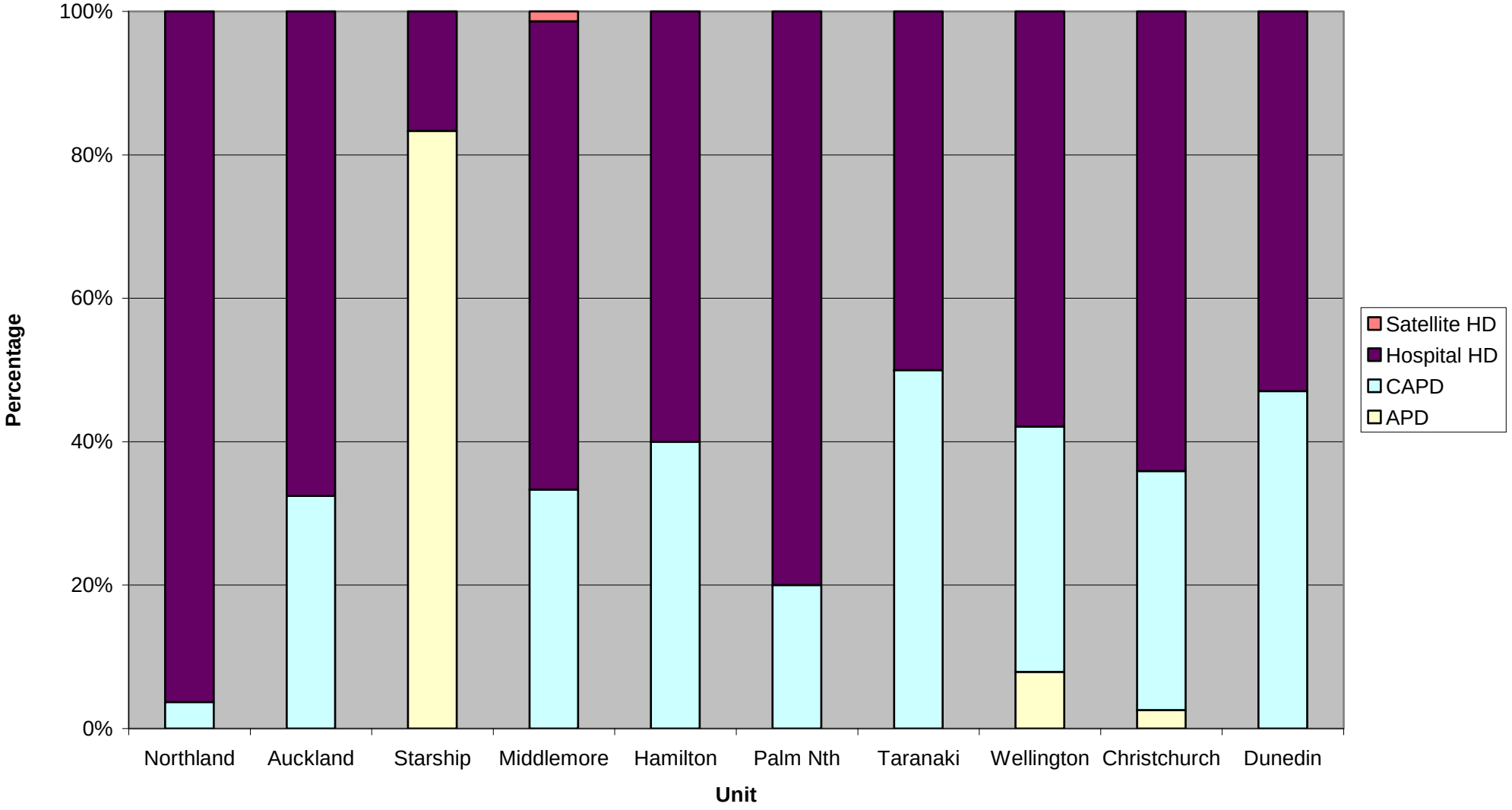
The National Renal Advisory Board would appreciate feedback on this report. Comments can be sent to Johan Rosman, Chair of NRAB, JRosman@middlemore.co.nz or Kelvin Lynn, kelvin.lynn@cdhb.govt.nz

The audit data is shown in tabular and graphic form in the following pages

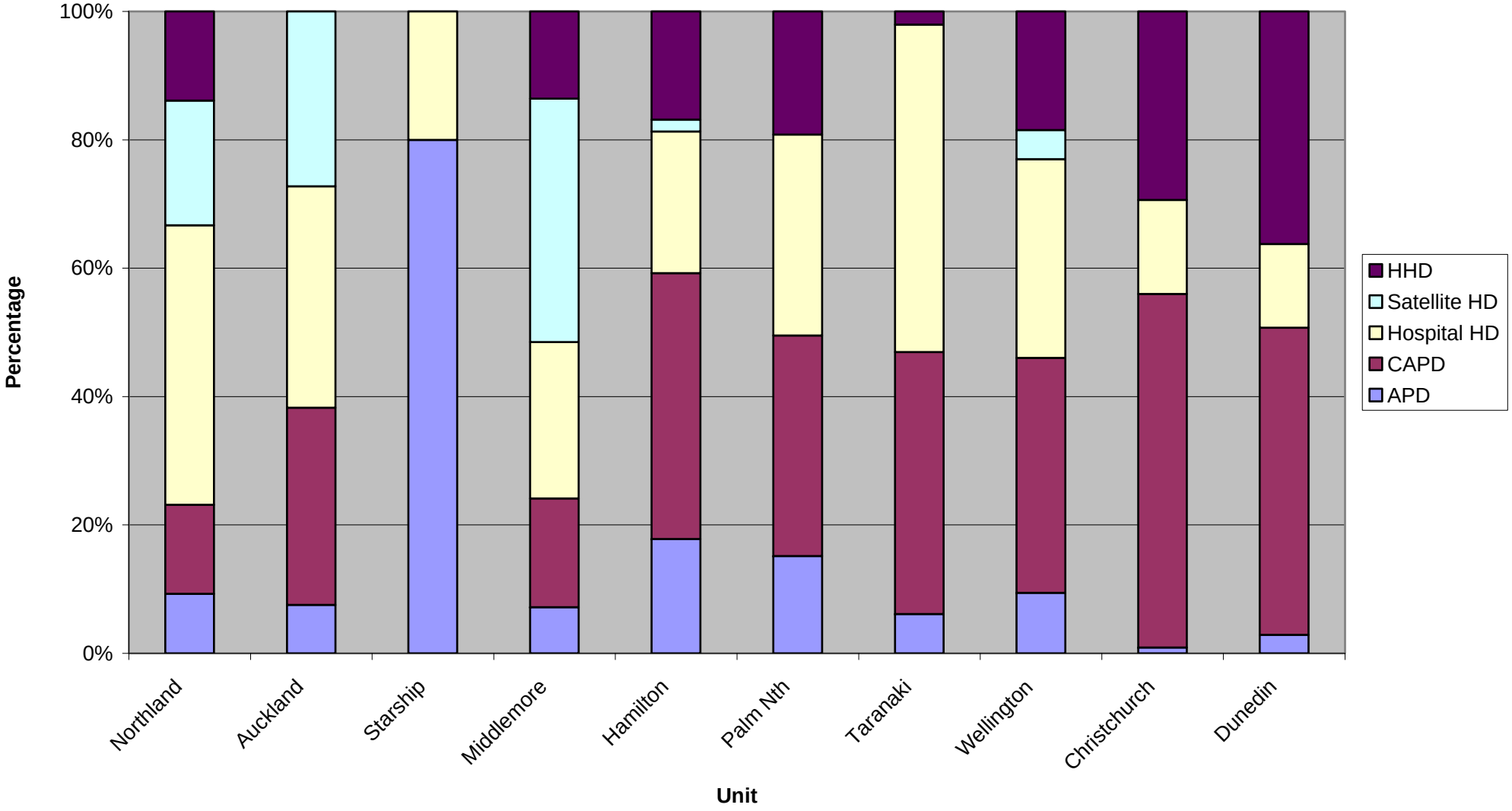
Treatment modality of incident patients in New Zealand in 2004



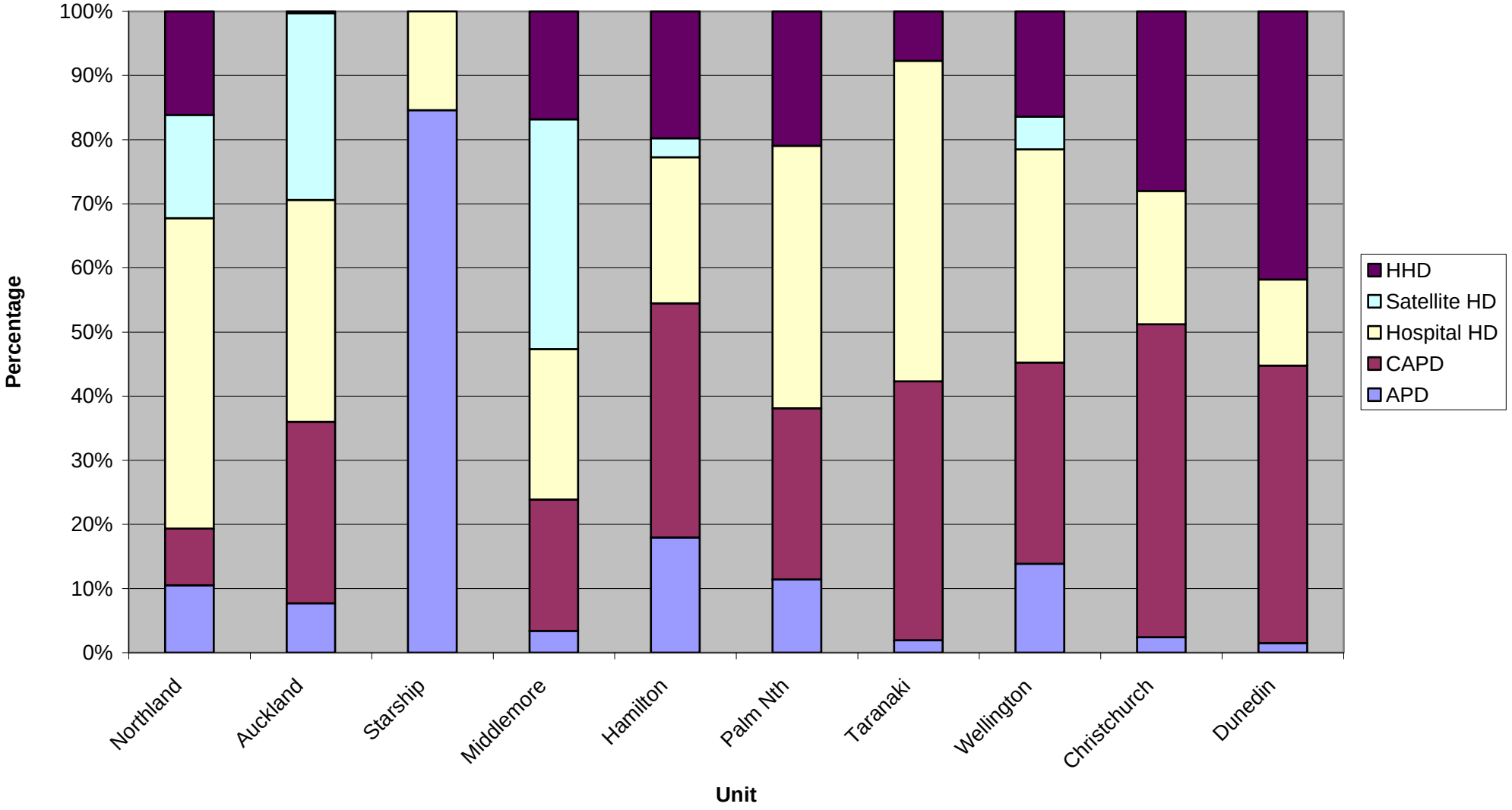
Treatment modality of incident patients in New Zealand in 2005



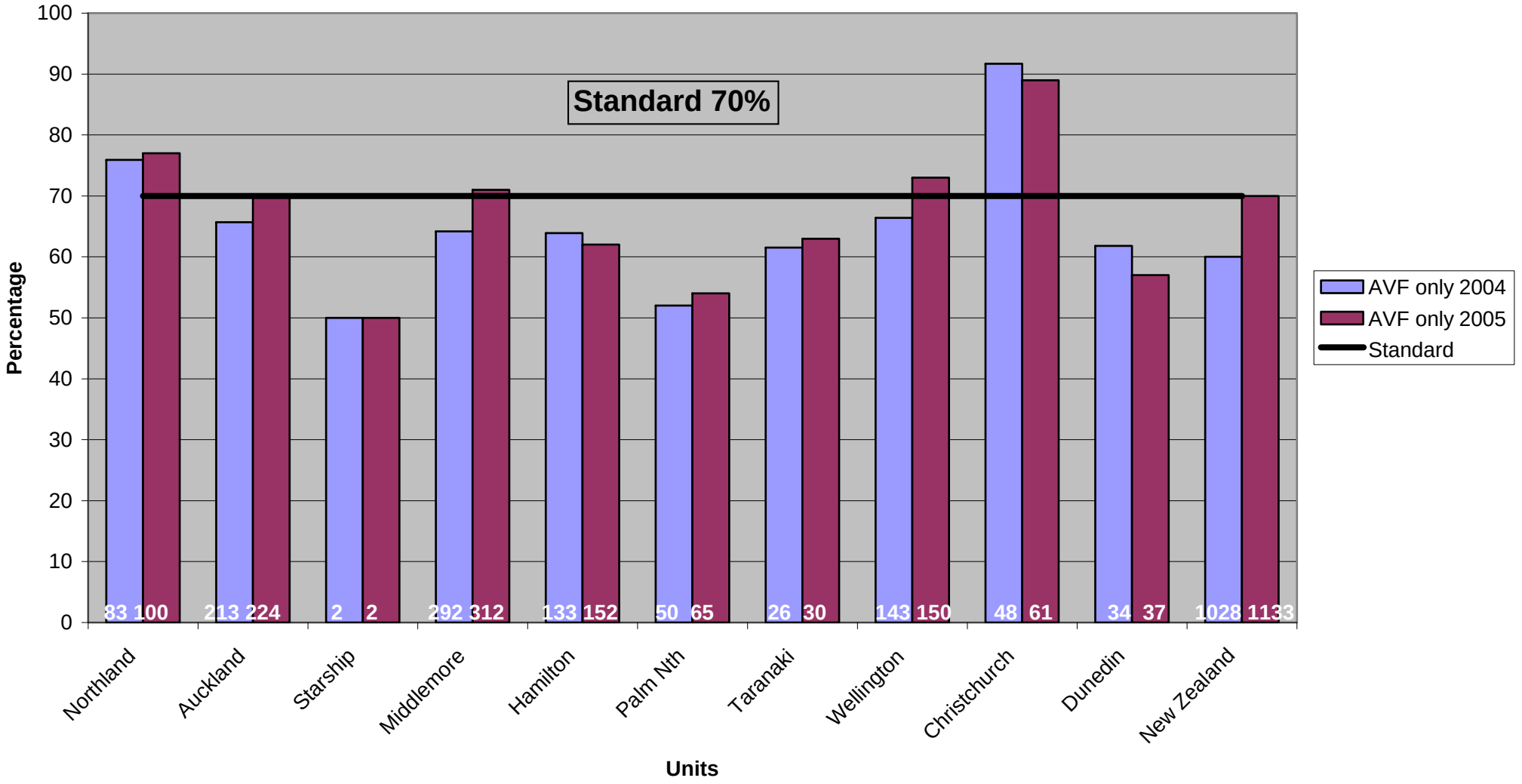
Treatment modality of prevalent patients in New Zealand in 2004



Treatment modlaity of prevalent patients in New Zealand in 2005

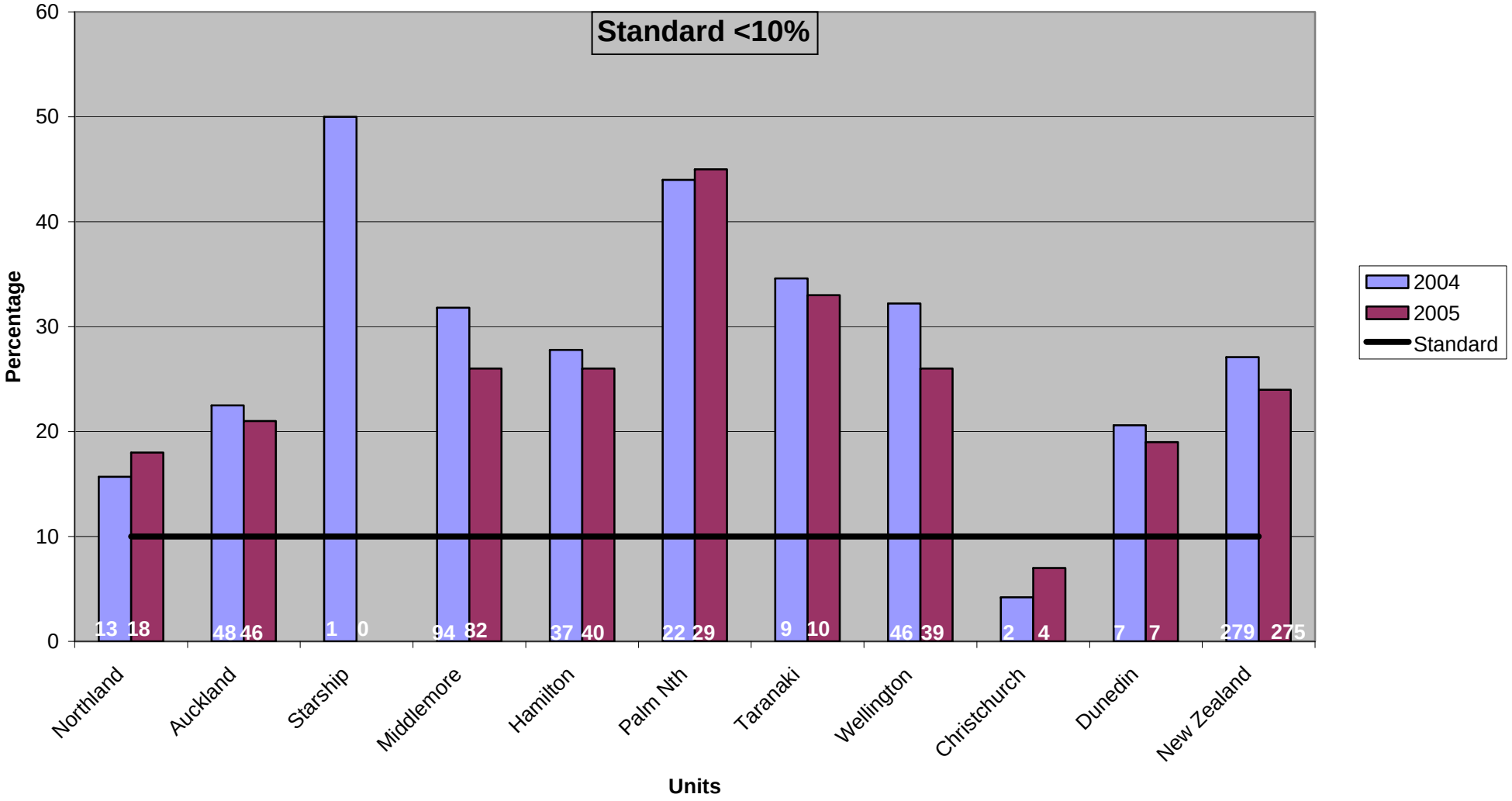


Vascular access of prevalent HD patients in New Zealand in 2004 & 2005 - percentage of AV fistulae
(number of patients show in columns)



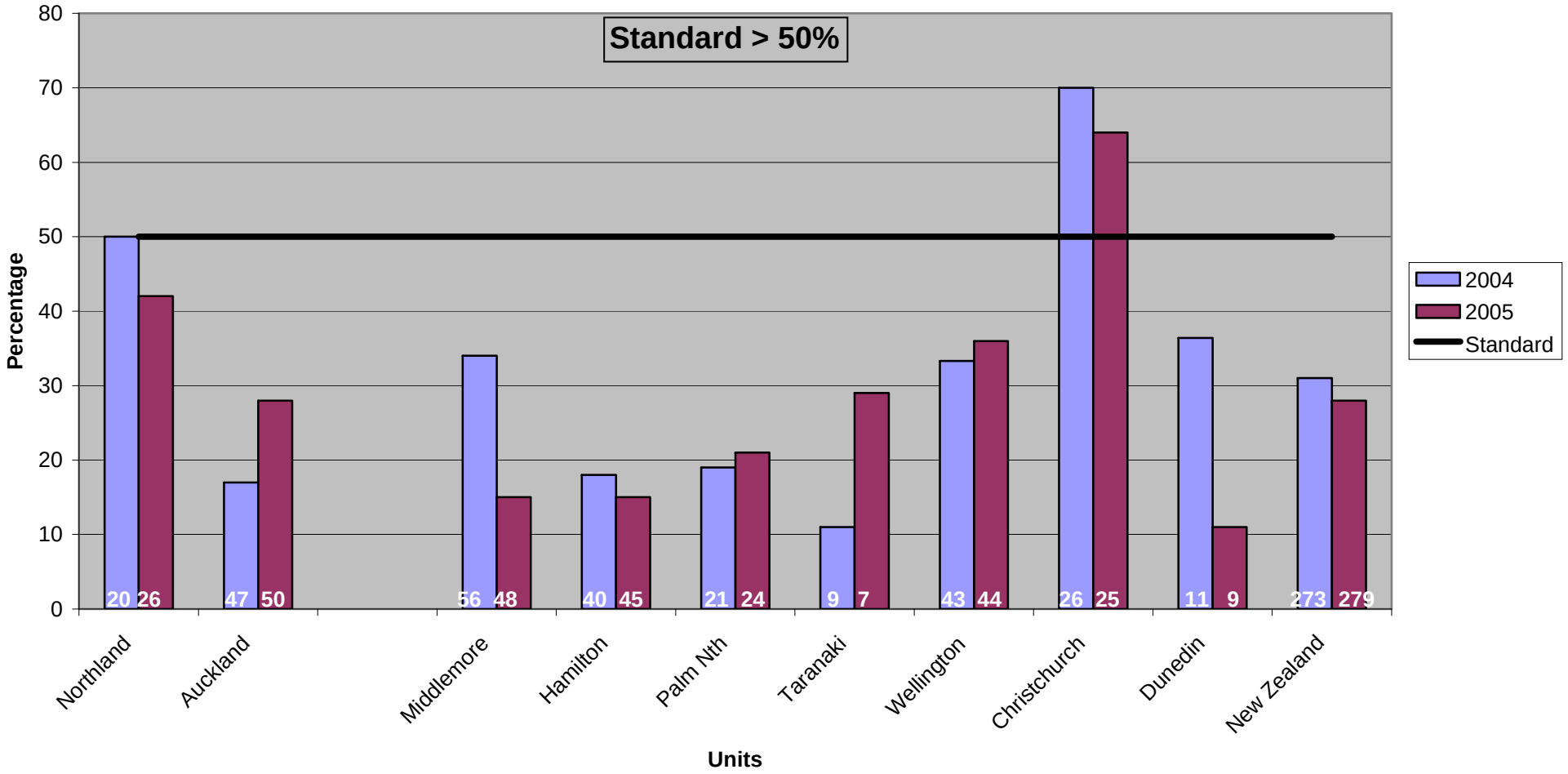
Vascular access in prevalent New Zealand HD patients at the end of 2004 & 2005 - use of catheters

(Includes tunnelled and non-tunnelled catheters - number of patients shown in columns)



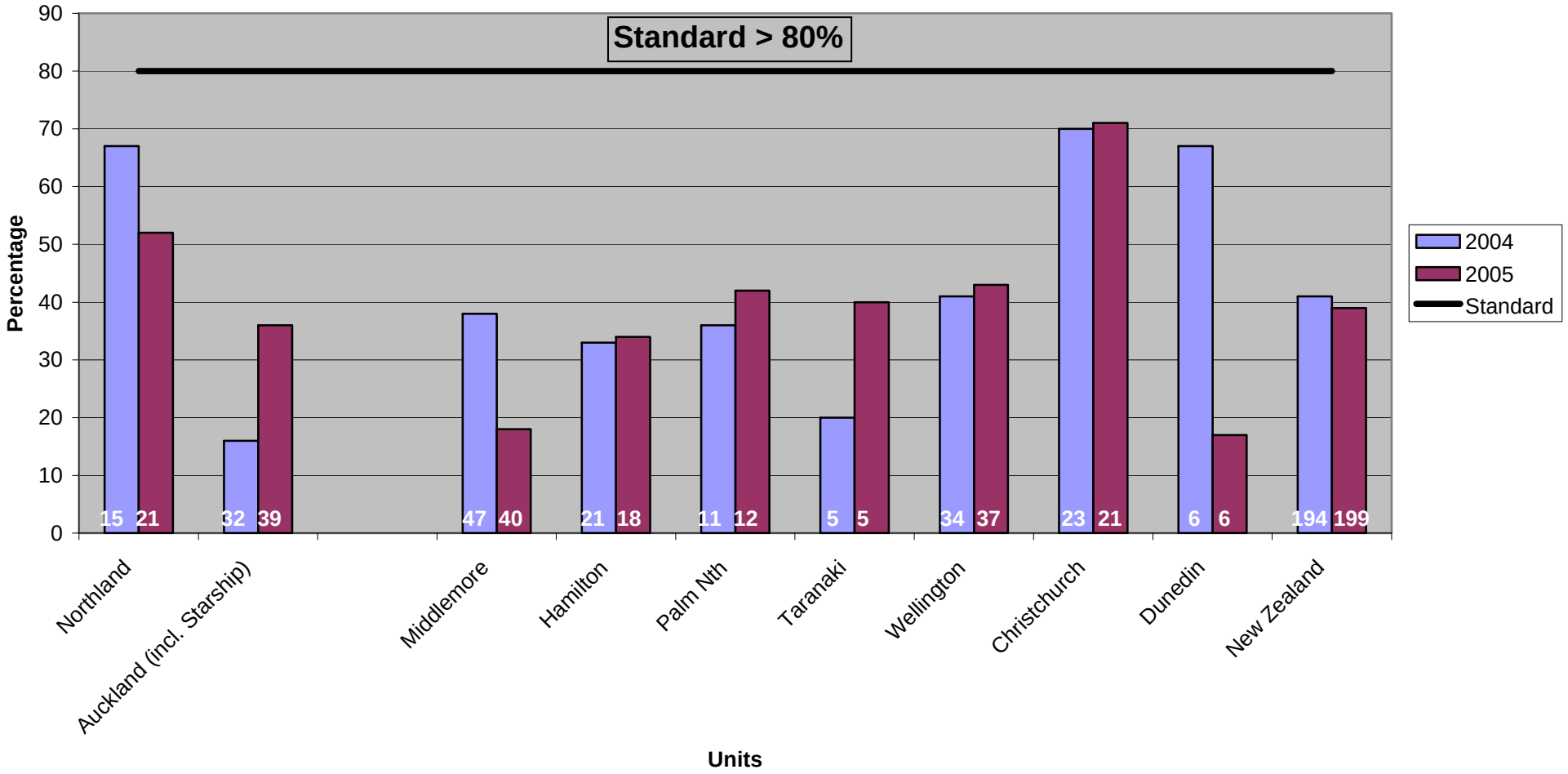
Percentage of incident New Zealand HD patients starting HD with permanent vascular access in 2004 & 2005 - AV fistula or AV graft

(number of patients shown in columns)



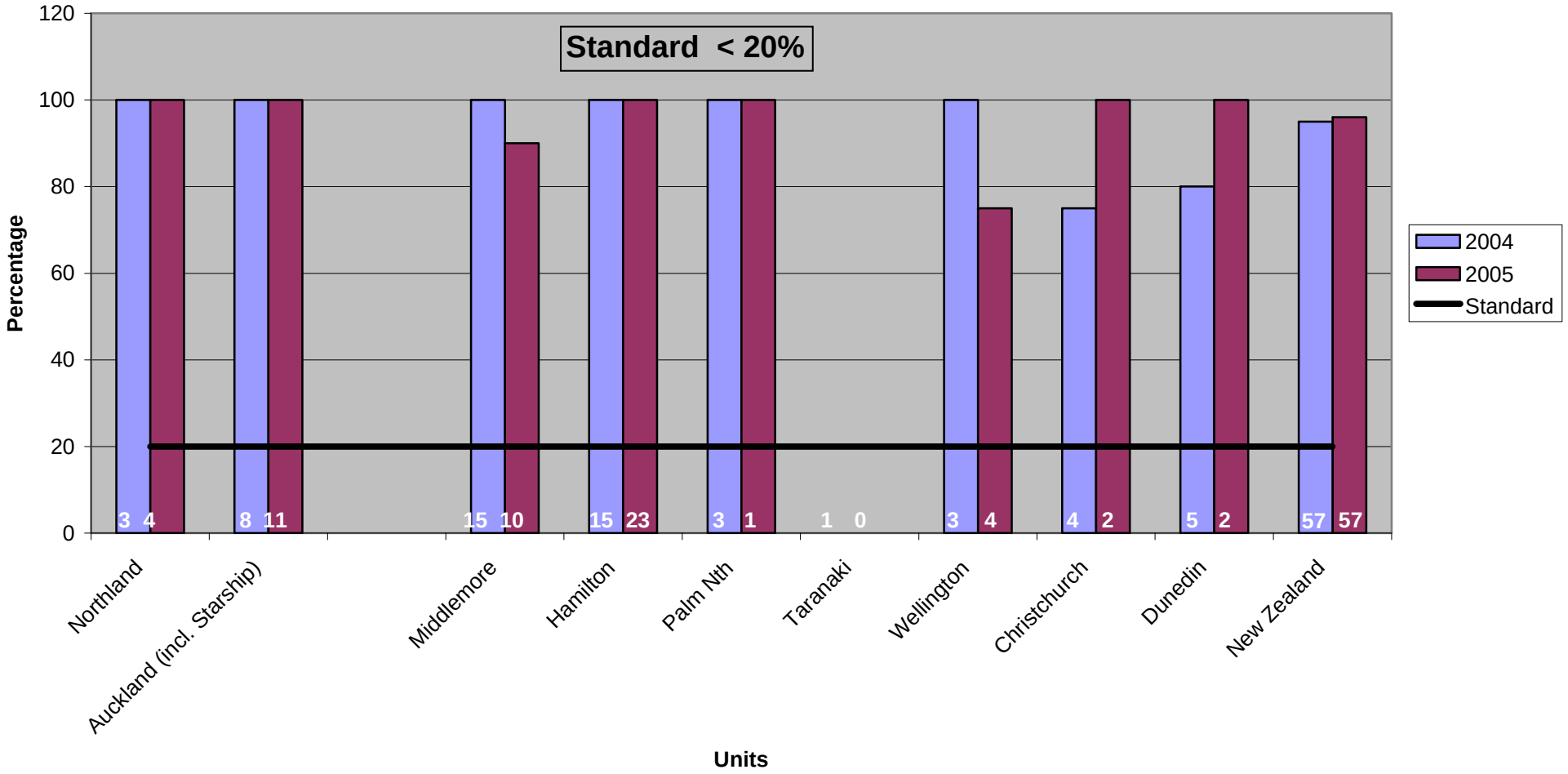
Percentage of non-late referred (<3 months) New Zealand HD patients starting HD with permanent access in 2004 & 2005 - AV fistula or AV graft

(number of patients shown in columns)



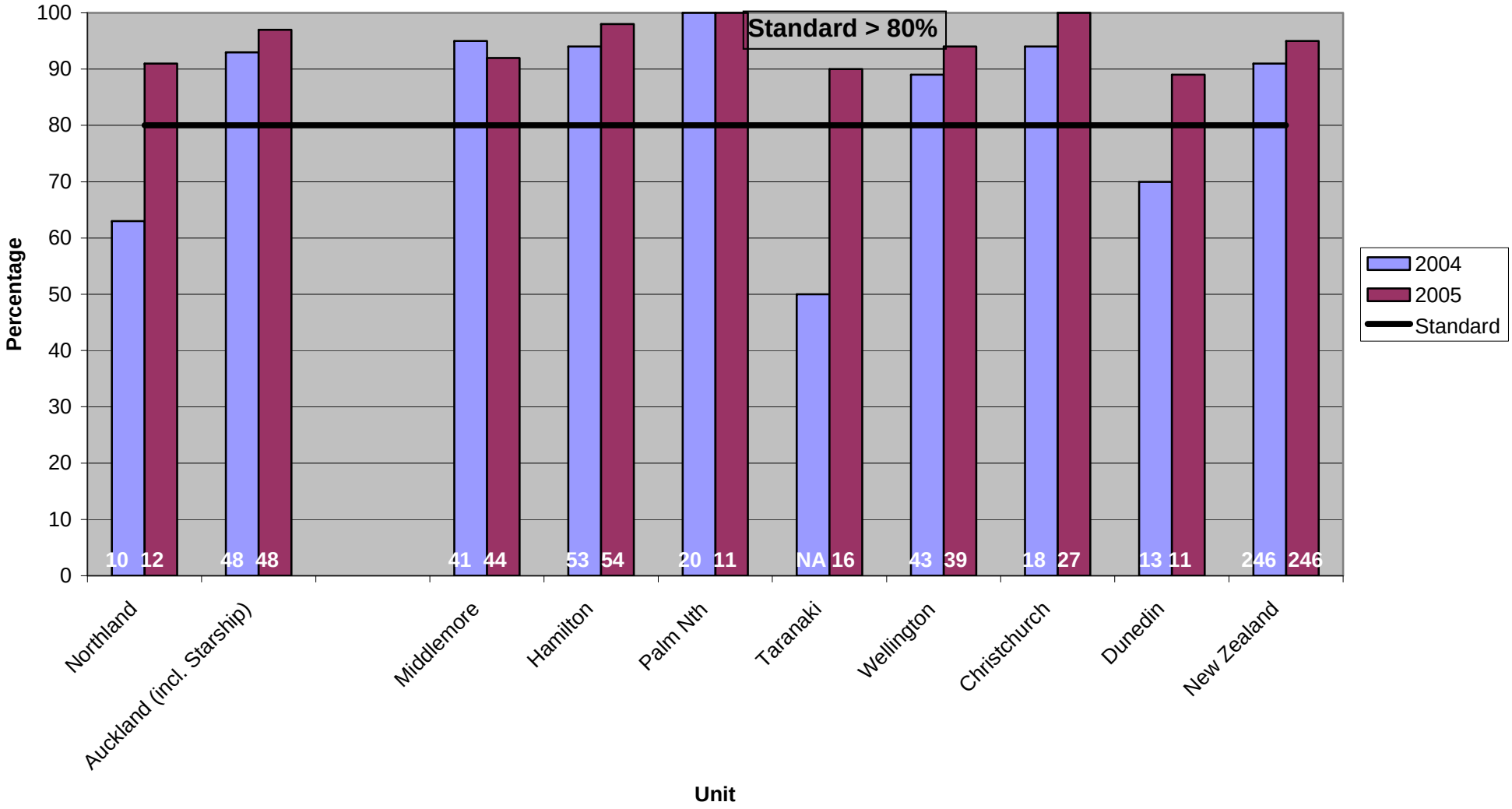
Percentage of incident New Zealand dialysis patients requiring HD for =<90 days via a temporary CVC before starting PD in 2004 & 2005

(number of patients shown in columns)

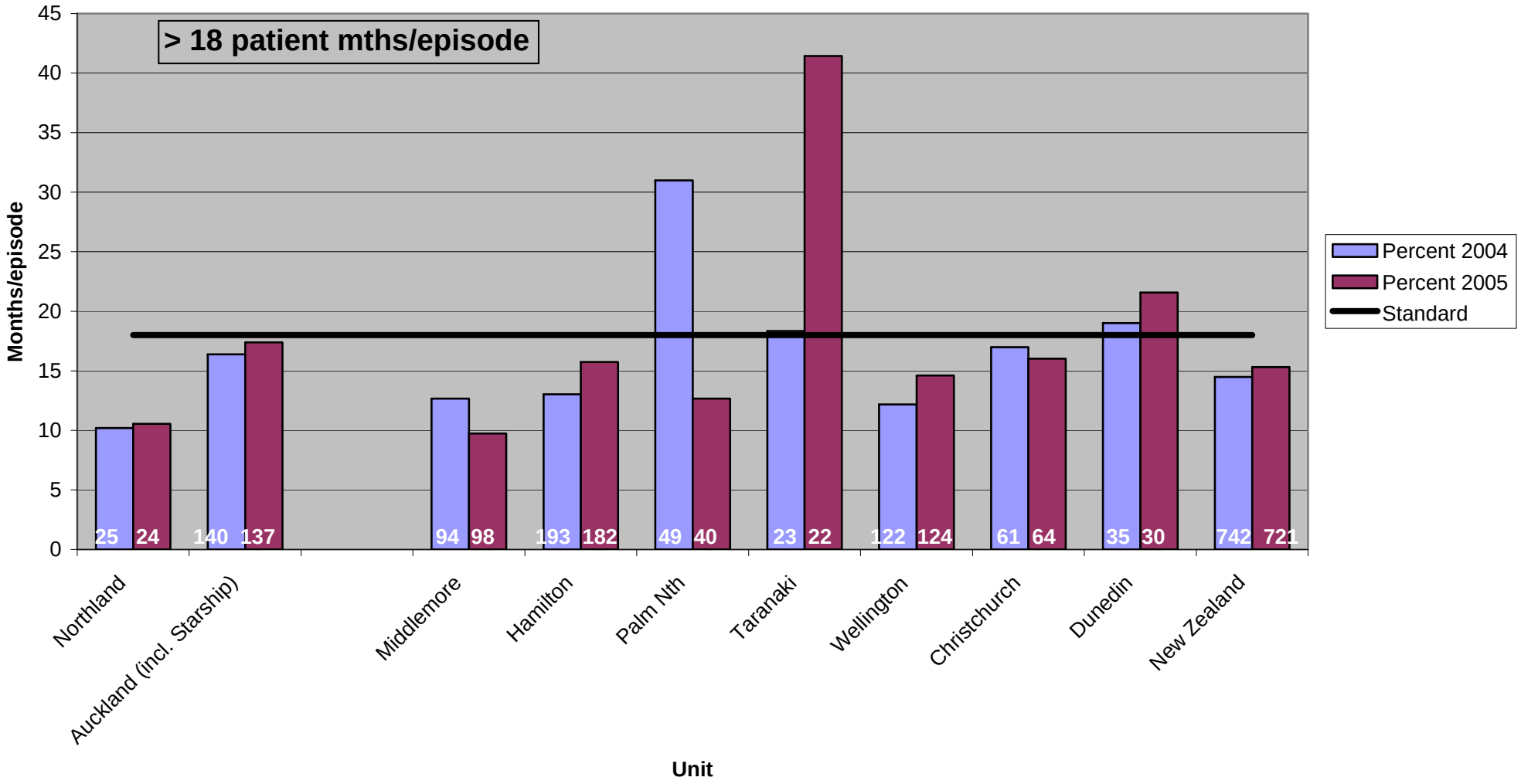


Percentage of first PD catheters in New Zealand PD patients that are functioning at one year for 2004 & 2005

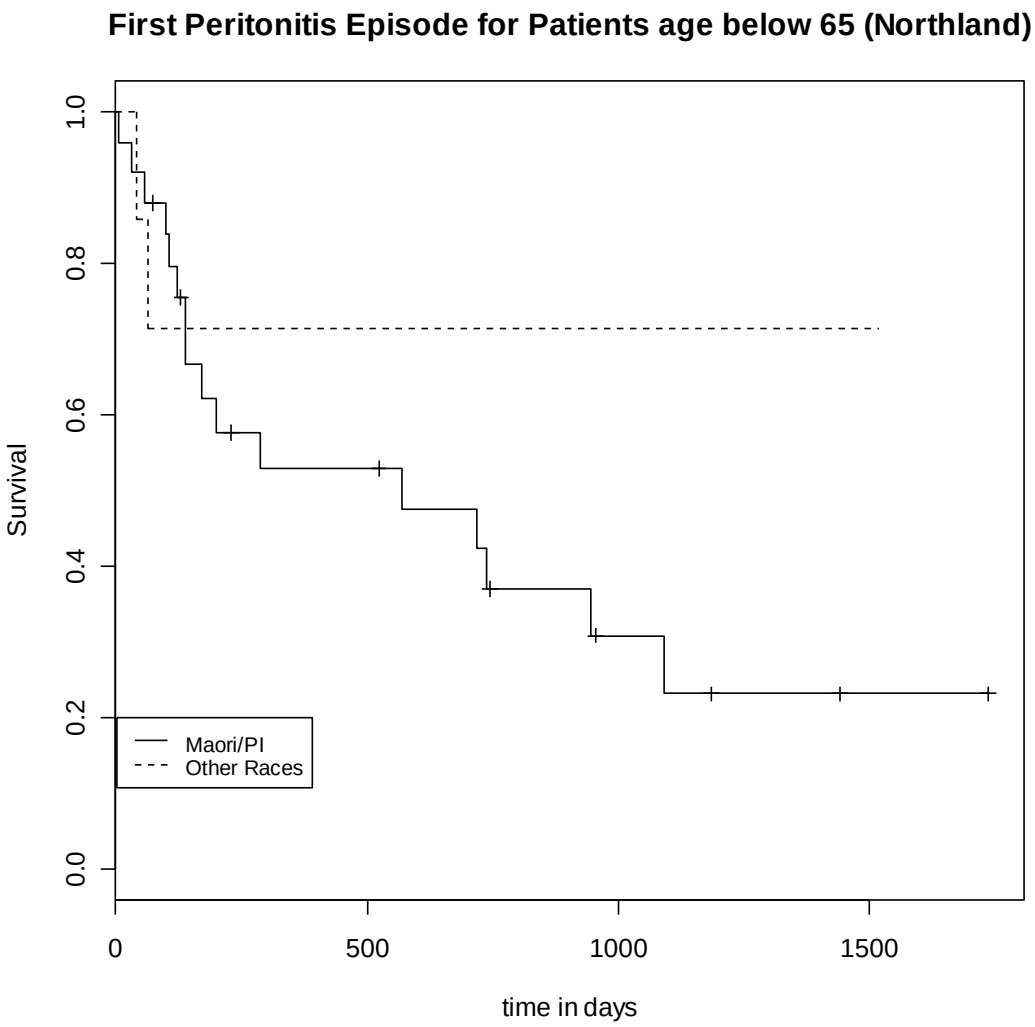
(number of catheters inserted shown in columns)

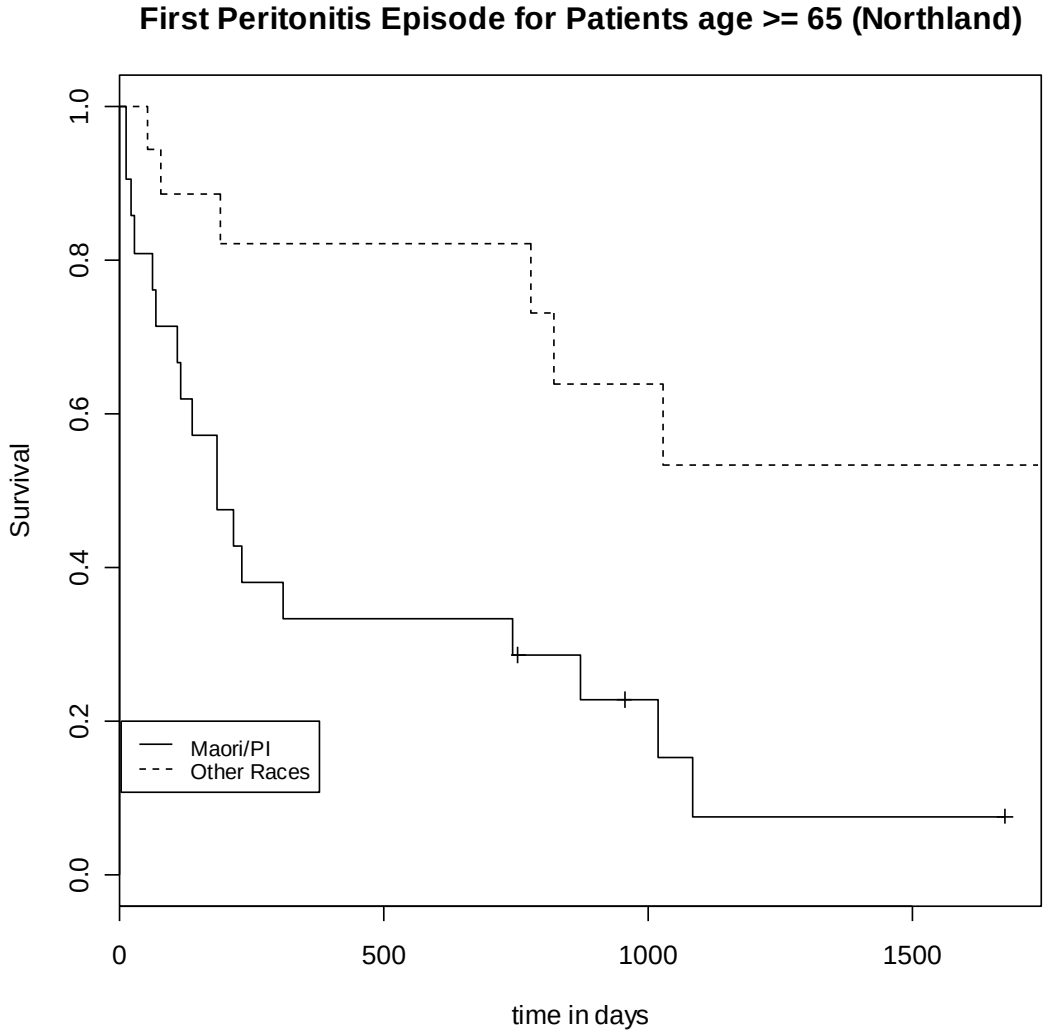


Peritonitis rates in New Zealand PD patients (months/episode) for 2004 & 2005
(number of prevalent patients shown in columns)



Peritonitis free survival for renal units in 2001-2005
Survival to peritonitis by age and ethnicity





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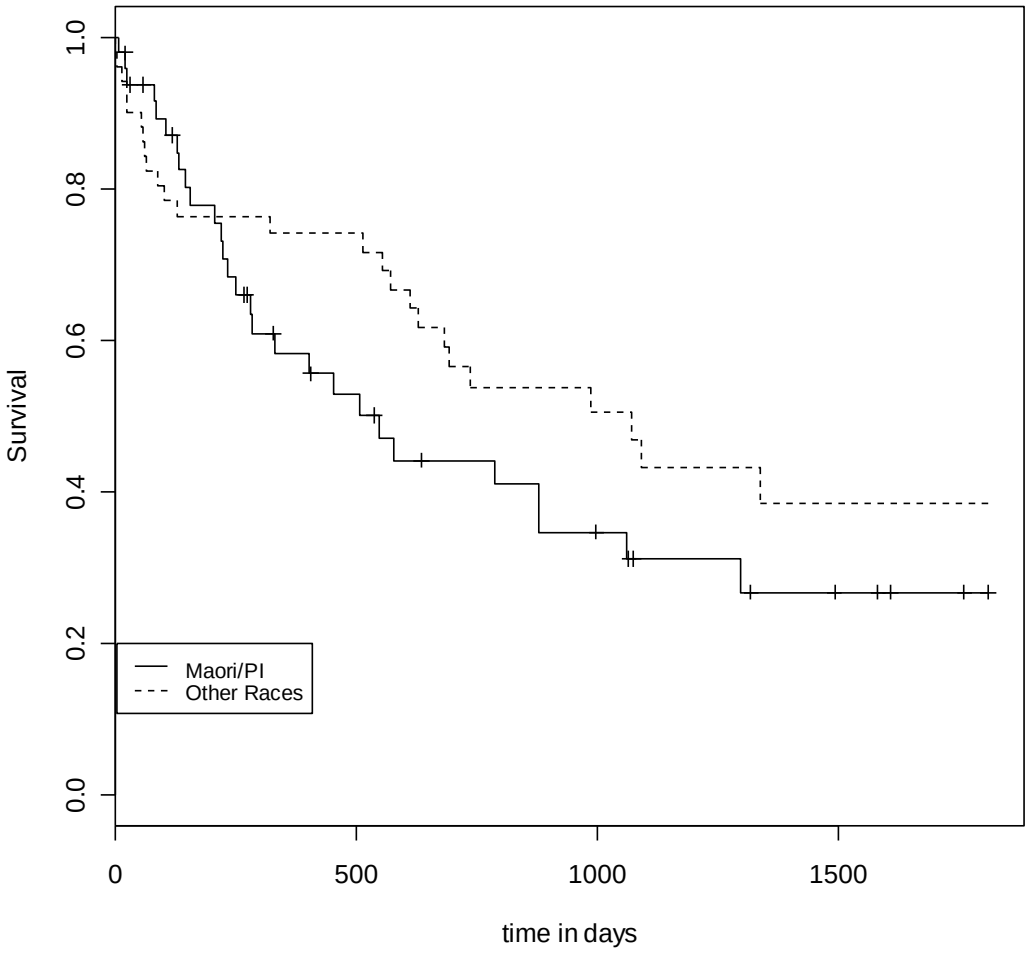
Survival to peritonitis by age and ethnicity

First Peritonitis Episode for Patients age below 65 (Auckland)



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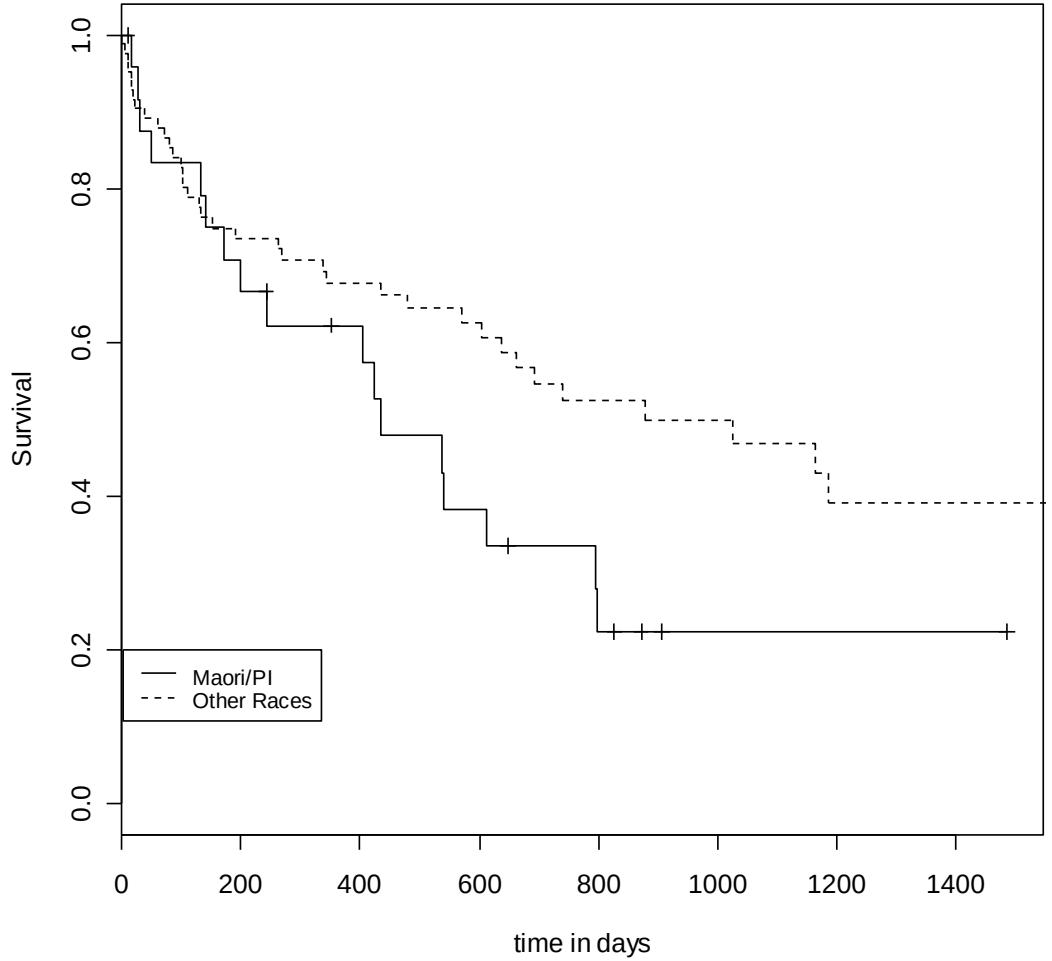

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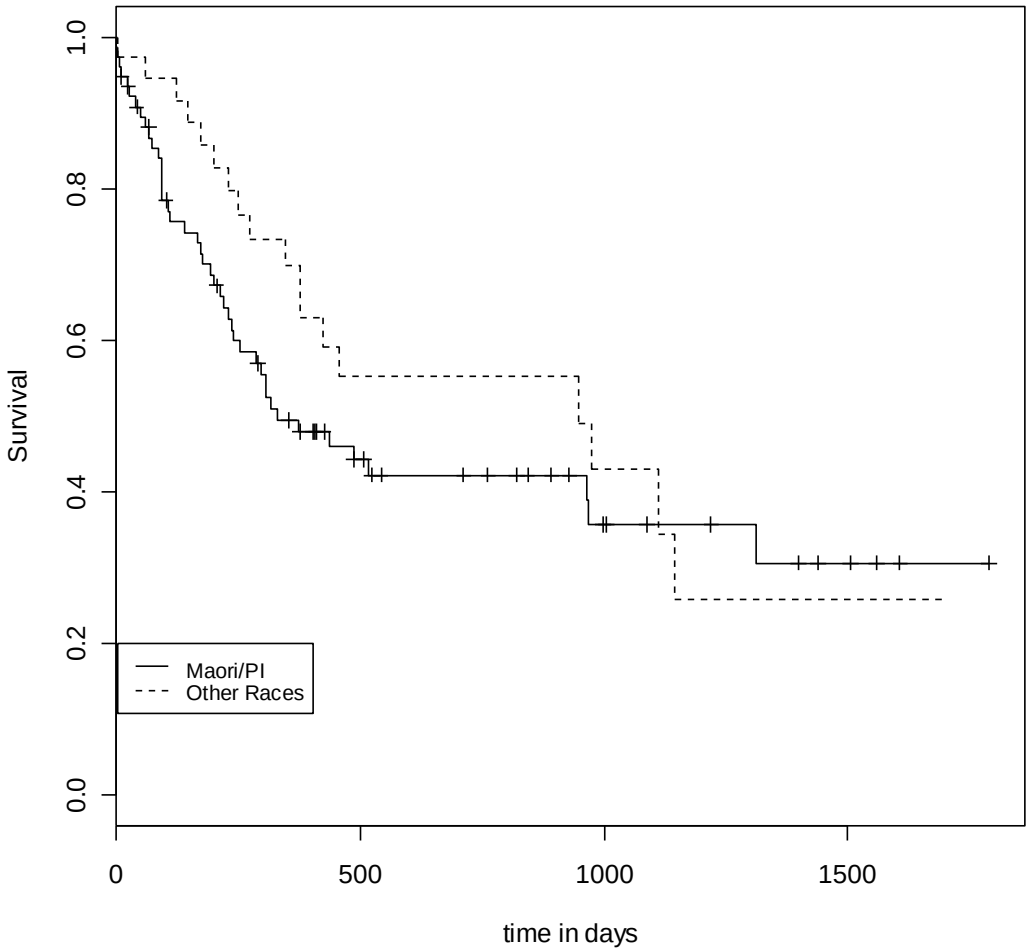
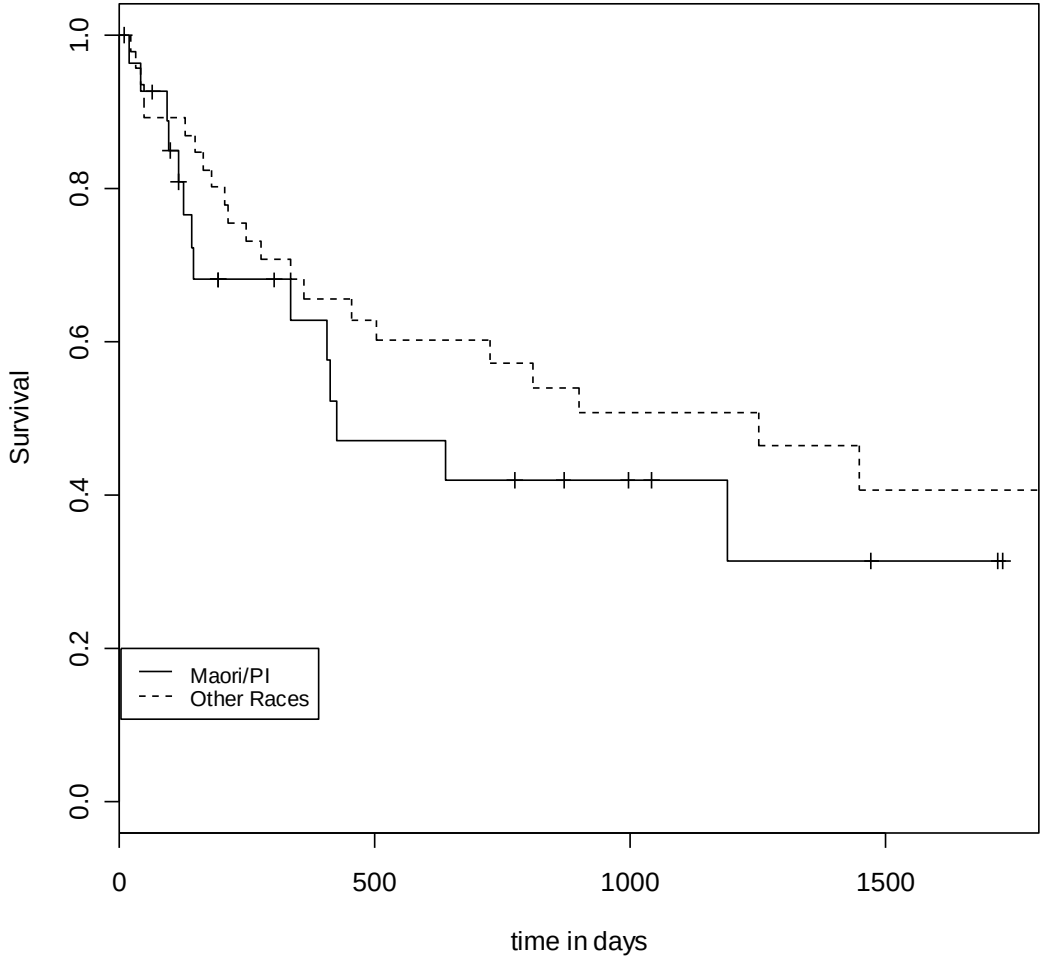
First Peritonitis Episode for Patients age below 65 (Middlemore)



First Peritonitis Episode for Patients age >= 65 (Middlemore)



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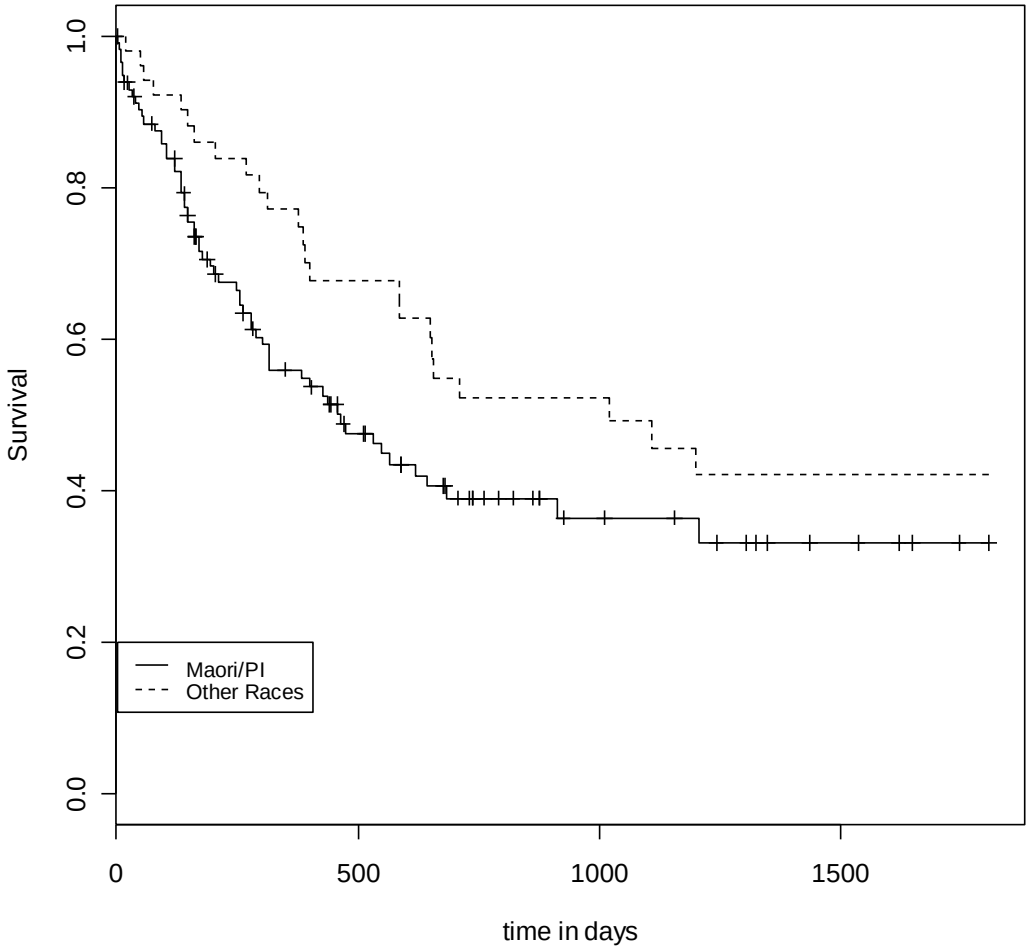
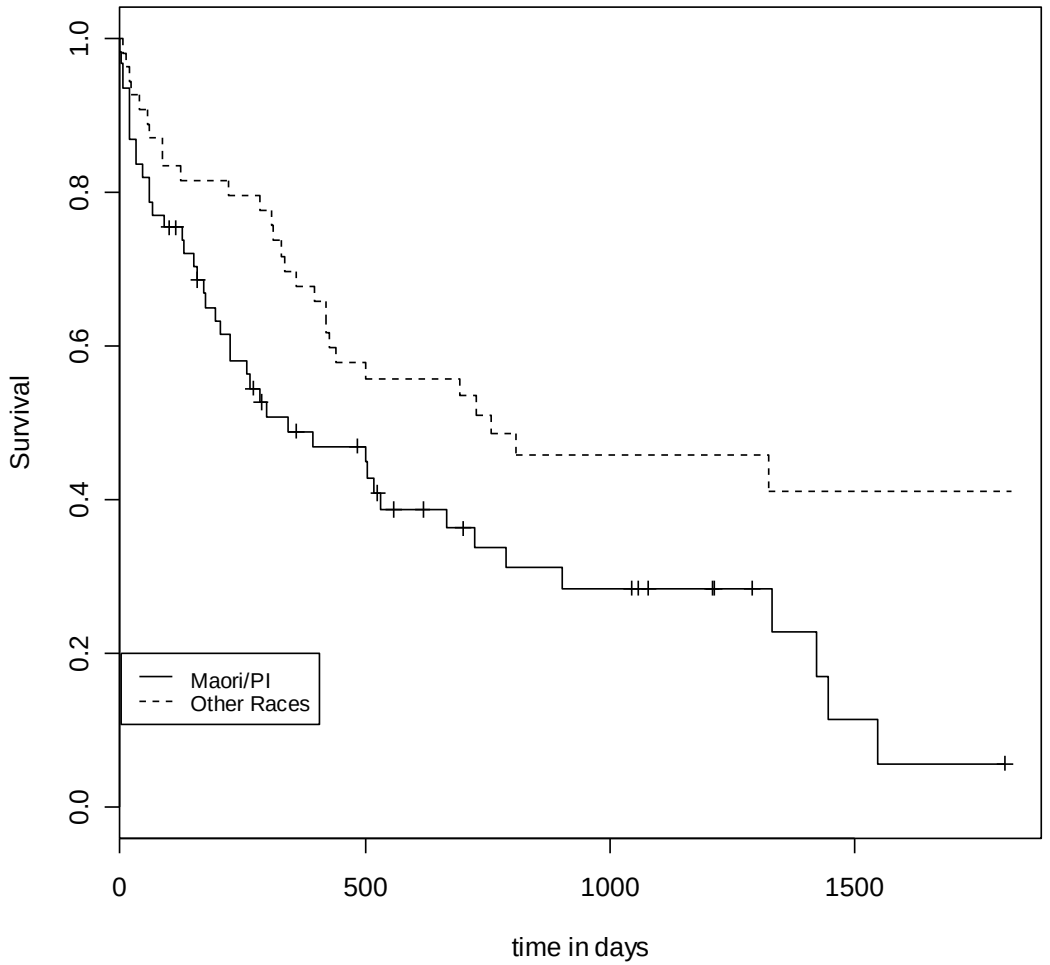
First Peritonitis Episode for Patients age below 65 (Hamilton)



First Peritonitis Episode for Patients age >= 65 (Hamilton)



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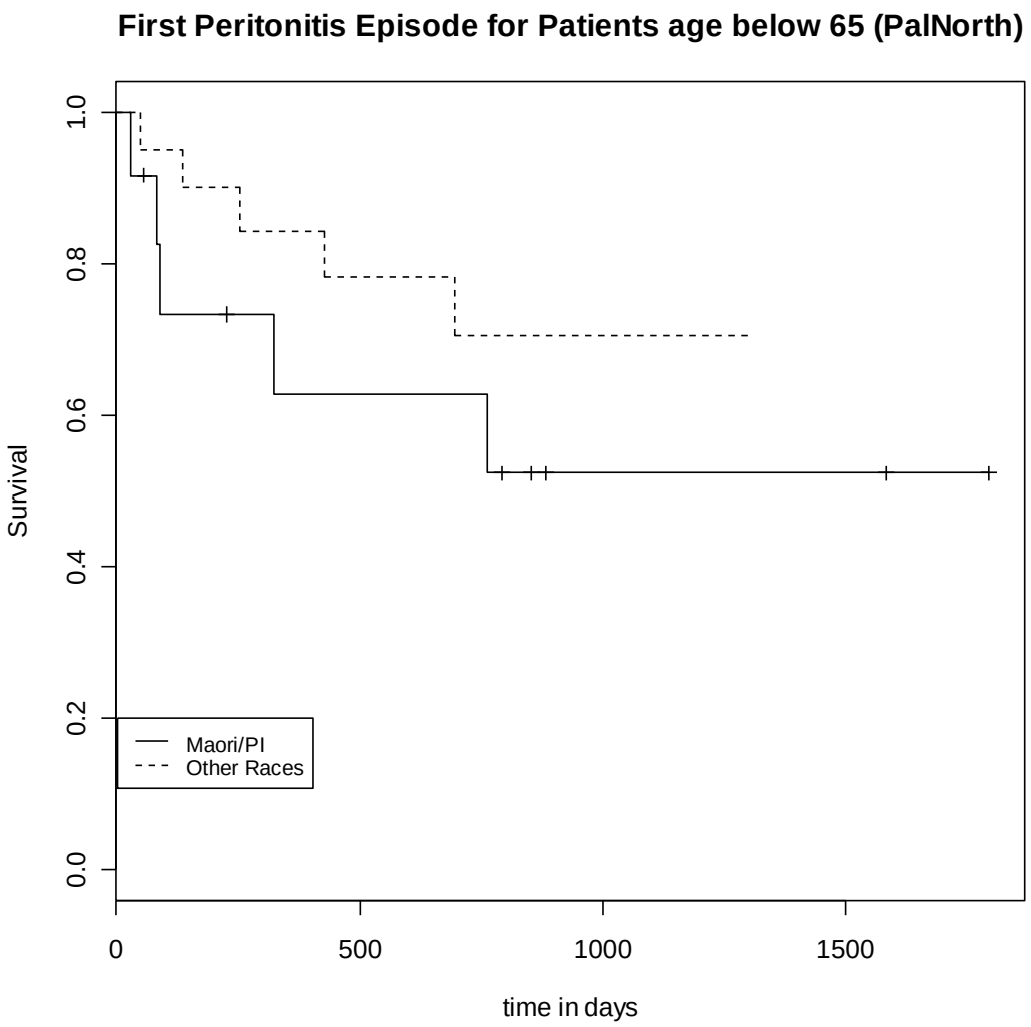
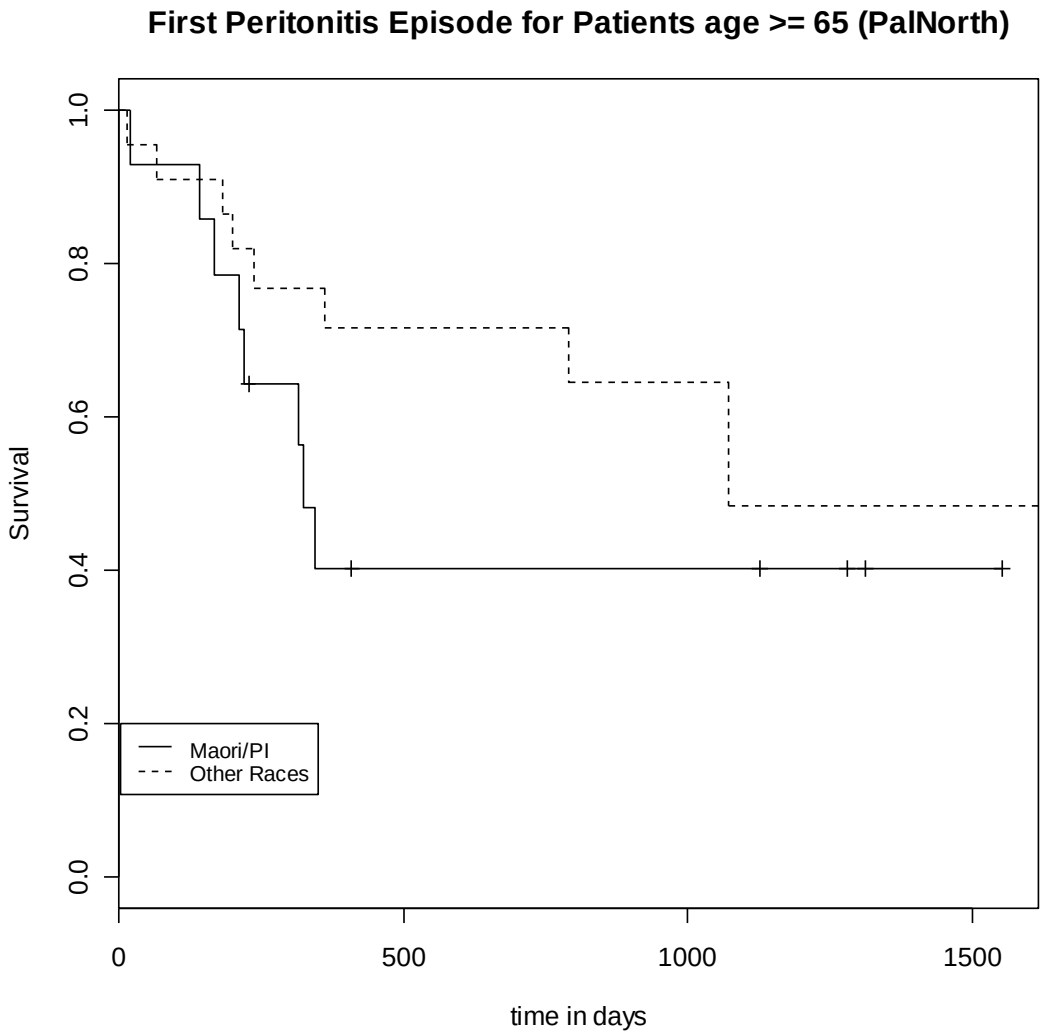
Survival to peritonitis by age and ethnicity





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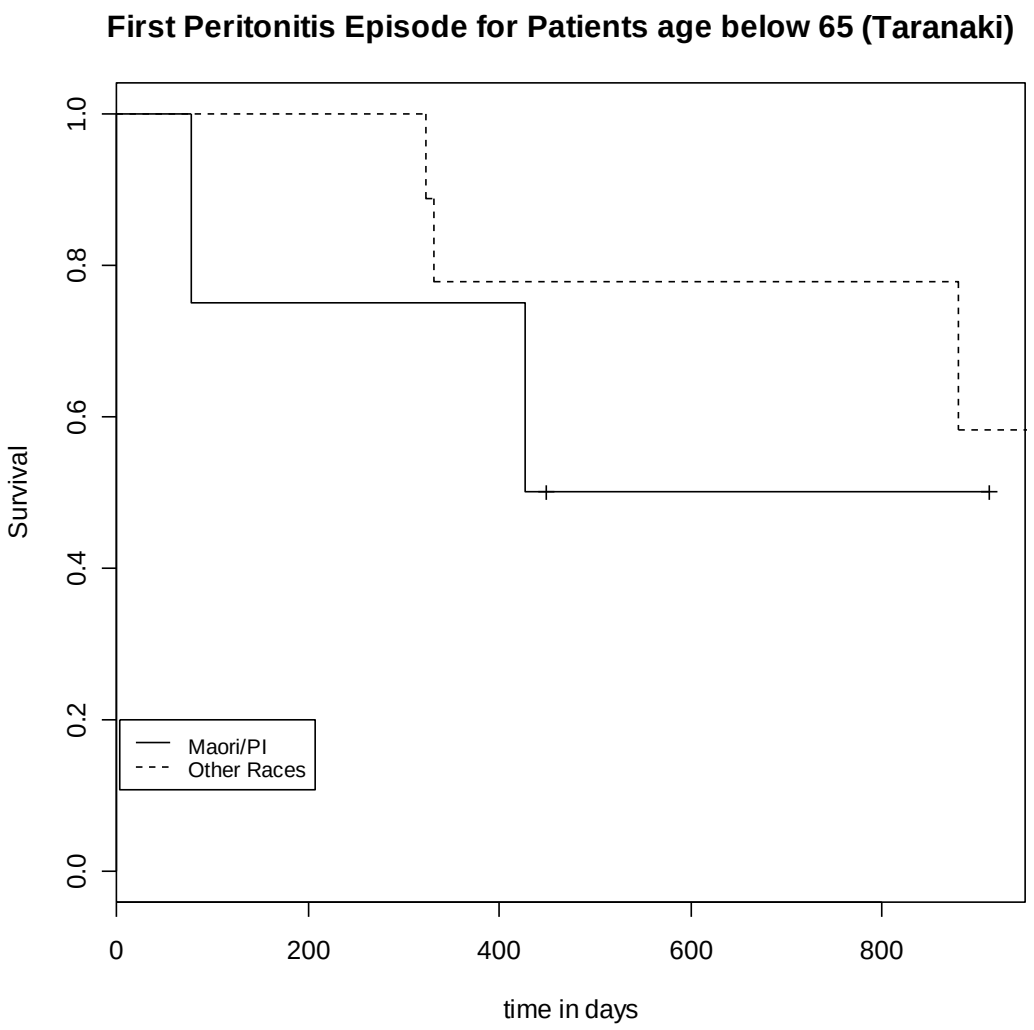

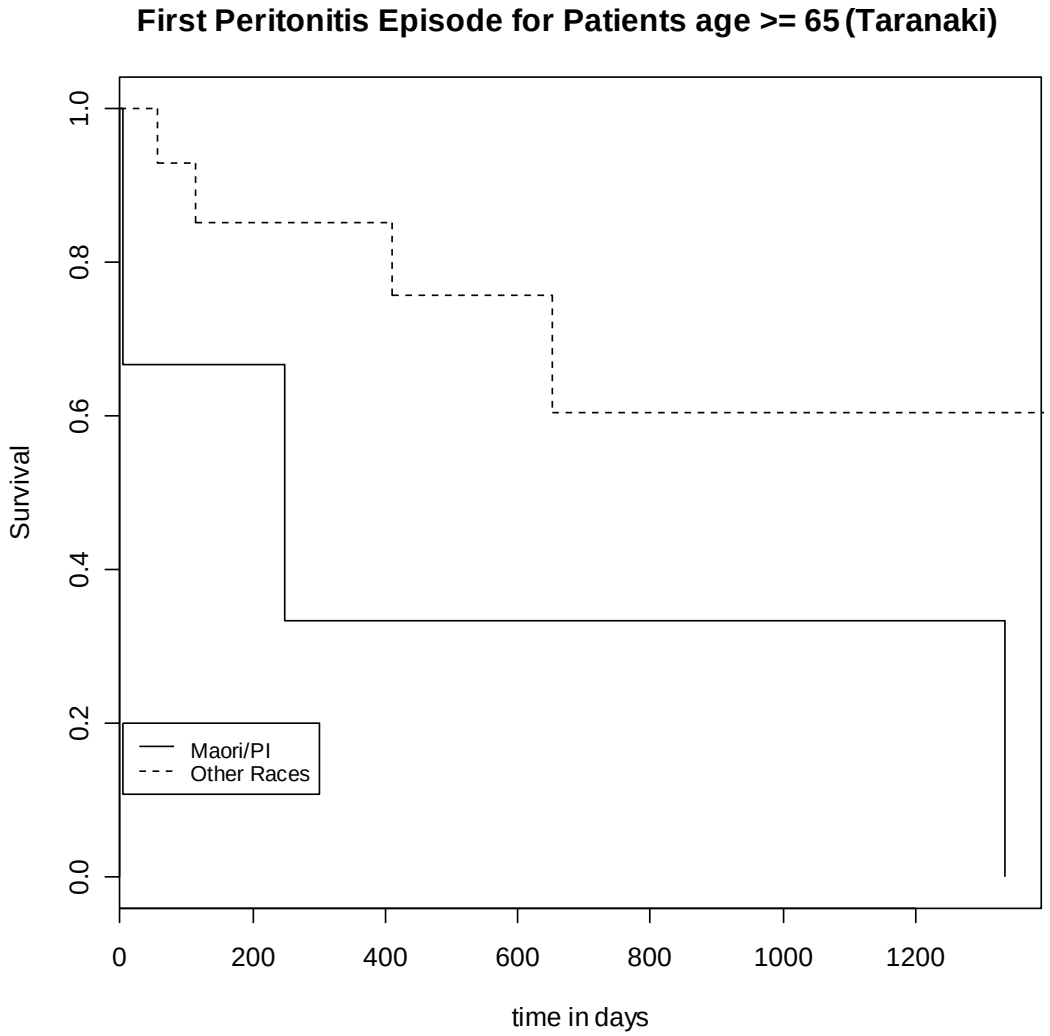

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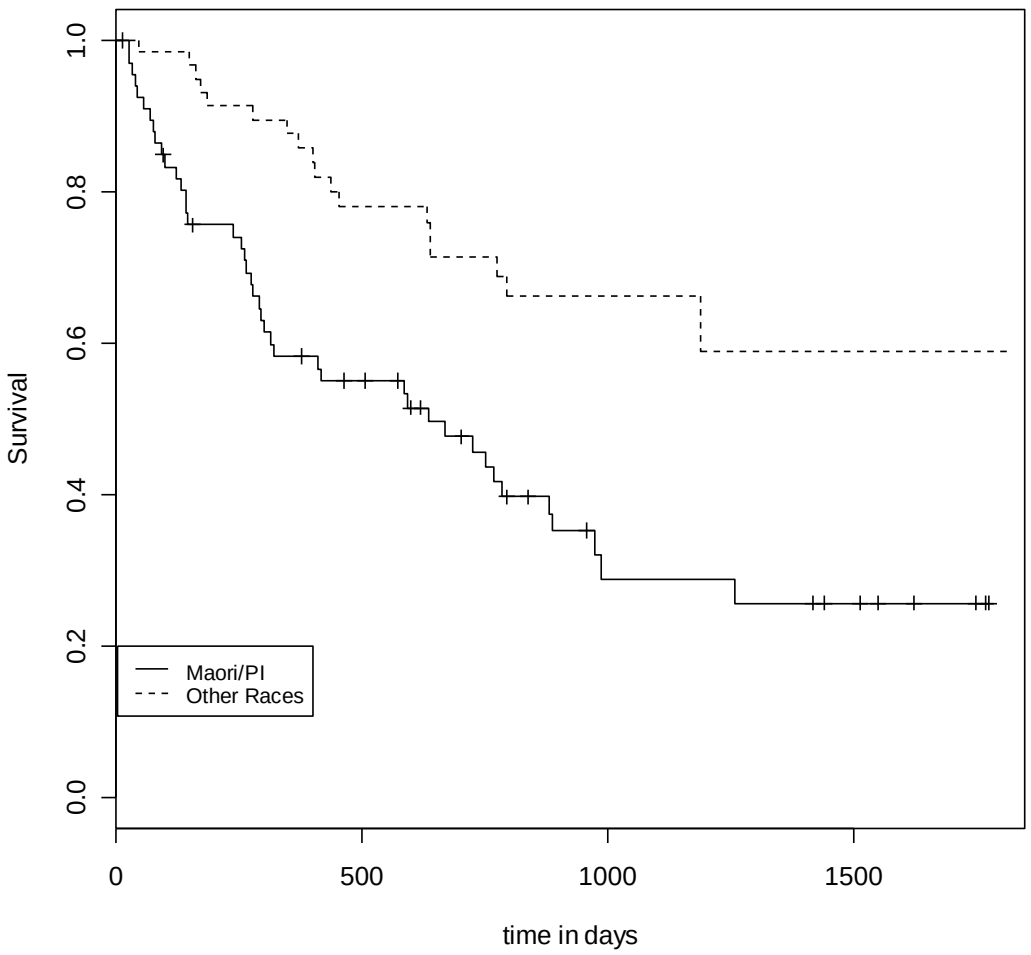
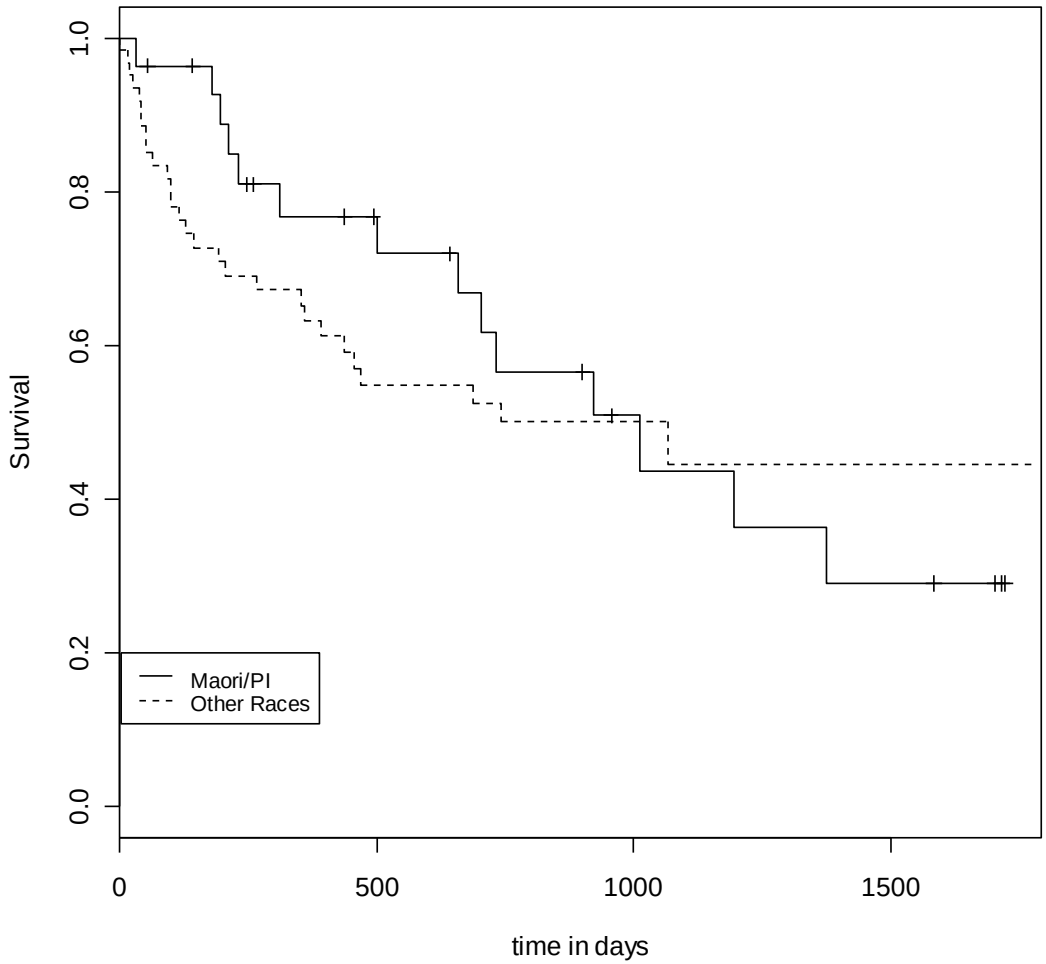
Survival to peritonitis by age and ethnicity

First Peritonitis Episode for Patients age below 65 (Wellington)

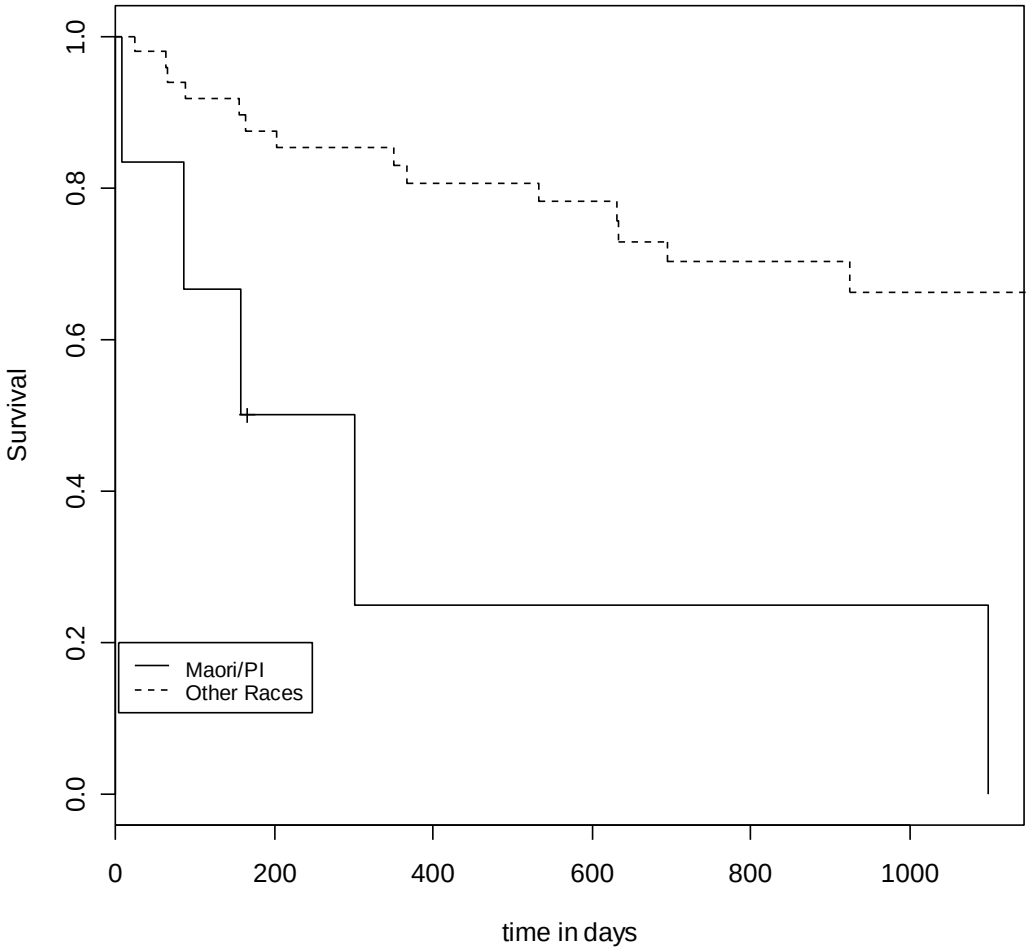


First Peritonitis Episode for Patients age >= 65 (Wellington)

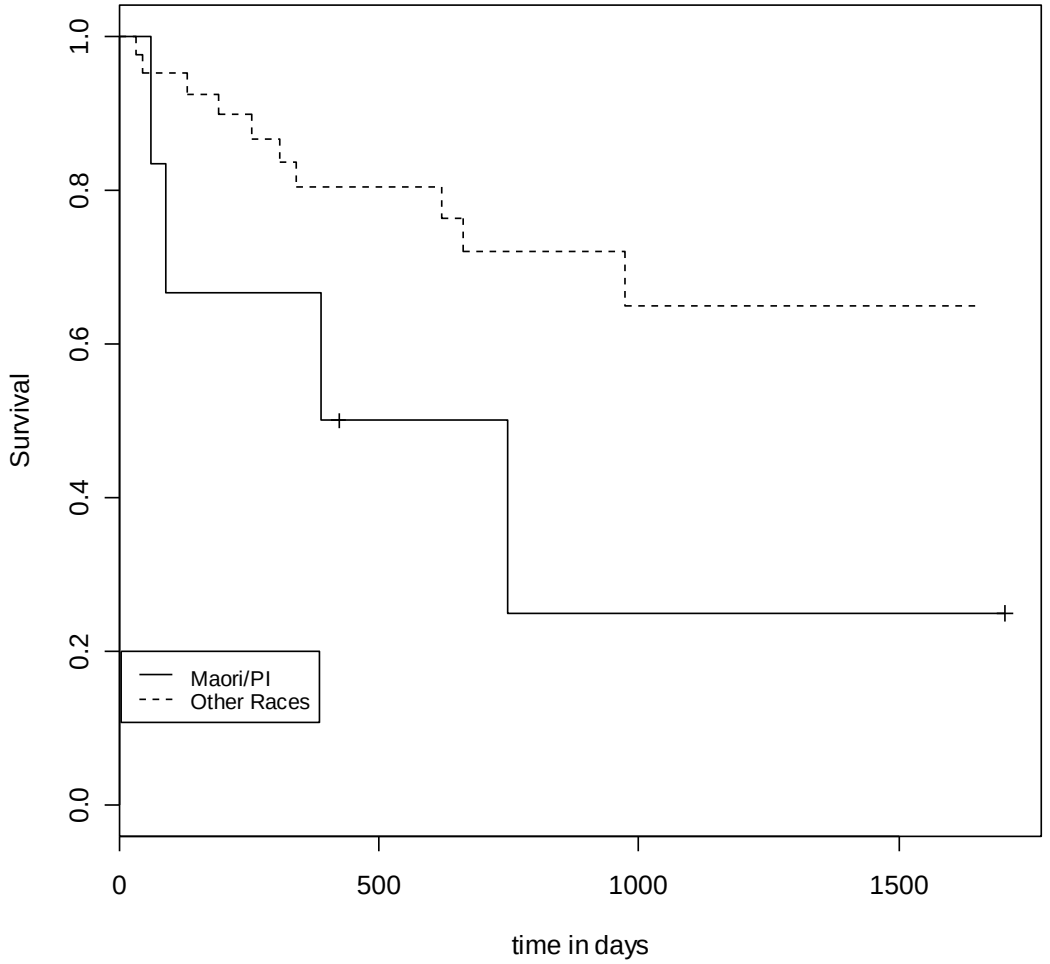


Peritonitis free survival for renal units in 2001-2005
Survival to peritonitis by age and ethnicity

First Peritonitis Episode for Patients age below 65 (Christchurch)



First Peritonitis Episode for Patients age >= 65 (Christchurch)



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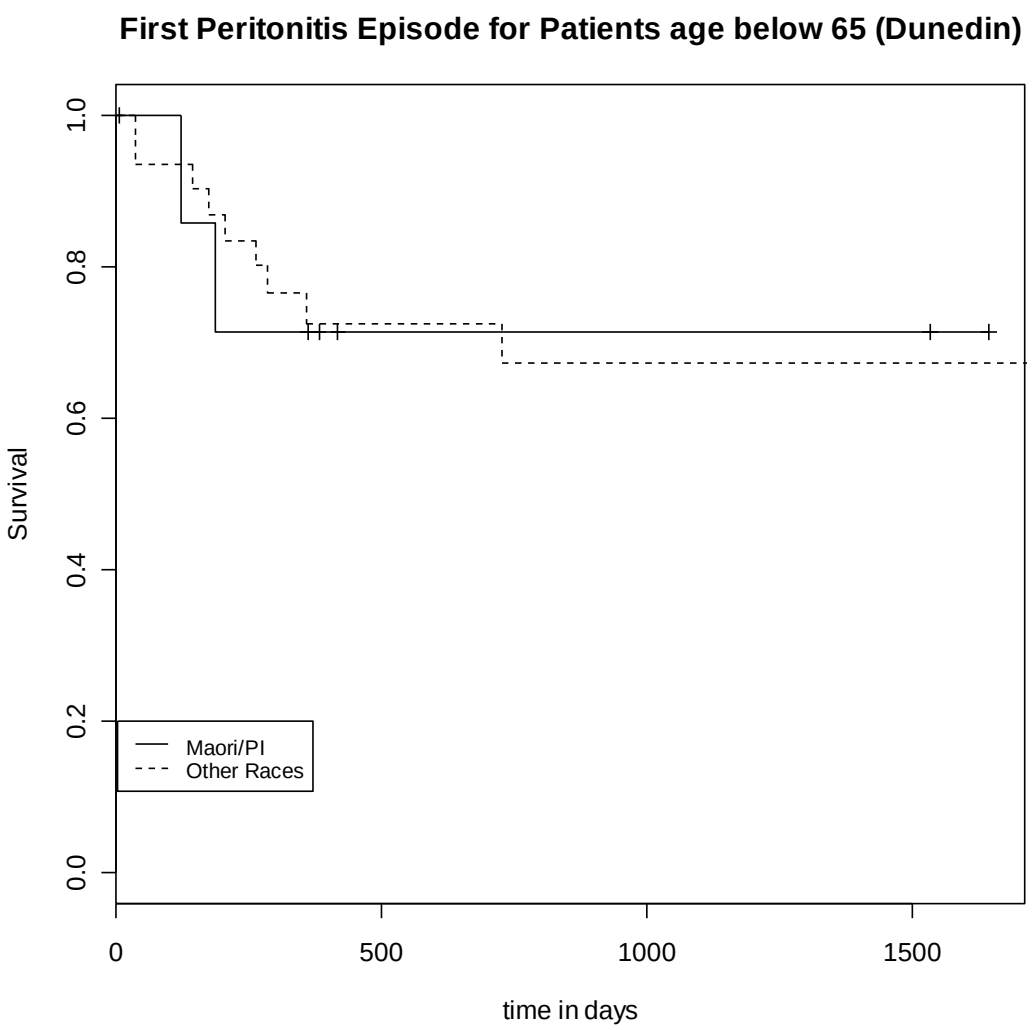
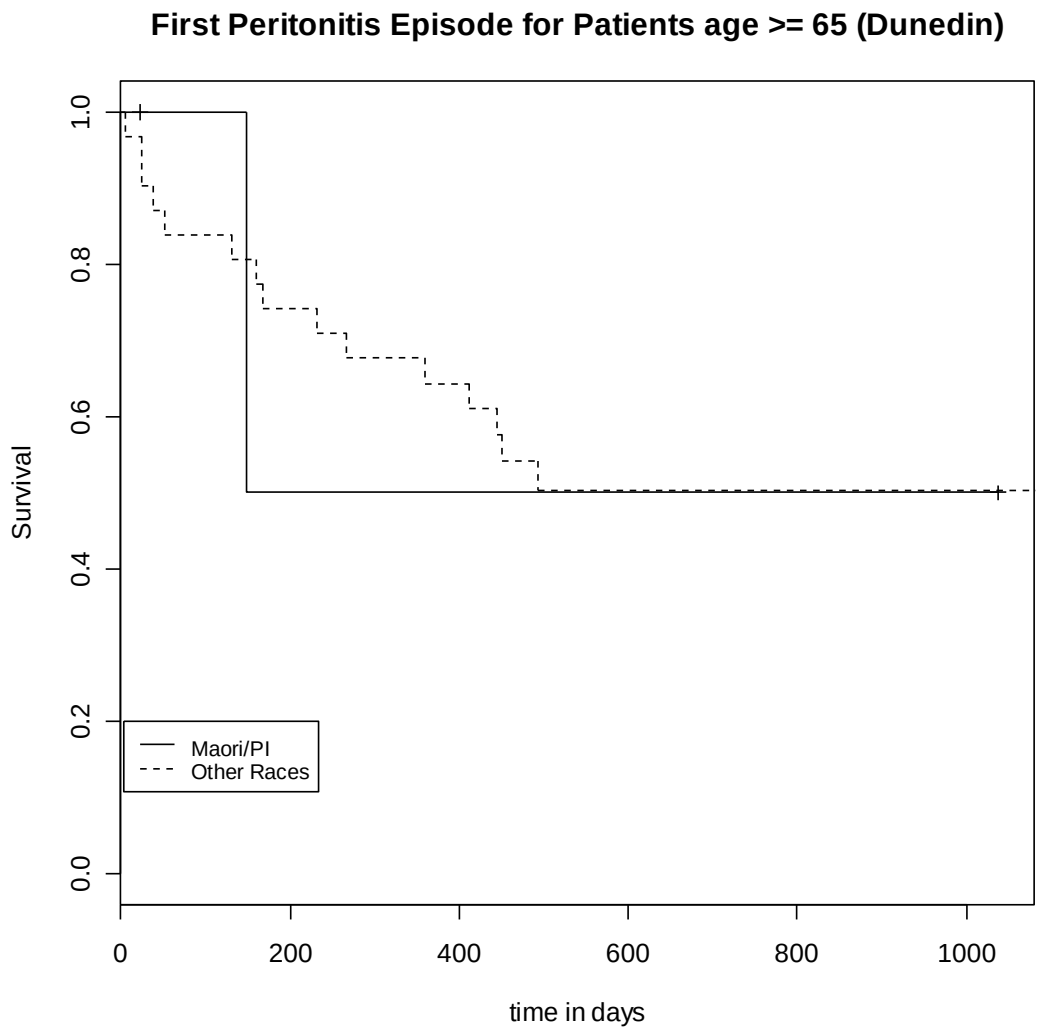
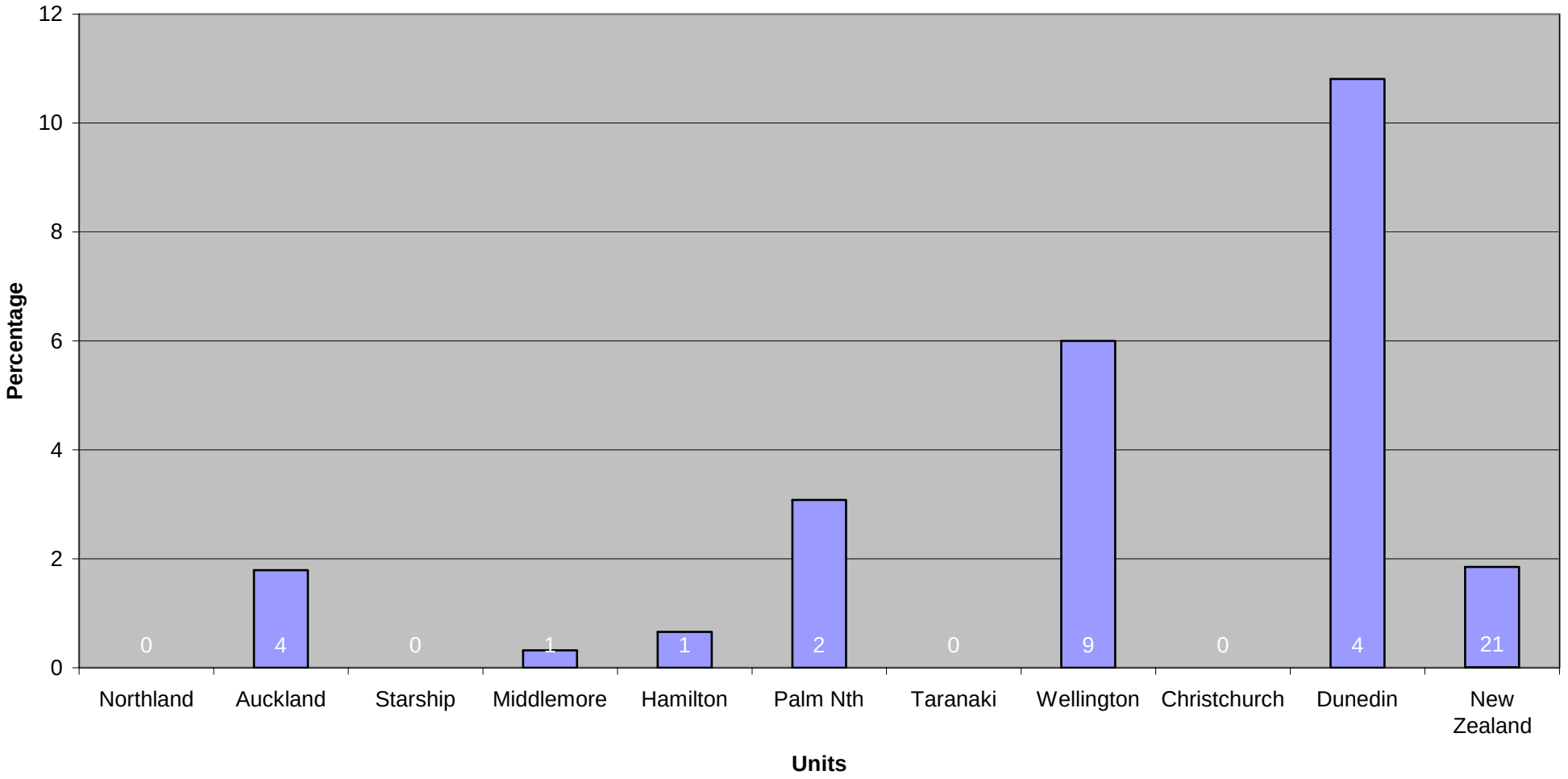
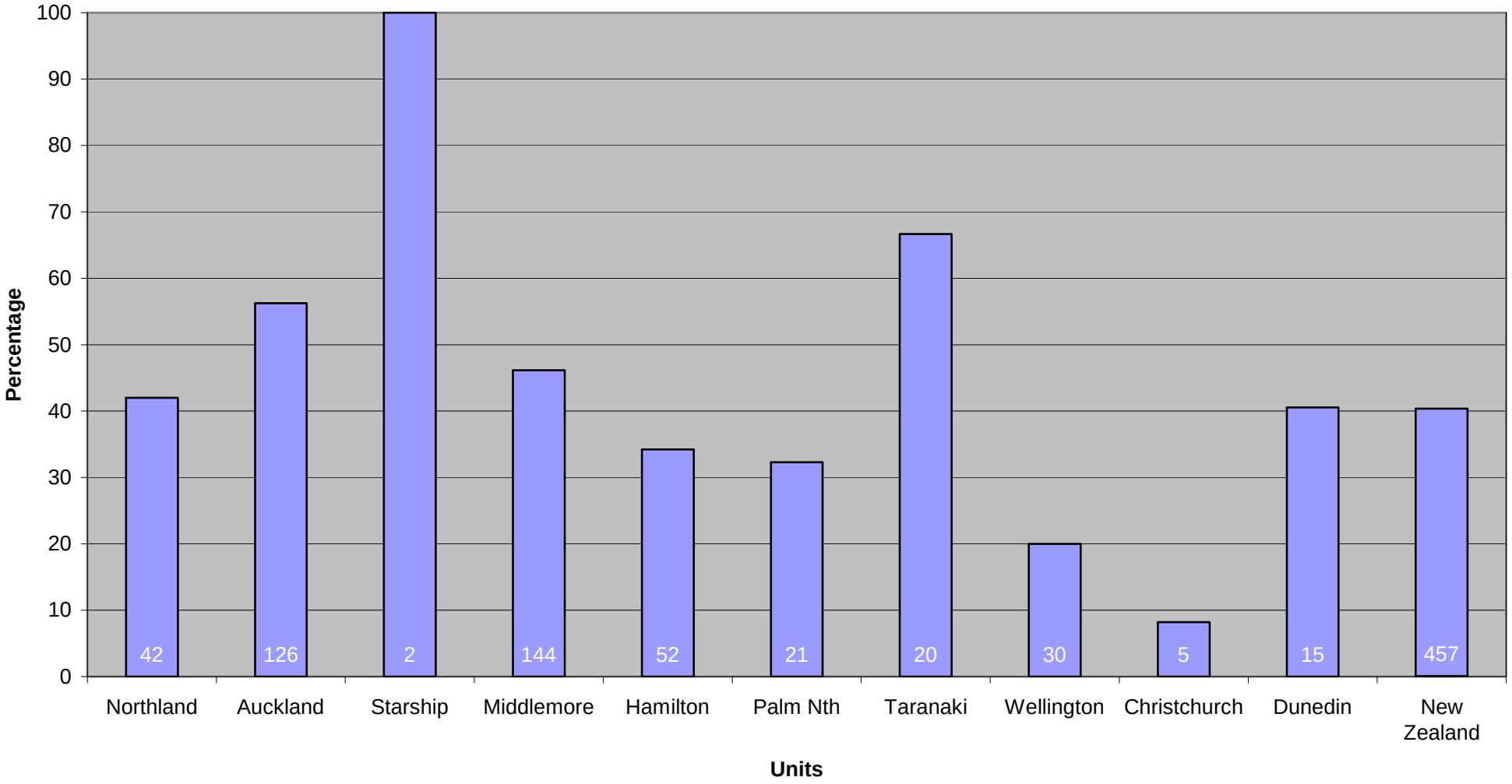




Percentage of HD patients - Treatment Frequency (< 3/week) for 2005
(number of patients shown in columns)

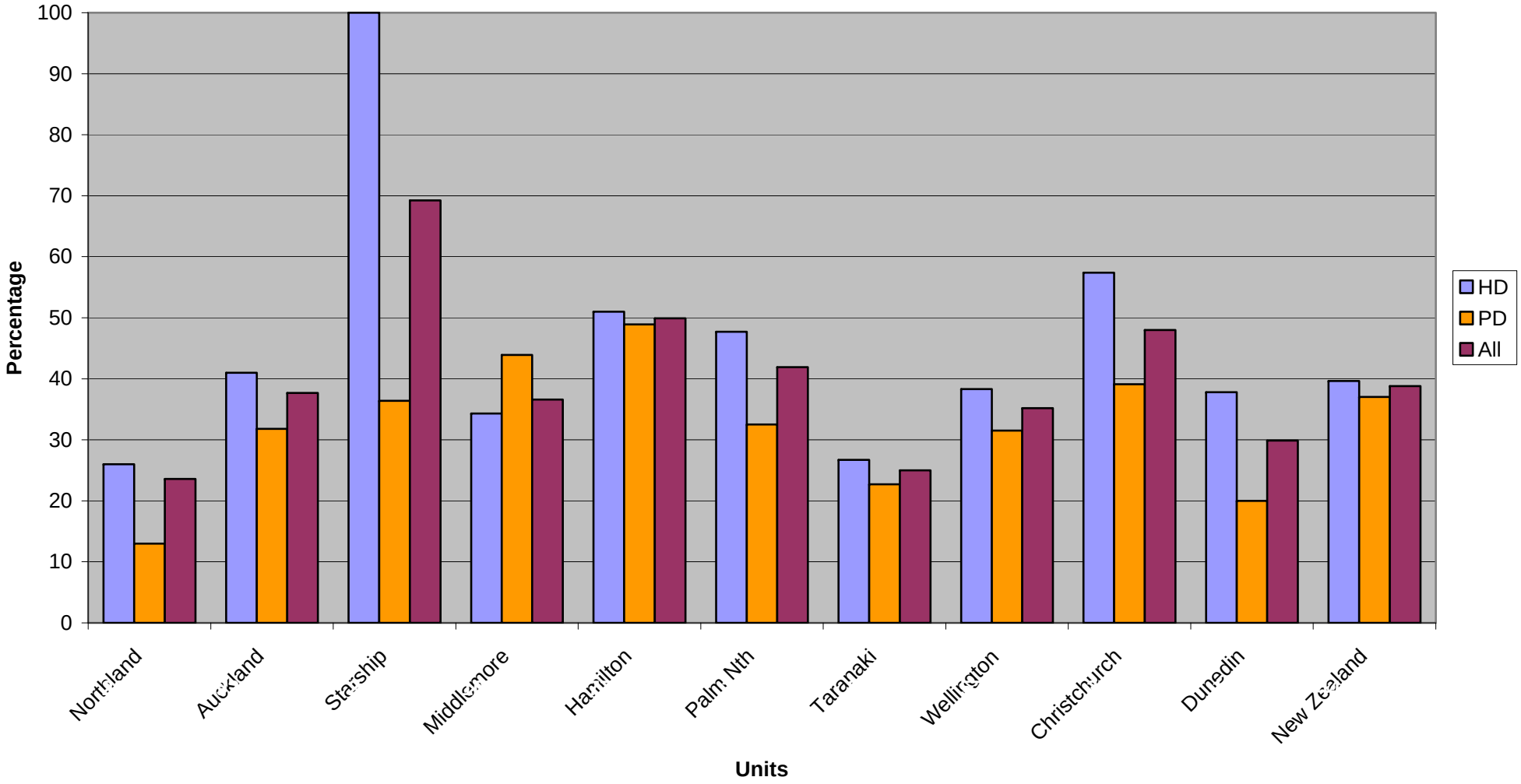


Percentage of Hdpatients - Session Length (< 4.5h/session) for 2005
(number of patients shown in columns)



Dialysis frequency and duration of session New Zealand 2005			
	Duration of dialysis treatment		
Dialysis frequency	**< 4 hours**	**> 4 hours**	**Total**
< 3/week	3	18	21
3 x weekly	32	1,010	1,042
> 3/week	16	54	70
Total	51	1,082	1,133

Percentage of dialysis patients with Hb Concentration (< 110g/l) at 31 Dec 2005
(number of patients shown in columns)



Commentary

- There continues to be a substantial variation between units in regard to initial and prevalent dialysis modality.
- The number of prevalent haemodialysis patients rose and the number on peritoneal dialysis fell during 2005.
- Forty percent of haemodialysis patients (457) receive less than 4.5 hours dialysis per treatment session.
- Thirty-two patients on thrice weekly dialysis are receiving less than 4 hours dialysis for each treatment session.
- Units should review the duration of dialysis treatment provided in light of data associating haemodialysis for <4.5 hours/session with poorer outcomes than for longer treatments.
- Although there is an increasing interest in the clinical benefits of increased frequency dialysis, only seventy haemodialysis patients are having more than 3 dialyses per week.
- **Eight of ten units** now achieve the standard for optimal vascular access (arteriovenous (AV) fistula + graft) for prevalent patients but only **one unit** for all incident patients and **none** meet the more stringent standard for non-late presenting patients.
- There has been a small fall in the number of prevalent haemodialysis patients using a vascular catheter for dialysis but only **one** renal unit has <10% of their patients using this form of vascular access.
- In both 2004 and 2005 57 patients received haemodialysis for up to 90 days before starting on peritoneal dialysis. Almost all of these patients had a dialysis catheter, rather than an AV fistula. Units may wish to review their policies regarding the placement of AV fistulae in all patients during work up for dialysis treatment.

- The continuing high rates of central venous catheter use are of concern because of the evidence that survival is inferior with this form of access when compared with an AV fistula.
- The influence that any changes that renal units have been able to make in the organisation and provision of surgical and radiological services for vascular access since the last audit report are not apparent.
- One year survival of first peritoneal dialysis catheters is excellent with all units achieving the standard.
- Peritonitis rates vary considerably. Two smaller units have achieved a rate of > 18 months/episode. Peritonitis rates for Maori and Pacific people are greater than for other ethnic groups.
- Dialysis patients with the anaemia of chronic renal failure and a haemoglobin concentration < 100g/L are entitled to receive subsidised epoietin. The target haemoglobin concentration for patients without overt cardiovascular disease is 110 – 130 g/L. The proportion of dialysis patients with a haemoglobin concentration < 110g/L was surprisingly high at 39% (719 patients).
- Near complete data on provision of vascular access was available from three units, all of which achieved the standards.
- Four units provided data on dialysis catheter related blood stream infections and all had rates < 4/1000 catheter days.
- The data related to provision of vascular and peritoneal access for incident patients suggest that units should review the effectiveness of their pre-dialysis programmes and in particular the co-ordination of vascular access assessment and provision.

References

1. Marshall MR, Byrne BG, Kerr PG and McDonald SP. Associations of hemodialysis dose and session length with mortality risk in Australian and New Zealand patients. Kidney Int 2006; 69: 1229–1236

2. Leonardi B, McDonald S for the Haemodialysis Working Group of ANZDATA Registry (Agar J, Kerr PG, Marshall MR). The Relationship between Practice Patterns and the Survival of Australasian Haemodialysis Patients. Presented at the Australia and New Zealand Society of Nephrology Annual Scientific Meeting, 2003. http://www.anzdata.org.au/

3. Piraino B, Bailie GR, Bernardini J et al. ISPD Ad Hoc Advisory Committee on Peritoneal Dialysis Related Infections. ISPD Guidelines/Recommendations. Peritoneal dialysis-related infections recommendations: 2005 update. Peritoneal Dialysis International 2005; 25: 107–131
http://www.ispd.org/treatment_guidelines.html

Appendix A: Circulation list

The National Renal Advisory Board

Standards and Audit Subcommittee

Heads of New Zealand Renal Units

Chief Executive Officers of DHBs with Renal Units

New Zealand Peritoneal Dialysis Registry

Australia and New Zealand Dialysis Registry

New Zealand Ministry of Health (Director General)

Australian and New Zealand Society of Nephrology

Renal Society of Australasia, New Zealand Branch

New Zealand Kidney Foundation

Board of Nephrology Practice New Zealand

Patient support groups/societies

Appendix B: New Zealand Dialysis Standards 2006

These standards and guides are appended to the Tier 2 Renal Service Specifications

http://www2.moh.govt.nz/QuickPlace/nsfl/PageLibraryCC256B4A00721041.nsf/e5674c2e19b044adcc256b4a0072264f/979f8da3bd94401ecc256ec80080bf40/?OpenDocument

Access to Dialysis Treatment

Recommendations

1. All centres providing dialysis treatments must do so under the direct supervision of a vocationally registered and credentialled nephrologist.
2. All centres must provide access to both haemodialysis (HD) and peritoneal dialysis (PD).
3. All centres to provide access to both independent (home/self care) and dependent (in-centre/caregiver assisted) HD.
4. All centres must offer either directly, or indirectly, a conservative care program for those who decline an offer of dialysis.
5. All centres must ensure that patients have access to transplantation services.
6. All centres must offer at least a 3 times a week HD schedule for those with minimal residual renal clearance.
7. HD treatment duration, frequency and modality should be determined according to clinical need. These modalities may include, but are not necessarily limited to, daily or nocturnal schedules, and high flux dialysis.
8. HD services must be provided to patients by appropriately qualified medical, nursing, technical, and clerical personnel.
9. Clinical dialysis staff and technicians should be certified or credentialled by an appropriate professional body.

Audit standards[1]

1. Dialysis modality for incident and prevalent patients (ANZDATA)
2. No HD patients dialysing for less than four hours per session or less than three times weekly and Kt/V less than 1.2 or urea reduction rate (URR) <65%. (ANZDATA)

Vascular Access for Haemodialysis (HD)

Recommendations

1. Renal units must have access to appropriate vascular surgical services.
2. An arteriovenous fistula (AVF) is the vascular access of choice.
3. Preference should be given to formation of an AVF before placement of an arteriovenous graft (AVG) or permanent central venous catheter (CVC) (preferred order of provision).
4. New (incident) HD patients should have a functioning AVF or AVG at commencement of dialysis.
5. Patients should be referred for vascular access formation when the estimated glomerular filtration rate (eGFR MDRD) [2] is <25mls/min or within 6 months of anticipated need for dialysis.
6. If it is anticipated that a CVC will be required for HD for more than 3 weeks a tunnelled cuffed catheter is preferable to a non-tunnelled line.
7. Placement of CVCs should ideally be with ultrasound or fluoroscopy guidance.

Audit standards

1. At least 70% of prevalent HD patients dialysing via AVF. (ANZDATA).

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[1] *Source of data in brackets e.g. ANZDATA*

2 MDRD equation. GFR (ml/min/1.73m^2)= 0.021 x serum creatinine$^{-1.154}$ (µmol/L) x age$^{-0.203}$ (x 0.742 if female)

2. Less than 10% of HD patients dialysing using a central venous catheter (CVC) as their permanent access. (ANZDATA)
3. More than 50% of incident HD patients commencing dialysis with a functioning AVF or AVG. (ANZDATA)
4. More than 80% of non-late referrals[3] commencing HD with a functioning arteriovenous fistula or graft. (ANZDATA)
5. Less than 20% of patients on vascular surgery waiting list greater than 2 months from date of referral. (Renal Units)
6. Estimated glomerular filtration rate (eGFR) by modified MDRD equation at time of referral for first vascular access formation. (Renal Units)
7. Incidence of <4 episodes of CVC blood stream infection per 1000 catheter days. (Renal Units)

   Defined by the following:

   a) Use of central CVC for HD,

   b) blood stream infection (BSI) is considered to be associated with a central line if the line was in use during the 48-hour period before development of the BSI. If the time interval between onset of infection and device use is >48 hours, there should be compelling evidence that the infection is related to the central line.[4]

[3] *Late referrals defined as referral to a nephrologist less than 3 months before 1st treatment. It is acknowledged that it is difficult to achieve late referral rates less than 30%*

[4] *Centers for Disease Control and Prevention. Guidelines for the Prevention of Intravascular Catheter-Related Infections. MMWR 2002;51(No.RR-10):28.*

Peritoneal Dialysis (PD)

Recommendations

1. Automated Peritoneal Dialysis (APD) should be available as an alternative to Continuous Ambulatory Peritoneal Dialysis (CAPD) for patients with inadequate solute clearances or ultrafiltration failure (high transporter membrane type) on CAPD or for significant psychosocial reasons.
2. New PD patients should have a PD catheter placed 2-4 weeks prior to their requiring dialysis.
3. Renal units must have access to appropriate Surgical and/or Radiological services for PD catheter implantation.
4. Icodextrin peritoneal dialysate should be available for use when clinically indicated.
5. Units must have policies and procedures to minimise the rate of peritonitis on APD/CAPD.

Audit standards

1. Percentage of total PD patients on APD. (ANZDATA)
2. Less than 20% of incident patients requiring interim HD via a temporary CVC before starting PD. (ANZDATA)
3. Peritonitis rate of > 18 patient months/episode.
4. More than 80% of catheters functioning at 1 year. (NZPD Registry)
5. Percentage of total PD patients using Icodextrin. (Renal Units)

Dialysis facilities standards[5]

(These standards apply primarily to hospital and satellite HD centres. It should be noted that for training facilities involving home based therapies, an environment equivalent to a domestic situation would be acceptable.)

Lighting

1. 500 lux shadowless light positioned to cater for individuals or focussed activity such as cannulation (NZ Building code).
2. Less than 100 Lux for general purpose unit lighting (NZ Building code).
3. Wherever possible ceiling and wall light fittings should be recessed so that they are flush with the surrounding surface to prevent dust collection and minimise cleaning needs (Design considerations for Infection Control 9.6)
4. Emergency lighting of 3 lux for at least 10 minutes duration must be available to enable evacuation of building. This can be separate lighting or part of existing lighting but attached to battery back up (NZ Building code).
5. Battery torches should be kept on the premises (NZ Building code).
6. Systems to deal with power failure should be available.

Controlled environment

1. Either open windows or mechanical ventilation to be used (NZ building code). The ability to adjust environment locally can be advantageous and should enable staff to function and carry out their duties.
2. The air change rate should be capable of removal of odours.

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[5] *Design consideration for Infection Control: the Technical Advisory Centre for Health Facilities, New South Wales Hospital Planning Advisory Centre, Australia, April 1989*

Guidelines for Satellite Dialysis Units, Victoria, Australia, May 1999

Hospital and Healthcare facilities: guidelines for design and construction, The American Institute of Architects Academy of Architecture for Health, 2001

New Zealand Building Code

3. Mechanical ventilation air intake should be filtered.

Oxygen and suctioning

1. Availability, type and location will depend on number of patients, and location of unit (Victorian satellite guidelines).

Security

1. Requires individual assessment for both staff and patient safety particularly if the area is used in the evening or is isolated (Victorian satellite guidelines).

Vinyl floors

1. A hard-wearing surface that is durable, has a floor waste hole and 15 – 30 cm coving.

Telephones

1. Telephones should be linked to other areas and /or Emergency Services.
2. Public phone access for patients is desirable but subject to local policy (Victorian satellite guidelines).

Dialysis and emergency service access

1. Disabled and ambulance access to the unit is necessary.

Toilets

1. A designated toilet and hand basin for staff and separate wheelchair accessible facilities for patients should be adjacent to or within the treatment area. The number of toilets to be provided per person is indicated in the NZ Building code.

Emergency spills

1. A shower and eye bath for staff or patients affected by blood or chemical spills subject to OSH guidelines.

Clean and dirty utility

1. A clean workroom should be provided and used for preparing patient care items. This should contain a work counter, a hand washing station and storage facilities for clean and sterile supplies. If the room is only used for storage and holding as part of a system for distribution of clean and sterile materials, the work counter and hand washing station may be omitted.
2. A dirty utility room should be provided that contains a sluice with face guard, appropriate pan sanitiser or pan disposal facilities, hand washing station, work counter, storage cabinets and storage of contaminated waste bins. Sharps containers and dirty linen skips can also be kept there (Hospital & Health Care facilities 7.14.B11) (Victorian satellite guidelines).
3. Wheelie bins or separate containers for contaminated and general waste as required (Victorian satellite guidelines).
4. The dirty utility and clean utility should have no direct connection (Hospital & Health Care facilities 7.14.B10).

Ancillary facilities

1. A waiting room ideally with toilet and hand washing facilities and seating with cleanable surfaces for waiting periods be provided or accessible to the dialysis unit (Hospital & Health Care facilities 7.14.C3).
2. An office area should be available for administrative services (Hospital & Health Care facilities 7.14.C4). This should be separate from the treatment areas.
3. There should be a dedicated staff room for meal breaks separate from treatment areas.

Other facilities

1. If a kitchen is provided for patients it should contain a sink, a work counter, a refrigerator, storage cupboards and equipment for serving nourishment as required (Hospital & Health Care facilities 7.14.B13).
2. An environmental services closet should be provided adjacent to and for the exclusive use of the unit. The closet should contain a sink and storage space for housekeeping supplies and equipment (Hospital & Health Care facilities 7.14.B14).
3. A storage space should be provided for wheelchairs out of direct line of traffic (Hospital & Health Care facilities 7.14.B17).
4. A clean linen storage area should be provided. This may be within the clean workroom, a separate closet, or an approved distribution system. It must be out of the path of normal traffic and under staff control (Hospital & Health Care facilities 7.14.B18).

Specific Haemodialysis Facility Standards

Haemodialysis chairs

1. Purpose built HD chairs is desirable. Chairs for HD areas should be assessed on their comfort for patients, ease of transfer and appropriateness & safety for staff in carrying out the dialysis and emergency procedures.
2. Other considerations include suitability for surface cleaning, durability and mobility.

Dialysis Machines

1. Machines should be surface cleanable between patient treatments.

Dialyser Re-Use

1. Dialyser re-use not recommended for Hepatitis B,C, D or HIV infected patients

Hand basins

1. Hand basins should be of sufficient size to allow patients to wash their arms without touching the basin or taps.
2. The height of the basin from the floor should be 910mm.
3. There should be a ratio of at least one hand basin to every four patients (Victorian satellite guidelines).
4. Soap dispensers should be smooth surfaced and easy to refill and clean.

Treatment areas

1. Treatment areas may be an open area and shall be separate from administrative and waiting areas (Hospital & Health Care facilities 7.14.B1).
2. The facility should have an adequate layout with sufficient space, light and temperature control to allow best practice infection control by staff.
3. The staff station should be located within the dialysis treatment area and designed to provide visual observation of all patient stations (Hospital & Health Care facilities 7.14.B2).
4. The minimum working area for HD is 1 metre out from each point of the HD chair or 9 square metres per dialysis station.
5. An open unit should be designed to provide privacy for each patient (Hospital & Health Care facilities 7.14.B5).
6. If a medication dispensing station is required then a work counter and a hand-washing area should be included in this area. If required, provision should be made for controlled drug storage, preparation and refrigeration of medications (Hospital & Health Care facilities 7.14.B7).
7. An examination room of at least 9.29 square metres with hand-washing and writing surface should be provided (Hospital & Health Care facilities 7.14.B9).

Isolation Facilities

1. There should be at least one dialysis station in an isolation room in each Dialysis Unit

Specific Peritoneal Dialysis Facility Standards

Peritoneal Dialysis Training Room

1. There should be at least one room available for training patients in PD which provides visual and auditory privacy.
2. Minimum size 3m x 3m.
3. Hand basin and bench accessible.

Peritoneal Dialysis Clinic room / Interview room

1. A private room available for clinic reviews and interviews.
2. Minimum size 3m x 3m.
3. This room may be combined with the training room dependent on patient numbers and location of the unit.

Storage

1. There must be sufficient clean storage area available to hold dialysis supplies for expected unit use over a 4 week period.

Technical standards for dialysis

General

All work required to provide for the point of installation for dialysis equipment shall comply with:

1. The Building Act and Building Controls, 1991 (modified in 2004)
2. The New Zealand Building Code, 1992
3. Any specific Local Body requirements

Electrical

The installation and use of dialysis equipment shall comply with:

1. AS/NZS 2500:1995, Amendment A, June 2003; Guide to the safe use of electricity in patient care
2. AS/NZS 3003:1999; Electrical installations – Patient treatment areas of hospitals and medical and dental practices
3. AS/NZS 3551:1996, Amendment A, June 2003; Technical management programs for medical devices
4. AS/NZS 3200.2.16; Medical electrical equipment – Particular requirements for safety – HD, haemodiafiltration and haemofiltration equipment

Dialysate

Haemodialysis solutions (dialysate) shall comply with:

ANSI/AAMI RD52:2004; Dialysate for Haemodialysis

However this, and other currently available standards, relates specifically to facility-based HD and do not address home-based HD. Whilst the end quality of the dialysate should be the same in either location the standard raises significant technical and logistical issues for home HD installations, especially relating to testing frequency. It is therefore the responsibility of

individual home HD services to develop a testing protocol which ensures maximum compliance with the standard.