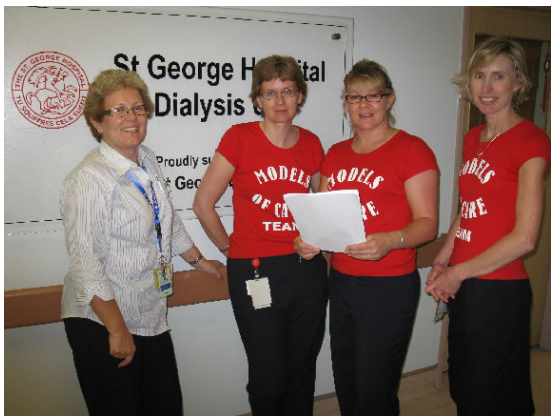
The St George Hospital Renal Department Quality Indicators



2009 Annual Report

Pre Dialysis
Haemodialysis
Peritoneal Dialysis
Renal Palliative Care
Renal Biopsies

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Contents

**Cover Photo: Models of Care team who secured a $10,000 grant for research into improving patient experience of haemodialysis: L-R Shelley Tranter, Tania Burns, Alison Smyth, Tracey Blow*

AIM

The primary purpose of these reports and benchmarking has been to allow our Unit to detect problems and institute systems or treatments that improve our patients' outcomes. This is facilitated by presentation and discussion of these data at regular department meetings. Our broad aims are to compare our Unit's performance against benchmarks where they exist or else to ensure we are meeting what we consider best practice in the following areas:

1. The management of haemodialysis patients' outcomes in terms of: survival, biochemical and haematology parameters and dialysis adequacy.

2. NSW chronic kidney disease benchmarks particularly relating to distribution of dialysis modalities.

3. Water quality to AAMI standards.

4. Vascular access outcomes with a focus on primary access; central venous catheter infection and complication rates.

5. Peritonitis and peritoneal dialysis exit site infection rates
6. Patients accepted onto dialysis

7. Nutrition in our dialysis patients

8. Pre-dialysis clinic activities for those with advanced renal failure planning dialysis or transplantation.

9. Palliative care of symptomatic renal patients

10. Renal biopsy outcomes

Executive Summary

1. a) **Peritoneal dialysis (PD)**: There have been improvements in phosphate and ferritin levels in 2009 with these results surpassing the benchmarks published in ANZDATA 2008. Patients with coronary artery disease (CAD) require careful monitoring to prevent haemoglobins (Hb) >120 g/L where possible. Dialysis adequacy in peritoneal dialysis shows 74% of patients have a Kt/V ≥1.6.

b) **Haemodialysis (HD)** biochemical results are comparable with the 2009 ANZDATA report. Patients continue to dialyse adequately with 97% of HD patients achieving a Kt/V ≥ 1.2 and 96% achieving a URR ≥ 65%.

2. The indicators from NSW Health show we are achieving good results compared to ANZDATA numbers on home dialysis, dialysis adequacy, dialysis time and peritoneal dialysis infection rates.

3. In 2009 Gambro maintained, monitored and sampled the dialysis water systems at both sites. The water audit shows that our results comply with the Association for the Advancement of Medical Instrumentation (AAMI) 2004 guidelines and European Best Practice Guidelines (EBPG) 2002 water quality standards.

4. a) A higher incidence of infection to permanent haemodialysis access occurred in early 2007; through subsequent changes to policies the infection rate reduced in 2009, meeting the KDOQI benchmark graft rate of <10%, but 2% higher than the recommended <1% benchmark for AVFs (3%).

b) The number of patients commencing haemodialysis with a functioning access was 36%, lower than the ANZDATA 2009 report for NSW (32%) and for the national data (38%) partly explained by the fact that St George had a greater number of late referrals in 2009 (33%) compared to the national average 25% (ANZDATA report).

5.Central Venous Catheter (CVC) infection rate remained the same at 9% in 2009 (1.07 episodes/1000 catheter days) compared to 9% (0.91episodes/1000 catheter days) in 2008. Blood Stream Infection (BSI) in gortex is 2% in 2009 and BSI for ArterioVenous Fistula (AVF) is 4.5% excluding BSI in buttonhole patients it is 0.7%

6. Rates of peritonitis and exit site infections have again improved. The peritonitis rate surpasses the ANZDATA benchmark in one area, months per patient episode. The peritonitis rate for St George is 1/27.6 months in 2009 (1/23.8 over 3 years) compared to 1/19.4 for ANZDATA 2008. Of the patients that have been on dialysis >3 years, 21% are peritonitis free compared to 31% for ANZDATA, this is a reduction from 46% in 2008. The exit site infection rate has improved from 1/47.4 months in 2008 to 1/49.3 months in 2009 (1/44 months over 3 years).

7. a) The peritoneal dialysis unit had a gross loss of 2 patients over 2009 with a total of 83 patients being treated compared to 85 in 2008. The trend in peritoneal dialysis continues to show an increase in patients on Automated peritoneal dialysis (APD) (an increase of 9%). ANZDATA 2009 has shown a 9% increase in numbers of patients on APD.

b) St George shows an increase in the percent of 75-84 year olds commencing peritoneal dialysis and haemodialysis as their first mode of dialysis over 2007 to 2009 compared to ANZDATA. ANZDATA shows higher percentages from 25 – 64 years. New patients over 2007 – 2009 have an average BMI of 30.3 in PD and 28.8 in HD. Co morbidities show new HD patients at St George have less cerebrovascular disease, peripheral vascular disease and diabetes than ANZDATA while new PD patients have less chronic lung disease and peripheral vascular disease, but a higher rate of diabetes.

c) The total haemodialysis activity level for St George patients (in-centre and satellite) decreased 3% from 22,843 sessions in 2008 to 22,207 sessions in 2009. St George shows 56% of dialysis patients are using haemodialysis (hospital and satellite), a reduction of 2% since 2008. ANZDATA shows a 4% increase in patients using haemodialysis. This correlates with increases in home dialysis patients at St George. Home haemodialysis rates at St George (22%) are higher than the NSW benchmark of 20%, and significantly better than NSW current rate (13%). Although satellite dialysis rates (13%) are much lower than the NSW benchmark, the unit has a 'low care' in-hospital HD area (51% of hospital haemodialysis patients), with 53% within this group earmarked for a satellite unit when funding becomes available.

d) The average age of patients commencing haemodialysis at St George over 2007 - 2009 was 65yrs, for PD patients the average age was 66 years. ANZDATA 2009 reports the average age for all new patients as 60.4 years. Fifty eight percent of new patients who commenced haemodialysis between 2007 and 2009 at St George were 65yr or older; this figure was 54% for PD patients, similar to the ANZDATA 2009 report. ANZDATA reports the greatest growth in the 45 – 74 yr age groups for all new dialysis patients.

8. Dialysis patients of SGH receive regular nutritional assessment by dieticians using criteria as recommended by the CARI and DOQI guidelines. Nutritional assessment and intervention are also provided for pre dialysis patients. Hyperphosphatemia and achieving optimal phosphate control continues to be a major challenge to our dialysis patients.

9. The Pre-dialysis clinic has been operating since April 2002. In 2009 there were 75 new attendees and 51 follow up appointments compared to 2008 when there were 41 new attendees and 14 follow up appointments.

10. There have been 112 visits to the renal palliative care clinic by 43 patients since it commenced in March 2009. The average age of patients is 78 years with 70% of attendees being male.

11. There were 106 renal biopsies performed in 2009. An unexpected increase in complication rates in late 2008/early 2009 prompted a change in practice which included overnight admissions for patients. This change in practice has resulted in complication rates falling from 13% to 5.5%.

NSW Benchmarks

The NSW Department of Health has developed benchmarks for the distribution of dialysis modalities that is part of the NSW Renal Dialysis Service Plan to 2011 document (NSW Health 2007). This document contains indicators for managing people with Chronic Renal Disease.

Comparison of St George Hospital dialysis modality rates with NSW Health benchmarks and the Australian data from ANZDATA.

	Hospital dialysis (%)	Satellite (%)	Home HD (%)	Peritoneal Dialysis (%)
NSW Health Benchmark	***20***	***30***	***20***	***30***
ANZDATA NSW 2009	***26***	***33***	***14***	***28***
St George 2005	59	0	20	22
St George 2006	61	0	20	18
St George 2007	59	0	20	21
St George 2008 %(n)	44 (109/249)	14 (34/249)	19 (48/249)	23 (58/249)
St George 2009 % (n)	**43 (108/253)**	**13 (33/253)**	**22 (55/253)**	**23 (57/253)**

Indicators from NSW Health 2007, pp.iii - iv. St George measurements indicate how these indicators are being measured and the results for 2009.

Principles	Indicators	St George Measurements
Integrated secondary prevention programs for CKD	1. Proportion of eligible patients with GFR <30ml/min when first seen by Nephrologist	1. Not measured
Patients with a diagnosis of CKD receive timely, appropriate investigation, information, treatment and follow-up.	2. Proportion of patients commencing dialysis whose first referral to a nephrologist is <90 days prior to first dialysis	2. Haemodialysis late referral rate 29% in 2009. Peritoneal Dialysis late referral rate 4%. ANZDATA late referral 22%.
Patients with progressive CKD receive appropriate education and preparation for ESKD and treatment in partnership with health care professionals.	3. Proportion of patients who completed a pre-dialysis education program.	3. 54% (54/100) of new dialysis patients attended the pre-dialysis clinic for education and assessment before treatment commenced in 2009.
Patients with CKD requiring treatment, have timely access to appropriate vascular access services.	4. Proportion of eligible patients commencing haemodialysis with permanent vascular access.	4. 36% patients' commenced haemodialysis with a functioning AVF; SVG or AVG. ANZDATA 2009 result was 32% (NSW) and 38% (Australia).
Patients with CKD requiring treatment, have access to clinically appropriate forms of treatment either in home,	5. Proportion of patients dialysed at home.	5. Total STG dialysis population: Home=45% (22% home haemodialysis & 23% PD) ANZDATA NSW = 41%

<table>
<tr><th>Principles</th><th>Indicators</th><th>St George Measurements</th></tr>
<tr><td>community or hospital facilities, designed around individual patient needs, including transplantation services where clinically appropriate.</td><td>6. Travel time - Proportion of patients for whom travel time to their dialysis location is ≤ 1 hour.</td><td>*28% of all STG haemodialysis patients dialyse at home (ANZDATA AUS=9%, NSW=14%)

6. 100%</td></tr>
<tr><td>Patients with CKD receive high quality, evidence-based, treatment services.</td><td>7. Patient waiting times – Frequency a patient commences dialysis more than 30 minutes after scheduled time.

8. Proportion of eligible patients who receive adequate haemodialysis (i.e. URR ≥ 65%)

9. Proportion of eligible haemodialysis patients with total weekly dialysis hours > 15 hours.

10. Proportion of eligible peritoneal dialysis patients with CCL >50L per week (or Kt/V ≥ 1.8).

11. Vascular access infection events per 100 patient catheter days.

12. Number of peritoneal infections per peritoneal dialysis patient-month.

13. Renal Transplant survival at 1, 3, 5 years</td><td>7. Not measured.

8. 95% URR ≥ 65%
ANZDATA 2008:
92% URR ≥ 65%

9. St George: 28% >15 hours per week, 30% ≥15 hours per week. ANZDATA 2009: 37% dialyse ≥15 hours per week

10. 72% had a CCL >50L (66% had a Kt/V ≥ 1.8). ANZDATA has not published CCL or Kt/V results in 2009.

11. CVC infection rate 0.07/100 catheter days.

12. Incidence per patient months = 27.6 compared to 19.1 for the whole of Australia (ANZDATA).

13. Analysed from transplant until death (no 5 year data)
<table>
<tr><th>Patient Survival</th><th>1yr</th><th>3yr</th><th>4yr</th></tr>
<tr><td>STG</td><td>96.8</td><td>96.8</td><td>89.8</td></tr>
<tr><td>Aust</td><td>97.4</td><td>94.6</td><td>93.1</td></tr>
<tr><td>NZ</td><td>96.7</td><td>94.2</td><td>91.9</td></tr>
</table></td></tr>
<tr><td>Patients with CKD at risk of suffering acute renal failure, have access to high quality hospital services in partnership with renal services.</td><td>14. Patient survival in dialysis treatment at 1, 3, 5 years.

15. Patient survival after Renal Transplant at 1, 3, 5 years.</td><td>14: Survival 1997 - 2007
<table>
<tr><th>Patient Survival</th><th>1yr</th><th>2yr</th><th>4yr</th><th>10yr</th></tr>
<tr><td>STG Hdx</td><td>86.7</td><td>72.8</td><td>61.2</td><td>26.7</td></tr>
<tr><td>Aust Hdx</td><td>84.2</td><td>72.9</td><td>53.9</td><td>19.2</td></tr>
<tr><td>STG PD</td><td>79.0</td><td>58.8</td><td>30.7</td><td>-</td></tr>
<tr><td>Aust PD</td><td>79.2</td><td>59.8</td><td>33.0</td><td>3.6</td></tr>
</table>
15: No data for CKD at risk of acute renal failure. Refer to number 13.</td></tr>
</table>

HAEMODIALYSIS

Haemodialysis: St George Hospital (STG) has a 34 chair in-centre service providing high level haemodialysis (HD) to 130 patients per month. In 2008-2009 there were 16,494 separations for HD. The renal department is responsible for running the satellite HD centre at Sutherland Hospital (TSH). This site has 12 renal satellite chairs (9 currently opened) providing access to HD for patients requiring less support.
In 2008-2009 there were 3552 same day separations for HD.

Home Haemodialysis training is provided through the STG campus however this is now being extended to TSH at the commencement of the financial year. There are currently 57 (22%) of patients on home haemodialysis, which is better than NSW targets. Satellite dialysis targets are much lower, 13%, compared with the desired 30%, but **51%** of 'in-centre' patients are being dialysed in the 'low care' section of our haemodialysis unit; these patients could be transferred to a satellite facility if another was available closer to STG. This would raise our satellite numbers to the desired target and achieve the desired target for in-hospital HD. In-centre HD is currently double the desired target.

The current distributions of HD modalities are as follows:

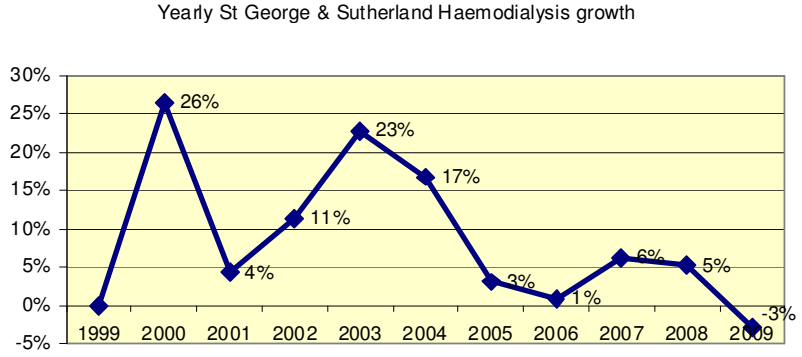
Dialysis modalities	n	%
PD	57	23#
Home Dialysis	55	22#
Satellite	33	13
In-centre	108	42
Total	255	

Home Therapies

There were a total of 198 HD patients at the end of 2009, with 29% being on home HD, 17% being at satellite HD, and 54% on in-centre HD.

Activity

The total haemodialysis activity level for St George patients (in-centre and satellite) decreased 3% from 22,843 sessions in 2008 to 22,207 sessions in 2009. The graph below shows the annual percentage growth in in-centre and satellite dialysis episodes over the past 10 years. This is partly explained by the growth in patients dialysing at home.



Patient Flow:

In-centre haemodialysis patients at beginning of year		**2006**	**2007**	**2008**	**2009**
		128	**141**	**144**	**109**
In	New Patients	39	28	33	32
	Transfers from other units	1	2	3	7
	Temporary transfer from PD	2	4	6	1
	Permanent transfers from PD	15	10	14	7
	Failed transplants	3	1	3	0
	Transfer from Home Hdx	1	4	2	1
	Transfer from Satellite			5	6
Subtotal		***61***	***49***	***66***	***54***
Out	Transplants	4	4	5	2
	Transfers to other units	5	2	2	6
	Transfers to Home Hdx	6	6	7	7
	Transfers overseas	1	0	0	1
	Transfers to PD	4	12	14	6
	Transfers to Satellite			39	6
	Regain Function			1	2
	Deaths (medical)	13	11	17	15
	Deaths (withdrawal)	13	11	16	10
Subtotal		***46***	***46***	***101***	***55***
Net Gain		15	3	-35	-1
In-centre haemodialysis patients at end of year		**143**	**144**	**109**	**108**

Satellite haemodialysis patients at beginning of year		**2008**	**2009**
		0	**34**
In	New Patients	0	1
	Transfers from other units	2	1
	Transfer from PD	1	0
	Transfer from Incentre	39	6
Subtotal		***42***	***8***
Out	Transplants	1	0
	Transfers to Home Hdx	2	1
	Transfers to PD		1
	Transfers to Incentre	5	6
	Transfer to other units		1
	Deaths (medical)	0	0
	Deaths (withdrawal)	0	0
Subtotal		***8***	***9***
Net Gain		34	-1
Satellite haemodialysis patients at end of year		**34**	**33**

Home haemodialysis patients at beginning of year		2006	2007	2008	2009
		45	**51**	**49**	**50**
In	New Patients	7	1	5	1
	Transfer from PD	1	0	0	0
	Transfers from other units	0	0	0	3
	Transfer from Satellite				1
	Failed transplants	0	1	0	0
	New Transfer from Incentre Hdx	6	6	6	5
	Home training 31.12.2009				2
Subtotal		***14***	***8***	***11***	***12***
Out	Transplants	7	1	6	6
	Transfers to other units	0	1	1	0
	Transfers to Incentre Hdx	1	4	2	1
	Transfers to Satellite	0	0	0	0
	Deaths	0	4	1	1
Subtotal		***8***	***10***	***10***	***8***
Net Gain		6	-2	1	4
Home haemodialysis patients at end of year		**51**	**49**	**50**	**54**

Comments:

- On 31st December 2009 33 (13%) STG patients were dialysing at the Sutherland Satellite dialysis unit which opened in March 2008. The ANZDATA 2009 (ANZDATA 2009) report indicates 33% of NSW haemodialysis patients dialyse within a satellite facility. Full capacity for this unit is 48 patients.
- Home haemodialysis completed training 7 patients, there were 2 patients in training at the end of the year at St George hospital. Six in-centre patients, 2 satellite patients and 1 new patient were successfully trained or in the process of being trained at 31st Dec 2009. In-centre patients have shown interest in home haemodialysis training due to its visibility within the hospital dialysis unit.
- Twenty two percent of haemodialysis patients are dialyzing at home compared to 14% in NSW as stated in the ANZDATA 2009 report (ANZDATA 2009).
- The percent of deaths on haemodialysis in 2009 was 8% compared with the ANZDATA 2009 (15%). Deaths due to withdrawal from haemodialysis is slightly lower than ANZDATA, St George (5%) compared to ANZDATA (6%).

Future Plans

- Development of a safe workload for ESKD patients (maximum 100 dialysis or transplant patients per 1 fte Nephrologist)
- Further development of home dialysis training
- Extension of the renal service to Sutherland Hospital.
- Establishment of a new satellite dialysis unit for the stable low level care haemodialysis patients currently receiving in-hospital dialysis at SGH in order to achieve NSW targets of maximum 20% hospital HD.

Biochemical and haematological targets and dialysis adequacy audit.

Background and Activity Level

- Routine monthly bloods are attended on haemodialysis patients.
- Blood results were audited in April and October 2009 from 136 and 137 (99%) chronic in-centre and satellite haemodialysis patients respectively.

Outcomes being measured

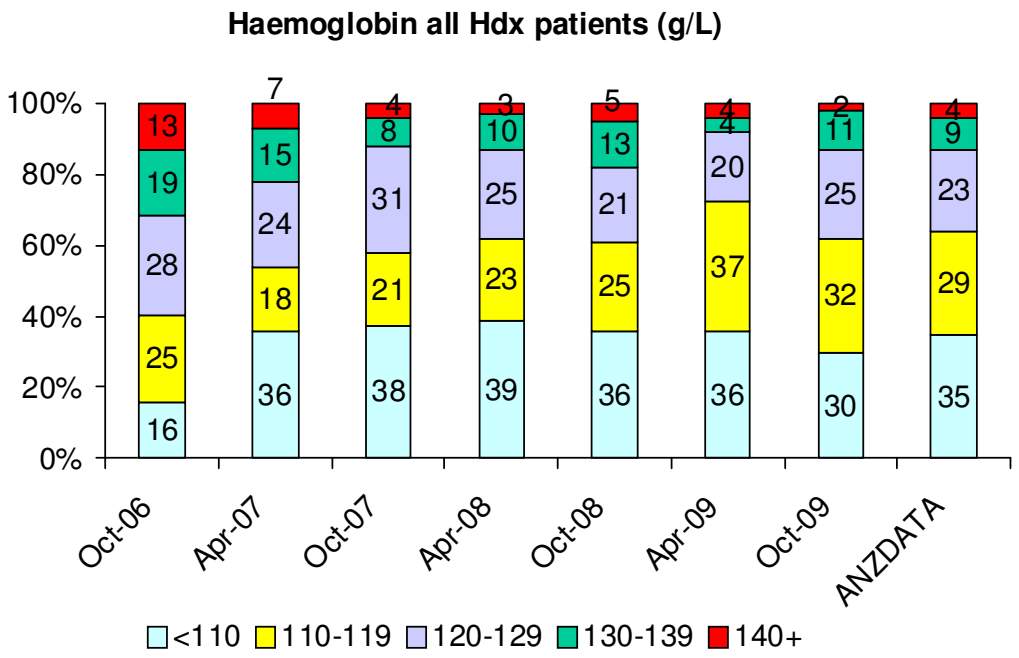
- Our aim is to compare our unit's performance against the National recommended guidelines (CARI) (CARI 2006) for the following parameters: Ca, PO4, Corrected Ca, Ca PO^4 product, Albumin, Mg, Hb, Fe studies, Bicarbonate and dialysis adequacy (Kt/V).
- Audit results are also compared to previous audit results and the ANZDATA 2009 (ANZDATA 2009) report.
- Lipid target range is set by the National Heart Foundation (National Heart Foundation of Australia and the Cardiac Society of Australia and New Zealand 2005) for high risk patients.

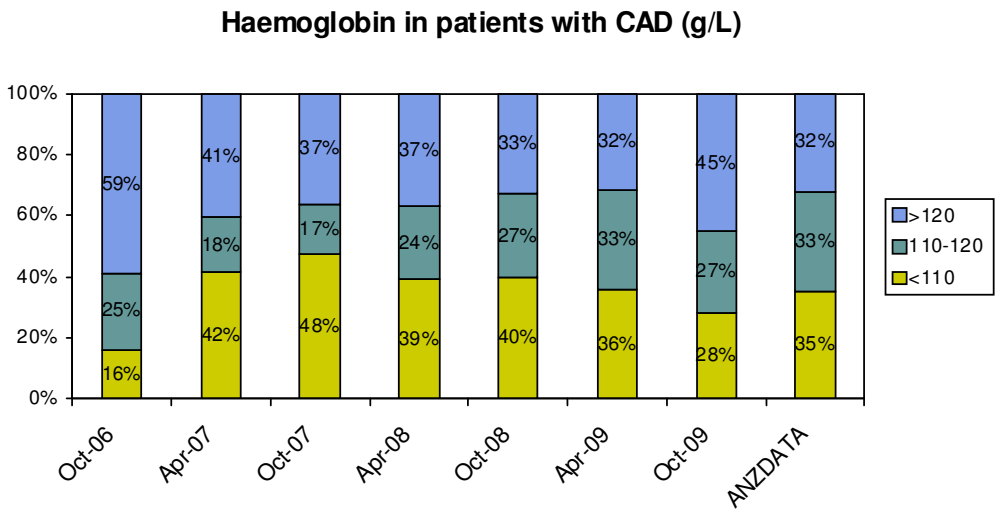
How did we Record, Store and Analyse the Data?

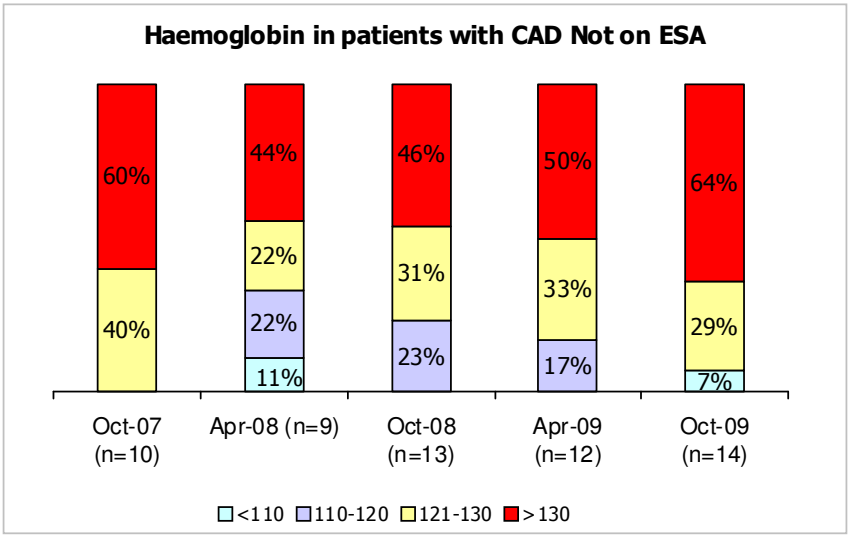
- Blood results were entered into an Excel Database.
- Analysis of data and basic statistics was performed using the SPSS 17 statistical program.

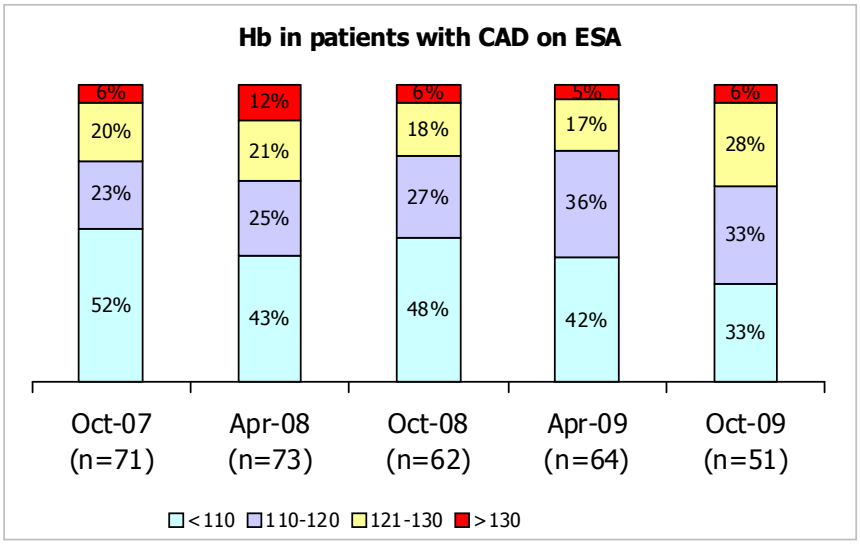
Outcomes & Recommendations:

Haemoglobin

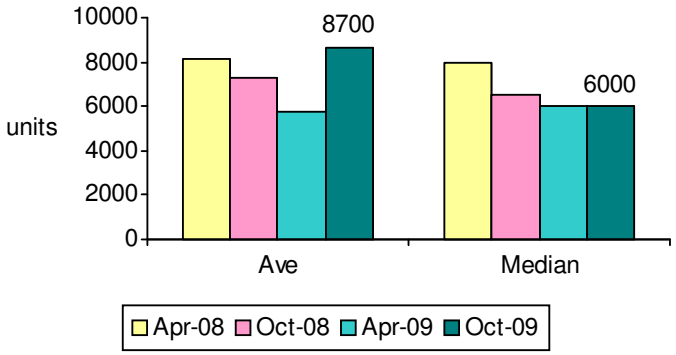



Haemoglobin in patients with CAD (g/L)
100%
80%
60%
40%
20%
0%
59%
25%
16%
41%
18%
42%
37%
17%
48%
37%
24%
39%
33%
27%
40%
32%
33%
36%
45%
27%
28%
32%
33%
35%
Oct-06
Apr-07
Oct-07
Apr-08
Oct-08
Apr-09
Oct-09
ANZDATA
>120
110-120
<110

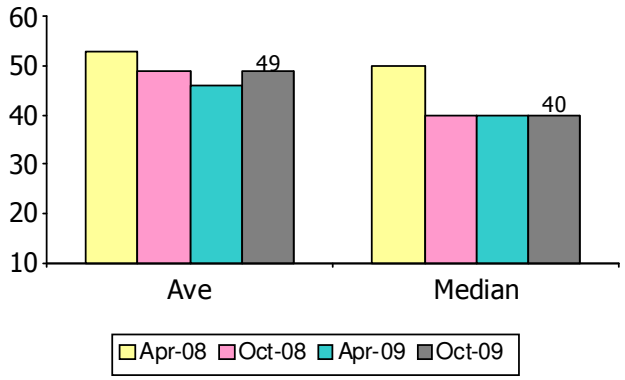

Haemoglobin in patients with CAD Not on ESA
60%
40%
44%
22%
22%
11%
46%
31%
23%
50%
33%
17%
64%
29%
7%
Oct-07 (n=10)
Apr-08 (n=9)
Oct-08 (n=13)
Apr-09 (n=12)
Oct-09 (n=14)
<110
110-120
121-130
>130


Hb in patients with CAD on ESA
6%
20%
23%
52%
12%
21%
25%
43%
6%
18%
27%
48%
5%
17%
36%
42%
6%
28%
33%
33%
Oct-07 (n=71)
Apr-08 (n=73)
Oct-08 (n=62)
Apr-09 (n=64)
Oct-09 (n=51)
<110
110-120
121-130
>130

Ave & Median weekly Eprex dose



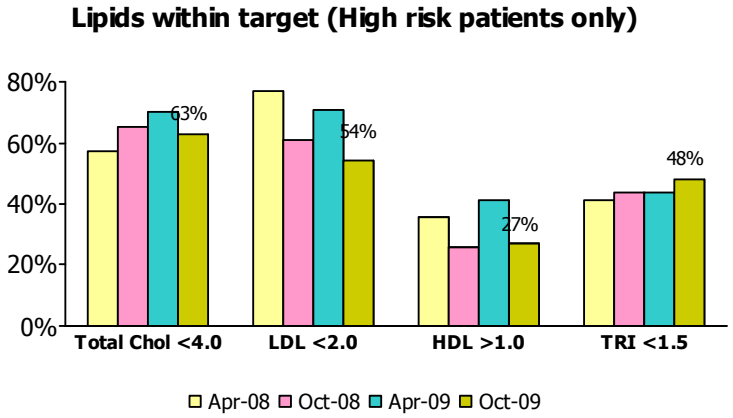
Ave & Median weekly Aranesp dose



Comments:

- KDOQI (2007) (NKF-KDOQI 2007) recommendation for target Hb should *generally* be in the range 110-120g/L due to fluctuations and variability in Hb levels.
- CARI guidelines recommend that haemoglobin not rise more than 10g/L per month. Haemoglobin of 110g/L is a suitable target, concentrations above 130 g/L are to be avoided. There is no data to suggest that those patients who maintain a higher haemoglobin without ESA should have their haemoglobin reduced.
- Out of 51 patients' who have CAD and are on Erythropoietin Stimulating Agent (ESA), 33% had an Hb<110g/L which is an improvement on the previous report.
- The average haemoglobin for all patients during the latest audit was 115, SD 12.5, min 83, max 151.
- KDOQI recommend Hb targets in dialysis patients receiving ESA should not exceed >130g/L (KDOQI 2007).
- The number of patients not on ESA increased by 1%. Seventy six percent of patients are on Aranesp, 4% on EPREX, 1% on Neorecormon and 17% not on ESA. The median weekly dose of ESA has not changed compared to previous audits.
- Overall, 32% of patients had the desired Hb, which is better than the national ANZDATA average (29%). STG also had less patients with lower levels (Hb<110) 30% vs. 35% and slightly more Hb>120g/L, 38% vs. 36%.

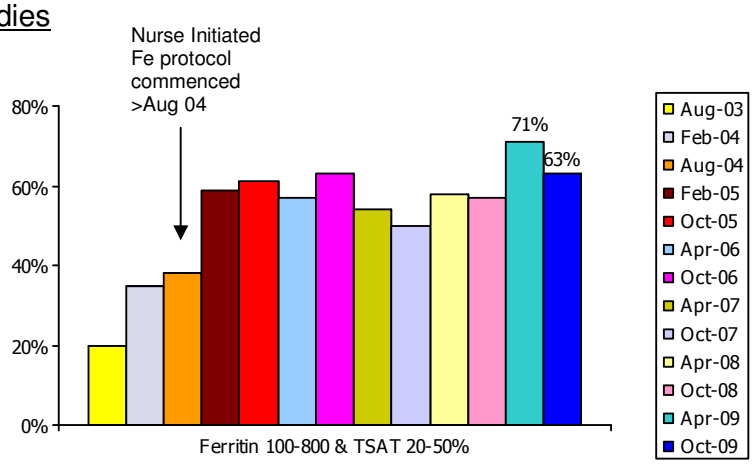
Lipids

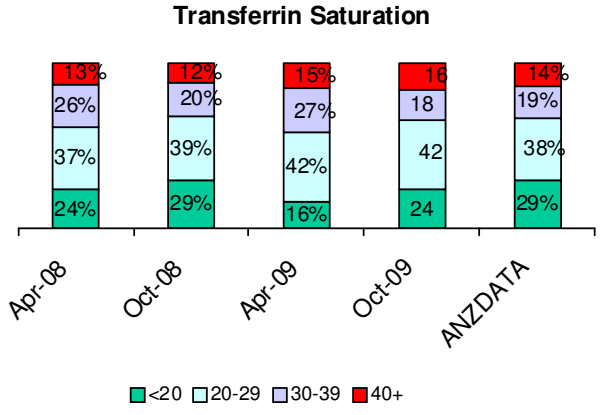


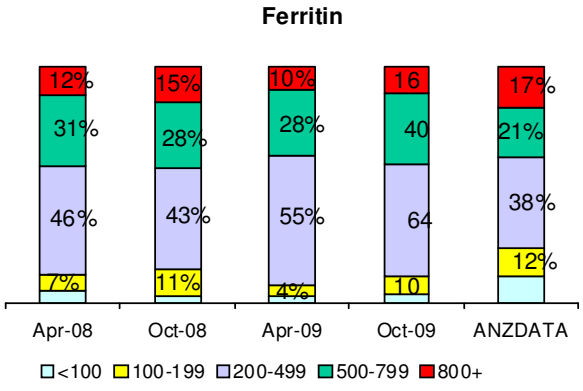
Comments:

- Ranges are recommended by the 2005 national heart foundation (National Heart Foundation of Australia and the Cardiac Society of Australia and New Zealand 2005).
- Results fluctuated during 2009, April results were good, but worse in October.
- Data is collected only on high risk patients, those with, or suspected of having, CAD, PVD, CVD or Diabetes. Seventy three percent of in-centre and satellite haemodialysis patients were considered high risk during October 2009 audit.

Total Iron studies



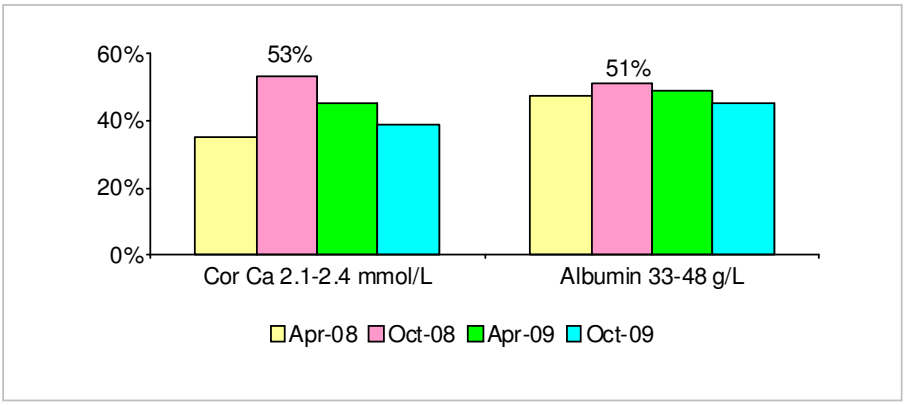




Comments:

- Sixty three percent of all patients in October 2009 were iron replete compared to 57% in Oct 08. Iron replete refers to ferritin levels between 100-800ng/mL as well as iron saturation between 20-50%. This shows improved results which are improving on 2004 when the nurse initiated protocol was introduced.
- Seventeen percent of patients in October 2009 had a ferritin level >800ng/L which was similar to previous audits.

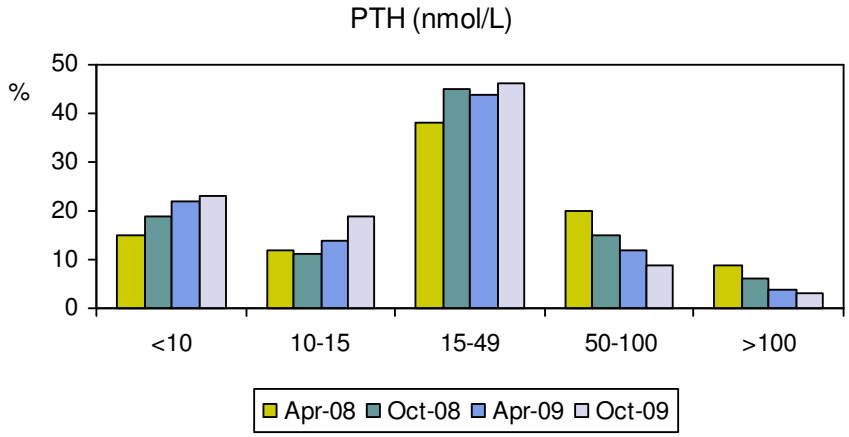
Corrected Ca & Albumin



Comments:

- Kruskal-Wallis Test *(H)* performed on corrected calcium between October 2007 and October 2008 indicated p=<0.005. No statistical significance was found in 2009.

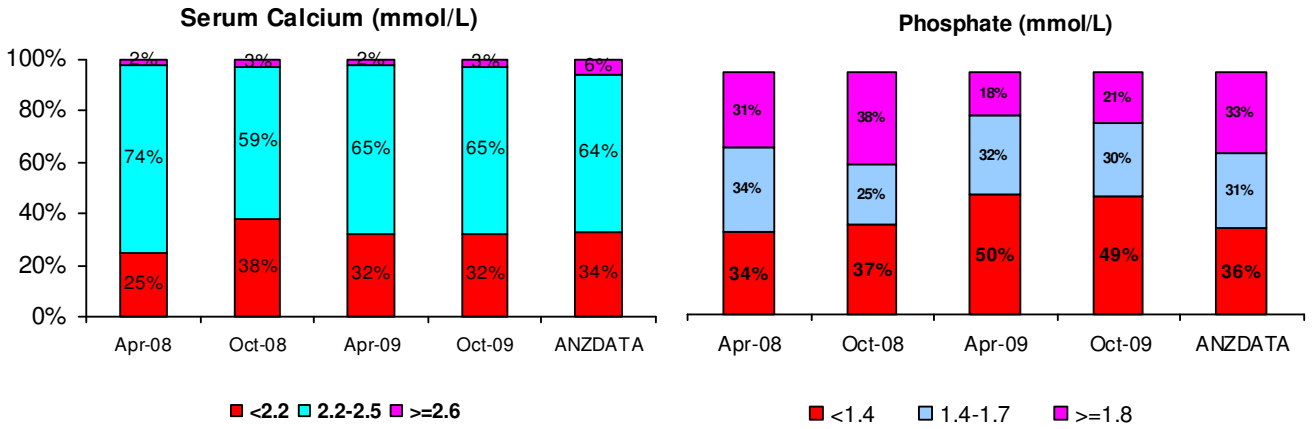
PTH

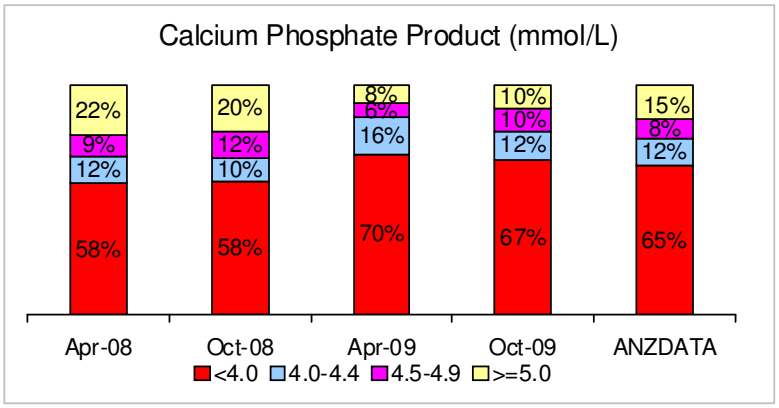


Comments:

- Patients with parathyroidectomies were excluded in the data if PTH <10.

Serum Calcium, Phosphate & $CaPO^4$ Comparison with ANZDATA

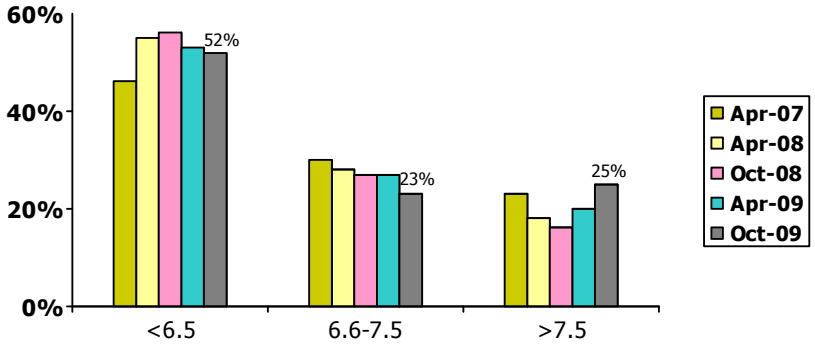




Comments:

- There have been a greater percent of patients with hypocalcaemia since October 2008, but the rate is similar to the ANZDATA 2009 report (ANZDATA 2009).
- Calcium phosphate product and phosphate results show a greater percent of patients have results <4mmol/L, but results are comparable with the 2009 ANZDATA report.
- Only 20% of patients fall outside of the acceptable calcium phosphate product, and this is slightly better than National achievements.

HBA1C

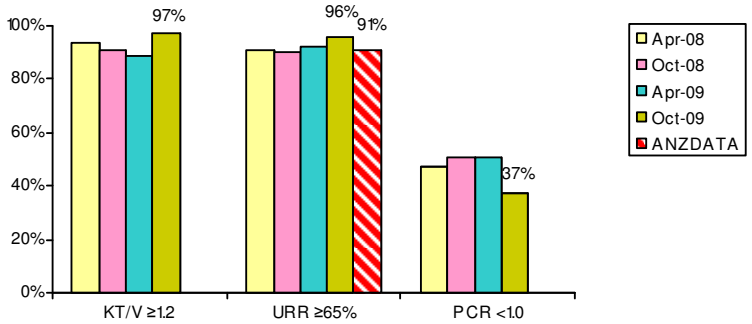


Comments

- Data was collected on 62 (45%) diabetic patients during the October audit. Results show an increase in HbA1c results >7.5% in one quarter of patients, indicating better diabetic control is required. Referral to the diabetic clinic for

patients who have not previously been could assist in this area especially when there are increasing numbers of people with diabetes entering the haemodialysis program. This is an area which requires closer monitoring, ensuring better control of diabetes is achieved in the future. The best practice guidelines indicate that we should be aiming for an HbA1c of <7% (Diabetes Australia 2009).

Adequacy



Comments

- Dialysis adequacy continues to be achieved and improved upon and exceeds the ANZDATA 2009 (ANZDATA 2009) haemodialysis results for URR.

Identified strengths and weakness:

- The unit continues to achieve better than national results in most outcome targets, confirming the unit to be one of the best haemodialysis units in the country, as reported by ANZDATA in 2009.
- Where previous weaknesses have been detected, efforts are being made to improve. This has occurred in areas such as iron stores and haemoglobin targets. It is also evidenced by the fact that the unit has shown improvements in most dialysis adequacy and outcome targets from the previous year.
- Through increased awareness and education to cease or temporarily withhold ESA in patients with Hb>130g/L in 2008, a reduction in Hb>130g/L was seen in that year. October 2009 reveals a higher percent of total patients with higher haemoglobins. This will continue to be monitored and iron management will be audited in 2010 by the renal anaemia coordinator to ensure staff are educated adequately on nurse initiated iron and when to temporarily withhold ESA therapy.
- The nurse initiated iron protocol will be formally re-evaluated in 2010 to ensure the protocol and iron forms reflect any new published evidence.
- The allocation of a 0.21 FTE CNS anaemia co-ordinator position commenced in 2009 aimed at providing closer anaemia surveillance and ESA management.
- Improvements need to be achieved to ensure better diabetes control.

VASCULAR ACCESS

Background and Activity level

- CARI and KDOQI guidelines advocate the preferred haemodialysis access is a native AV fistula.
- The Vascular Access Nurse assesses patients post access surgery, and provides follow up post surgery until the patient commences dialysis to assess maturity of access.
- Data includes access used for new patients commencing their first haemodialysis in 2009 as well as current home, incenter and satellite haemodialysis patients.

How did we Record, Store and Analyse the Data?

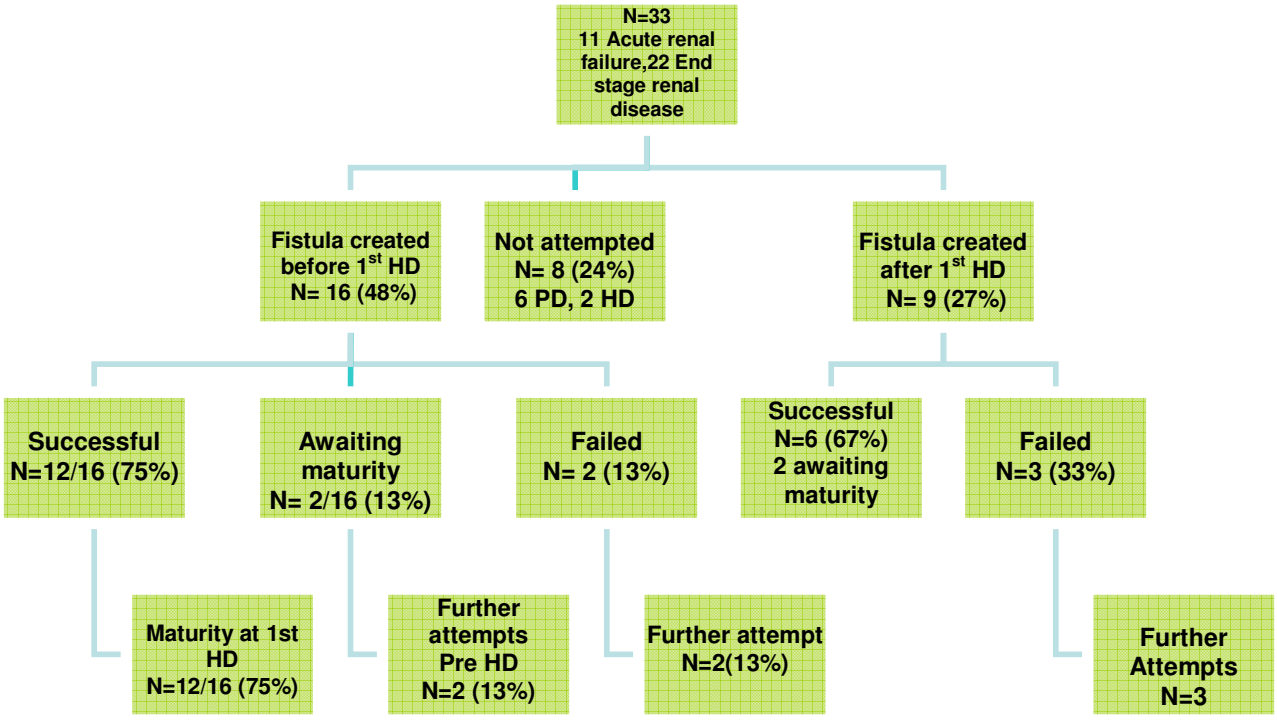
- Data was collected from operation reports at St George public and private hospitals and during follow up visits.
- Data is store in the RISC database and the Access Excel database.
- Data is collected on access at first haemodialysis during 2009 and current patients access at 31st December 2009.

Data Benchmark

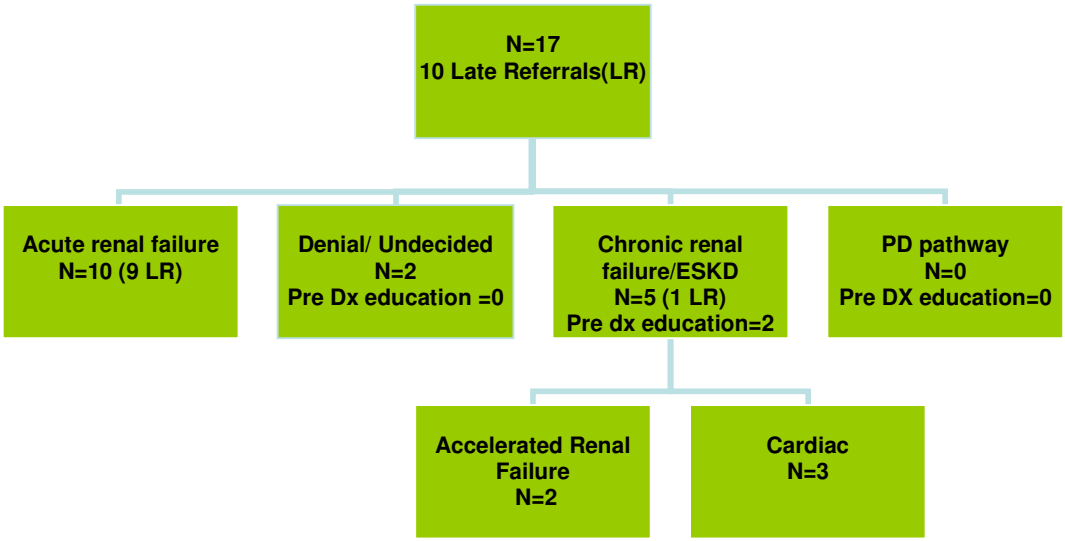
- Data is benchmarked against ANZDATA 2009 report and KDOQI 2006 guidelines

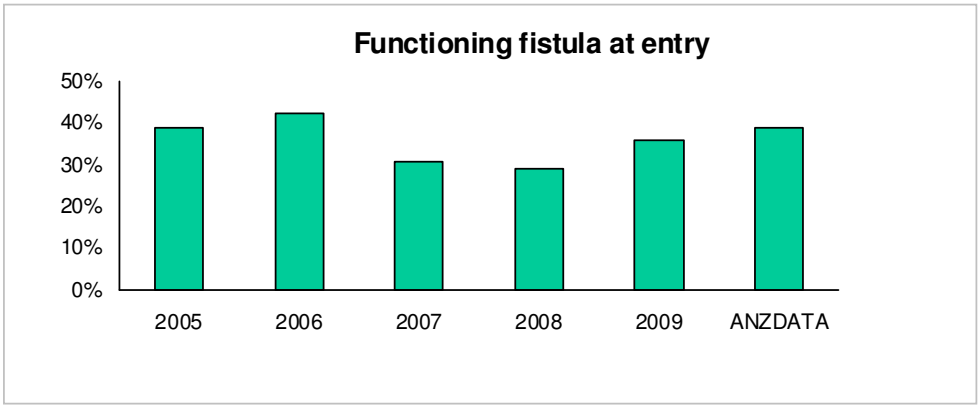
Vascular Access at Commencement of Haemodialysis

Fistulas in patients starting HDx 2009



No access created before 1st haemodialysis





Comments:

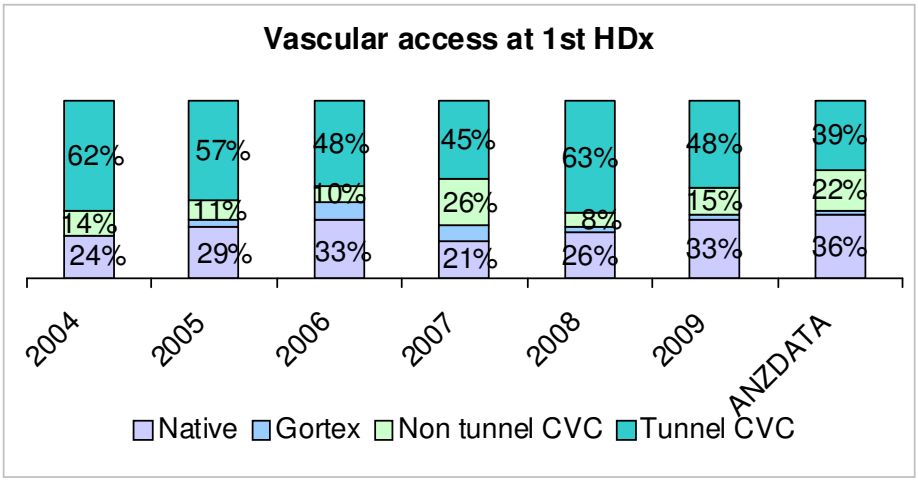
- The average age of patients commencing haemodialysis at St George in 2009 was 66.5 yrs, median age 70.5 yrs**.** The ANZDATA report (ANZDATA 2009) indicates the average age for all new patients commencing dialysis was 60.4 years. Fifty eight percent of new patients who commenced haemodialysis between 2007 and 2009 at St George were 65yr or older. This is similar to the ANZDATA 2009 report.
- Fifty three percent of new patients were from a non English speaking background (NESB). Overall, co-morbidities between 2007 and 2009 were lower than ANZDATA 2009 report with the exceptions of chronic lung disease and coronary artery disease.
- The late referral rate reflects patients who were referred to nephrologists less than three months prior to commencing dialysis. The late referral rate from 2007 to 2009 is 3% higher than the ANZDATA 2009 report (ANZDATA 2009).

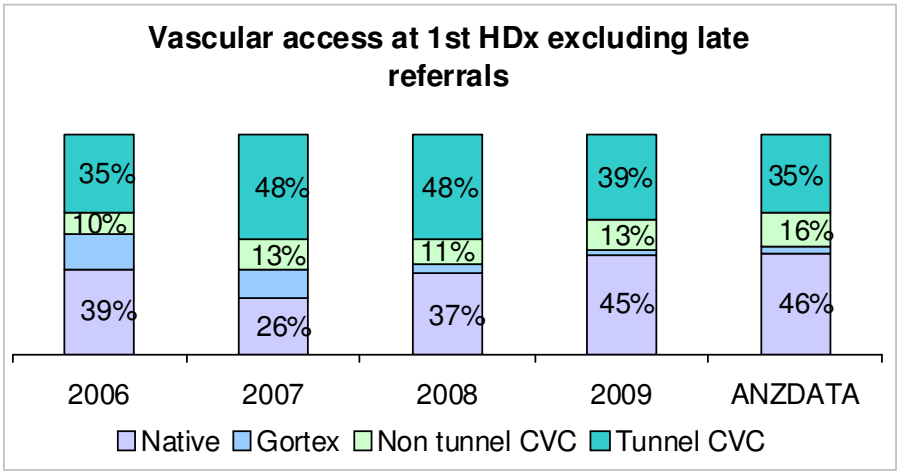
- The GFR is calculated using the Cockcroft-Gault formula. The Average corrected GFR from 2007 - 2009 was 13.5ml/min/1.73m^2 with a median GFR of 10.9 ml/min/1.73m^2.
- Forty eight percent new patients (excluding late referrals) had a fistula attempted in 2009, 36% had a mature functioning access at their first haemodialysis which has improved each year. The ANZDATA 2009 (ANZDATA 2009) report indicates 49% of patients (excluding late referrals) have a functioning AVF or AVG at their first haemodialysis
- Seventeen patients (52%) had no access created before their first haemodialysis, ten of who were late referrals from ARF or were lost to follow up within the health system. The majority of patients without an access were known to the nephrologists with CKF but their renal function deteriorated more rapidly than predicted due to sepsis, the necessity for nephrectomies or accelerated renal failure.

Identified strengths and weakness:

- A higher rate of late referral patients over 2007 - 2009 has reduced our overall number of patients commencing dialysis with a mature functioning fistula.
- Of continual monitoring of the access within the predialysis patient.
- A review of patients who did not have a functioning access was discussed in a Department meeting and was emphasised to send patients for pre dialysis education early to ensure the patient is adequately prepared for dialysis.

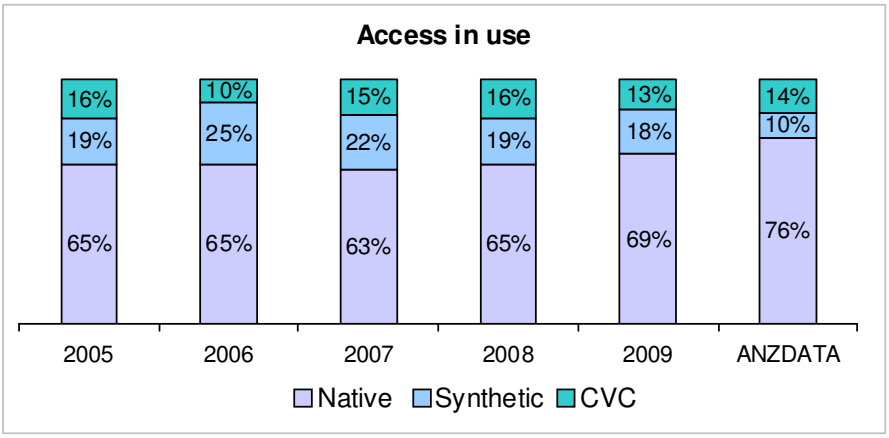
Outcomes





Comments:

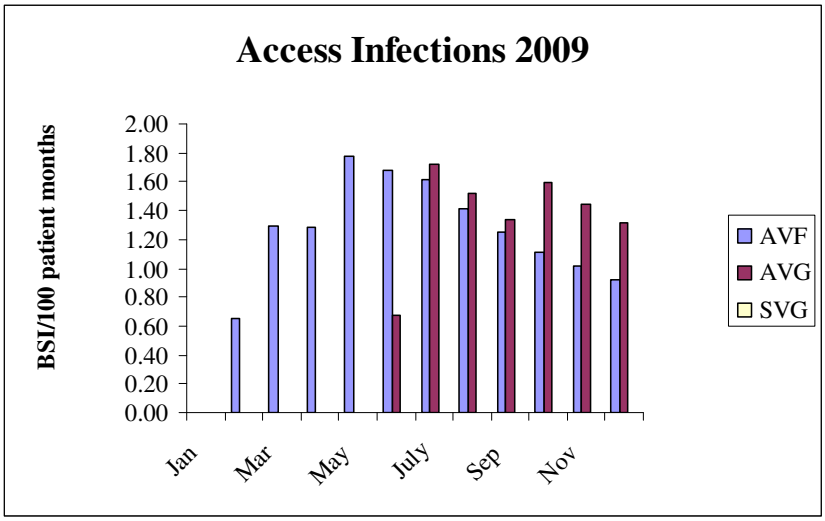
- The ANZDATA 2009 (ANZDATA 2009) report indicates the decreasing trend in the overall use of native fistulas or AVG as an initial access is stabilized at 38% Excluding late referral patients, 48% of new patients had a mature functioning fistula for their first session. ANZDATA 2009 reports the use of vascular access (native and graft) for first dialysis at 49%. The late referral rate for St George was higher (30%) than ANZDATA 2009 (22%). This was due to a higher incidence of patients with CRF not being followed up in the community and resulting in ESRD on first presentation.
- The incidence of non-tunnelled CVC used for first dialysis (15%) increased from previous years. The incidence of tunnelled CVC use remains higher at St George (48%) compared to ANZDATA 2009 report (39%).



Comments:

- The KDOQI 2006 evidence based practice guidelines (NKF-KDOQI 2006) recommends fistula use in 40% of prevalent patients. Sixty nine percent of patients at St George have a native fistula.
- The KDOQI 2006 guidelines (NKF-KDOQI 2006) suggest <10% of chronic haemodialysis patients have a permanent catheter. Four percent of the St George population has a permanent catheter access for dialysis, which is increasing each year.

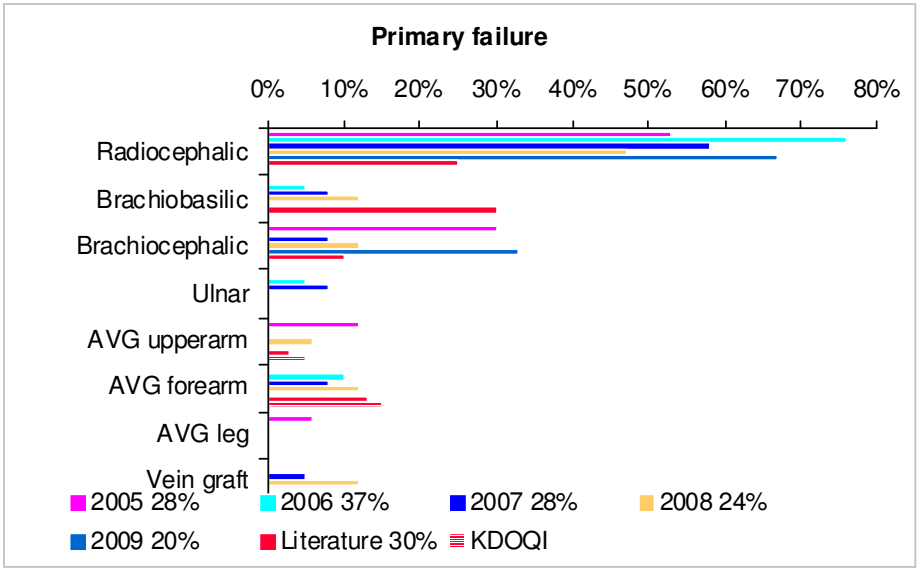
- Data from the Dialysis Outcomes and Practice Patterns Study (DOPPS) indicates the mortality risk associated with the use of a catheter (relative risk, 1.32; 95% confidence interval, 1.22 to 1.42) or graft (relative risk, 1.15; 95% confidence interval, 1.06 to 1.25) was higher than fistulas (Pisoni et al. 2009).



	Cumulative Blood stream infection (BSI) range AVF	Cumulative Blood stream infection (BSI) range AVG
2009	(3%) 0-1.77 BSI/100 pt months	(6%) 0-1.72 BSI/100 pt months
2008	(3.5%) 0.31-1.3 BSI/100 pt months	(5%) 0.95-1.03 BSI/100 pt months
2007	(2.3%) 0.0-1.32 BSI/100 pt months	(17%) 2.17-6.21 BSI/100 pt months

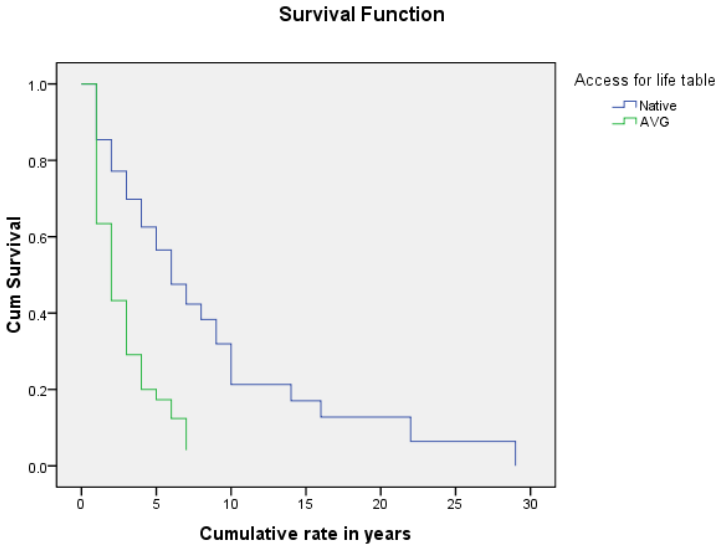
Comments:

- KDOQI 2006 guideline recommends a fistula infection rate <1% and graft infection rate <10% during the use-life of the access.
- In 2009 2% graft patient had (BSI) and 3% in AVF patients had (BSI) hence St George patients achieved KDOQI (2006) benchmark in Graft patients but not in AVF patients in 2009.
- An increased infection rate in 2009 amongst permanent vascular access due to buttonhole infection. Five patients with AVF had buttonhole blood stream infections hence reflecting higher rate of fistula infection rate of 3% in 2009. Excluding buttonhole infection, only 0.7% rate of BSI in AVF patients. From the department meeting increased (BSI) rate in buttonhole patients have been discussed and patients have been taken off from buttonhole cannulations since then infection rate have improved.
- A regular quarterly infection control meeting continues with senior nursing staff and the infection control department, which identifies and discusses infection control issues related to the renal department.
- Submission of permanent vascular access blood stream infection rates commenced in 2008 to the NSW Health department ACHS Indicators.



Comments:

- Sixty seven new access or first access were formed and a further 14 fistulas/gortex were revised in 2009. The primary failure rate of these accesses was 20% Primary failure is defined as an access that never provided reliable haemodialysis or failed within 3 months of surgery. Risk factors for primary failure are wrist fistulas, older patients, obesity, female, diabetics, PVD, CVD, previous failed vascular access, cephalic vein <2.0mm on ultrasound in forearm.
- The most common site for an AVF at St George is the radial-cephalic and less common is the brachial-basilic, which may suggest a higher rate of primary failure of radial-cephalic at St George compared to the literature. The literature reports a primary failure rate of 30%.



Comments:

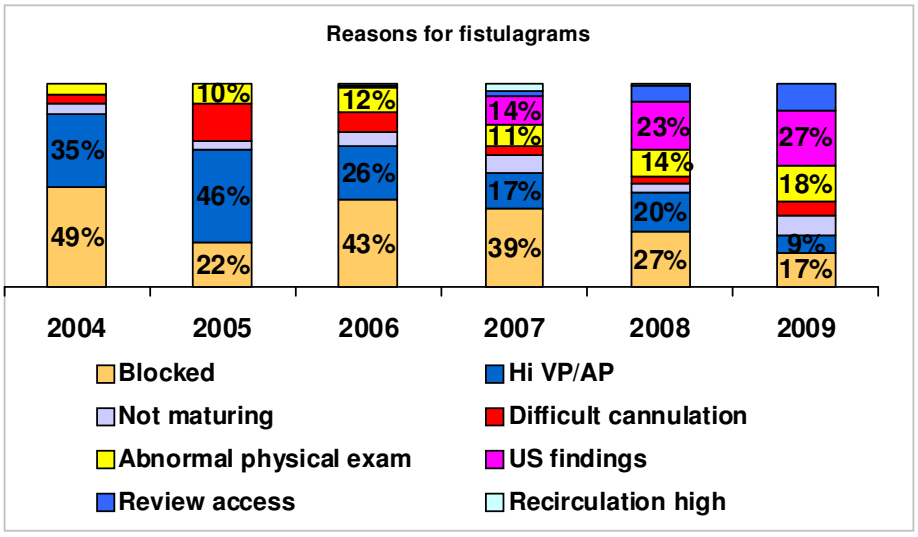
- Cumulative patency is defined as the number of access that remains patent regardless of the number of interventions during a time period.

- The literature indicates cumulative patency for radio-cephalic fistulas of 53% at 5 years and 45% at 10 years. PTFE grafts at 1 year 67%, 2 years 50% and 4 years 43%. KDOQI only provides rates for AVG which are 70% at 1 year, 50% at 2 and 3 years.
- KDOQI 2006 also recommends AVG patency >2.0years (by life-table analysis) and AVF patency >3.0years (by life-table analysis) (NKF-KDOQI 2006). The median survival time (time at which half the subjects have reached the event) for St George patients AVG was 2.16 years and AVF 6.9 years, similar to previous years. We are meeting both benchmarks.
- Data includes all current patients and deceased patients since 2004. A follow up life table was used with censored patients being those whose accesses are still functioning. The endpoint was access lost, death or transplanted or transferred with a functioning access.

Access surgery	2006	2007	2008	2009
First access	48	26	35	47
Revision	30	25	13	14
New access	9	13	23	20
Thrombectomy	5	13	14	11
Other access surgery (ligation, evacuation haematoma, excision, abscess drainage)	5	13	6	4
Fistulagram	80	95	100	120

Comments:

- As a larger focus on access monitoring and surveillance is undertaken amongst the unit an increase in pre-emptive fistulagrams has occurred.



Comments:

- A Pearson Chi-Square 42.0 p=0.000 indicates that pre-emptive investigations (fistulagram) and access failure are dependant. Reasons for pre-emptive fistulagram consist of high venous or arterial pressures, not maturing access,

difficulty with cannulation, abnormal physical assessment, abnormal ultrasound findings or recirculation.

- Eighty two percent of access did not fail when a pre-emptive fistulagram was performed. When no intervention (fistulagram) was taken 68% of access failed. Data includes all fistulagrams performed since 2004.
- In 2009, 120 fistulagram procedures were performed resulting in 82% salvaged, 8% requiring surgical intervention, 6% required further angioplasty and 4% no action. In 2008, 100 fistulagrams were performed with 76% salvaged, 17% required surgical intervention and 4% no action.

Identified limitations and strengths:

- Due to implementing several strategies within the renal department in 2007 as a response to increased infection rates amongst AVF and AVG, infection rates reduced in 2009.
- To improve primary failure rates all patients underwent venous mapping pre access creation.
- In 2009 two new vascular surgeons appointed at St George, assisted in timely access surgery.

CENTRAL VENOUS CATHETERS

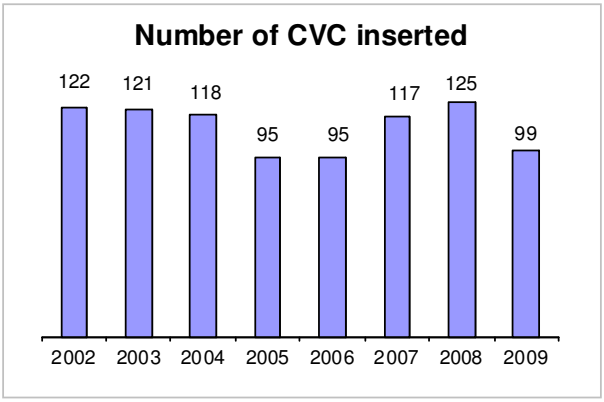
Background

- Central venous catheters (CVC) are required to provide temporary access for haemodialysis.
- Infection and complication rates of CVC are monitored and reported.

How did we Record, Store and Analyse the Data?

- Data is collected and entered into the access Excel database, which includes reason for insertion and removal, insertion site, type of catheter, number of catheters per patient and complications.

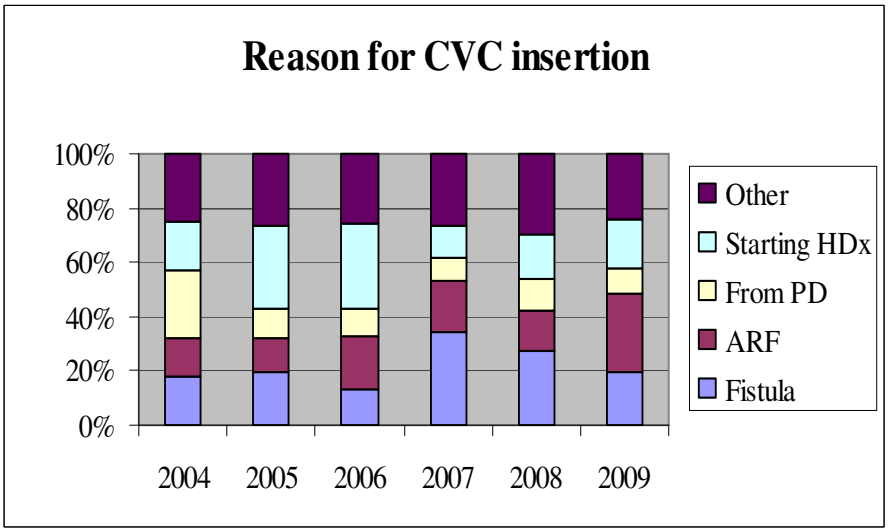
Activity Level



Comments:

- The number of catheters inserted for haemodialysis has decreased from previous years. The type of catheters inserted in 2009 remains predominantly Bard hemi-glide tunnelled cuffed internal jugular catheters (76 %). The remainder were temporary Arrow non–tunnelled femoral or subclavian catheters.

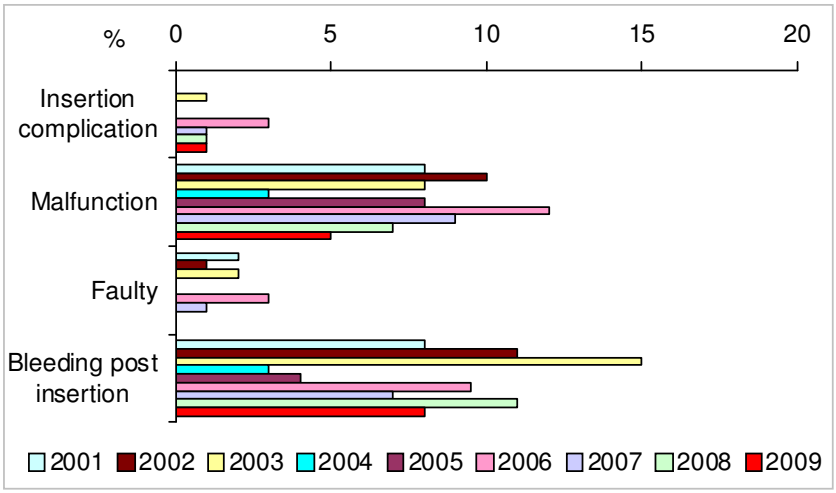
Reason for insertion of catheters in 2009



Comments:

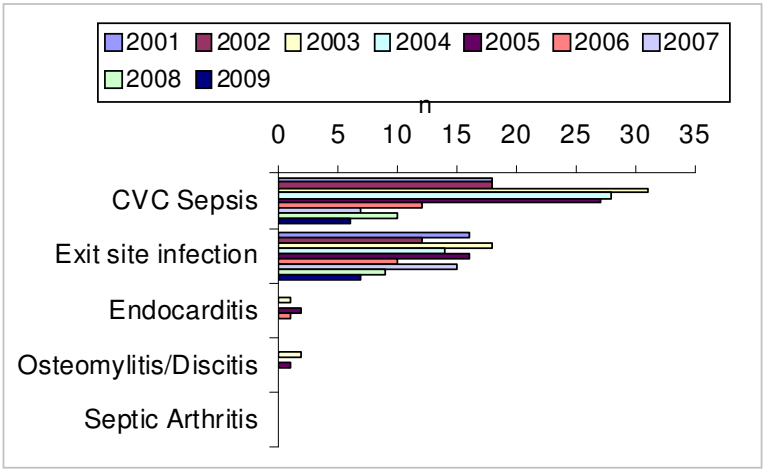
- In 2009 Vascular access practice development group continues to work on quality improvement projects to raise awareness of access monitoring and surveillance by performing monthly vascular access risk assessments to identify access dysfunctions early. Audits were done to improve access monitoring by the primary nurses.
- There was a lower incidence of requiring a CVC insertion for fistula or graft infections in 2009 due to several changes to infection control policy within the unit. These changes included reinforcement of aseptic techniques, reinforcement of patient and staff hand washing as well as access washing pre-cannulation, change of cleaning solution for cannulation trolleys and pre-cannulation skin prep, changes in taping cannula exit sites, administration of IV prophylactic antibiotics and antimicrobial wash pre access surgery and fistulagram procedures.
- The number of patients transferring from PD and requiring a CVC was similar to previous audits.
- Patients' requiring a CVC to start haemodialysis has reduced since 2006.
- Other includes replacing a non-tunneled catheter with a tunneled, malfunction of the catheter and replacing an infected or faulty catheter.

Complications related to insertion

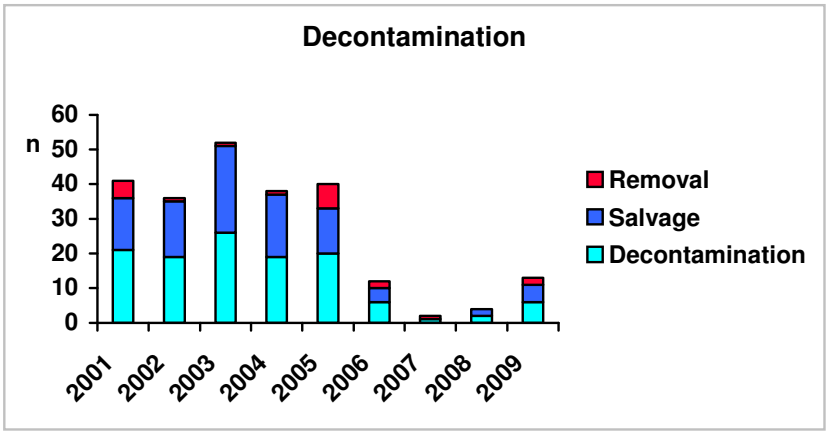


Comments:

- There was a reduced rate of catheters malfunctioning in 2009 (5%) compared to previous audits
- The number of tunnelled CVC that bleed post insertion has decreased (8%) in 2009. From the review of the bleeding patients from the post insertion of tunnelled CVC in 2008 and liaising with the radiology department less incidences of bleeding complication has been reported in 2009.



	Catheter related bacteremia (CRB) rate	Exit site infections (ESI) rate
2009	8% (0.93 episodes/1000catheter days)	10% (1.17 episodes/1000catheter days)
2008	9% (0.91episodes/1000catheter days)	8% (0.83 episodes/1000catheter days)
2007	6% (0.74 episodes/1000catheter days)	10% (1.26 episodes/1000catheter days)
2006	12.5% (1.24 episodes/1000catheter days)	11% (0.93 episodes/1000catheter days)
2005	28% (3.0 episodes/1000catheter days)	17% (1.7 episodes/1000catheter days)

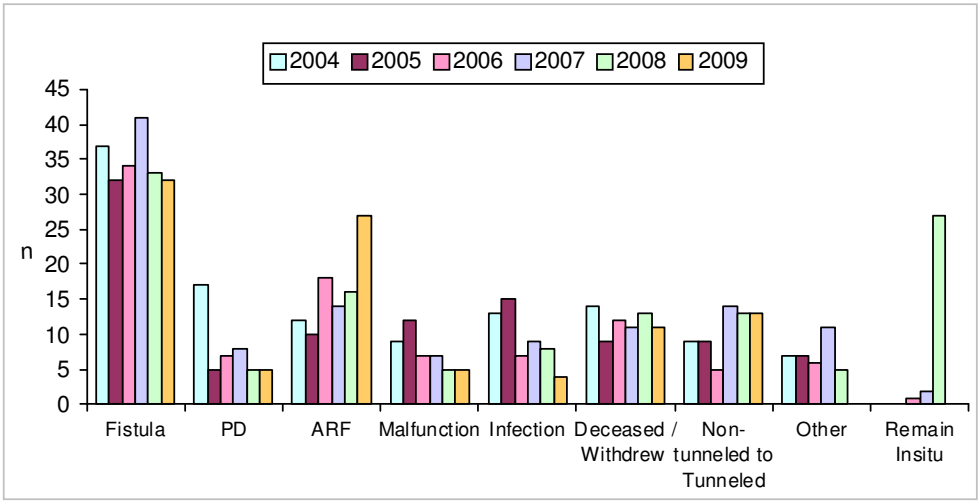


Comments:

- The use of the gentamicin/heparin lock instilled after each catheter is accessed continues to reduce catheter related bacteremia rates. In 2007 the prophylactic lock was implemented in non-tunnelled catheters which further reduced the infection rates. There were no femoral inserted non-tunnelled catheter infections in 2009.
- KDOQI 2006 guidelines recommend tunnelled catheter related infections <1.5 episodes/1000 catheter days, <10% at 3 months and <50% at one year (NKF-KDOQI 2006). In 2009 we have met the KDOQI benchmarking for tunnelled catheter related infection at (8%) which is 2% less than the (KDOQI) benchmarking of 0.93 episodes /1000 catheter days which is less than 1.5 episodes/1000 days (KDOQI 2006).

- Gentamicin levels are monitored randomly in all patients with CVC with all results <0.5mg/L indicating no toxicity. There were no gentamicin resistant organisms detected in this group.
- In July 2008 the CVC exit site care procedure changed to Chlorhexidine instead of Betadine after Bard allowed Aqueous Chlorhexidine to be used on tunnelled cuffed CVC. This change in protocol continues to reduce ESI in 2009.
- The main causative organism in 2009 for CRB and ESI was MRSA. In 2009 six catheters required decontamination two catheter required removal due to MRSA septicaemia and four catheters were salvaged. Since the implementation of the prophylactic antibiotic heparin lock in 2006 the need to decontaminate infected catheters has reduced. The cost of decontamination (medications alone) is approximately $310.

Reason for catheter removal



Comments:

- The main reason for removal of CVC remains fistula maturation.
- The number of CVC removed due to CRB, ESI or clinical sepsis continues to be low since implementation of the gentamicin/heparin lock. 'Other' indicates patients transferred to other units, insertion problems and tunnel breakdown.
- The average number of days non-tunnelled catheters were insitu in 2009 was 9, which was higher than in 2008. The average number of days a tunnelled catheter was insitu was 107 days, which was shorter than in previous years.

HAEMODIALYSIS WATER QUALITY

Background and Activity Levels

- The water quality is audited on 4 West incenter and satellite dialysis unit 2nd monthly for micro-organisms, Aluminium, chloramines and total chlorine.
- The U.S. Association for the Advancement of Medical Instrumentation (AAMI) guidelines (Association for the Advancement of Medical Instrumentation (AAMI) 2006) and European Best Practice Guidelines (EBPG) are used to provide a standard to monitor water quality.
- Full element analysis is conducted biannually and endotoxins are collected yearly.
- The hospital biomedical department previously collected the water specimens, followed up abnormal results and maintained the equipment. Gambro now performs this task.
- The audits are required to prevent infection amongst haemodialysis patients and maintain patient safety.
- Daily chloramine testing of central RO water is performed by nursing staff at each site using a chlorine test kit.

Outcome being measured

St George Hospital dialysis		
Date	**H2O (<200 CFU/mL)**	**Endotoxin (<2 EU/mL)**
Jan 09	Normal range	
Feb 09	Normal range	
Apr 09	CRO normal WRO>250. Repeat May <1CFU	
Jun 09	Missed	**<0.03**
Jul 09	WRO 1200 >2500CFU removed, WRO 1191 87CFU resample OK	
Sep 09	WRO 1188 >2500 removed	
Nov 09	Normal Range	

Sutherland Satellite Unit		
Date	**H2O (<200 CFU/mL)**	**Endotoxin (<2 EU/mL)**
Jan 09	Normal range	
Feb 09	Normal range	
Apr 09	Normal range	**<0.03**
Jul 09	Normal range	
Sep 09	Normal range	
Nov 09	Normal range	

St George and Sutherland Hospital Elements testing	
Date	**Element Testing**
Feb 09 (TSH)	Normal range
Apr 09 (4W)	Normal range
Oct 09 (both)	Normal range

Comments:

- The guidelines indicate action is required when results are >50CFU/mL. Microbiology water samples taken throughout the year resulted in the removal of two portable ROs (WRO) which were retested and returned to service when results returned to normal, and the retesting of another due to >50CFU/mL.
- The unit was provided with new WROs during the year.
- Testing was missed in June at both sites, but performed in July by Gambro.
- Element testing including Aluminium testing occurs twice per year; results were within the guideline recommendations.

Identified limitations and strengths:

- Due to good water quality results in 2009, hi flux dialysis commenced on a selected group of patients after consultation with Nephrologists.
- Gambro has performed the water testing throughout 2009 for both St George and Sutherland units. Communication from Gambro has improved since 2008 with results emailed to NUMs and the CNC to improve the follow up of out of range tests.

Satellite Haemodialysis Unit Patient Satisfaction Survey

Conducted by Louise Jordan, NUM Satellite Dialysis Unit
28th and 29th October 2009

Background/Aim
This survey was performed to:

1. Assist in ascertaining the satisfaction of patients having their Dialysis treatment within the Satellite Dialysis Service.
2. Develop a formal audit of patient satisfaction in the new unit.

Method
A survey was distributed to all patients who wished to voluntary participate, being confidential and anonymous. It was a no-validated in house tool to measure comfort, cleanliness, patients feeling of security and support services.
25 surveys were distributed with 22 returned - a return rate of 88% .

Findings

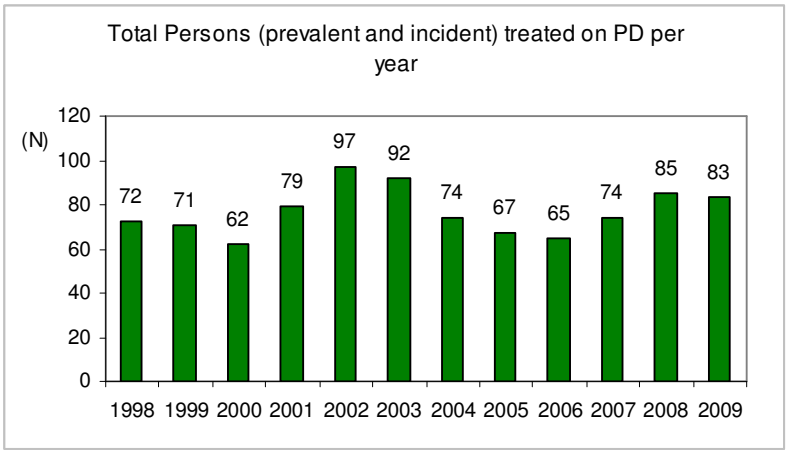
- Generally the patients are comfortable in the new surroundings of the Satellite Dialysis Unit with comments made about the spacious design and the "light and airy feeling".
- Majority of patients felt safe and secure whilst visiting the unit and happy with staff professionalism and helpfulness.
- Food services – 56 % are satisfied with the food provided a few patients elect to bring their own food. 33% were not satisfied with the sandwiches mainly commenting on the lack of variety of fillings
- Cleanliness – 100% satisfied with the cleanliness of the Unit both waiting area and clinical area.
- 90% of patients were satisfied with their information being appropriately educational.
- Allied Health services - 68% utilized the Dietetic service and Clergy was utilized at 36 %. The feed back was that patients preferred to keep their religious beliefs personal.
- Podiatry service has not commenced yet but the survey has informed patients that it will soon be available for Assessment and Educational information.

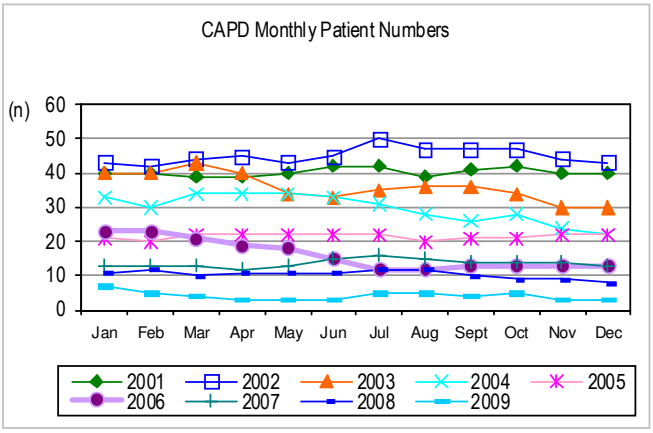
Plans following this survey

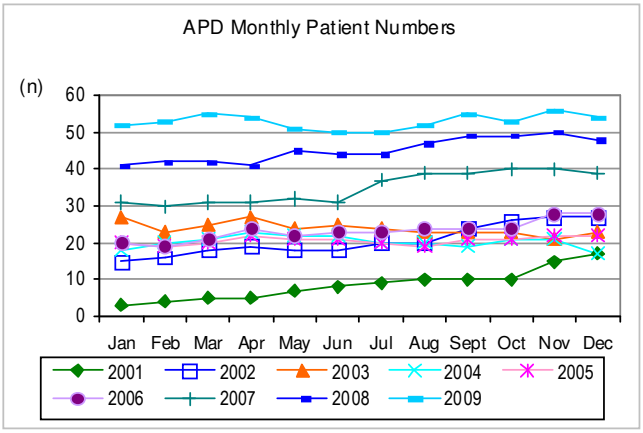
- Ongoing Risk management assessments and safe work practices in place reviewed in preparation for Numerical Profile 2010.
- Consultation with Dietetics services have changed the variety of sandwiches.
- Commencement of new Dietician for 12 months to improve follow up service.
- Ongoing quarterly cleaning audits to ensure cleanliness of environment is maintained.
- Commencement of Podiatry services in January 2010.
- Patients' satisfaction Survey to be annually reviewed again in November 2010.

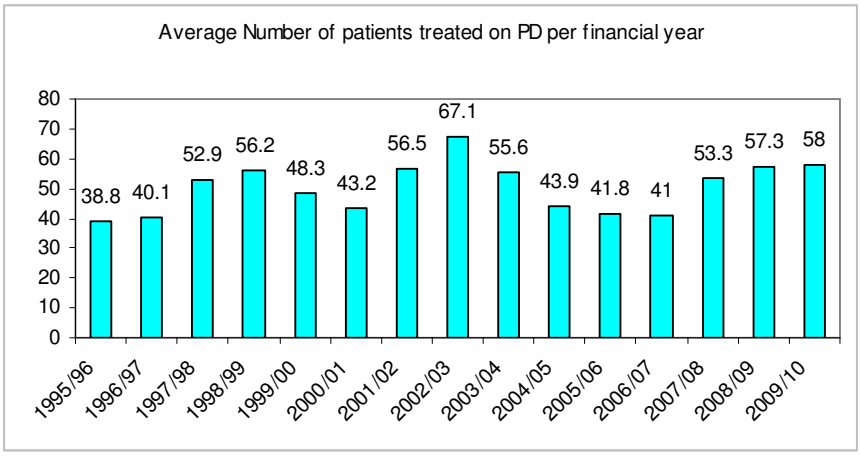
PERITONEAL DIALYSIS

The peritoneal dialysis (PD) unit has had a minimal decreased in the number of prevalent and incident patients in 2009 with a gross loss of 2 patients. A total of 83 patients were treated on PD during the year (including hospital IPD) compared to 85 in 2008 and 74 in 2007. In December 2009 the proportion of patients receiving automated peritoneal dialysis (APD) was 95%, and the proportion of continuous ambulatory peritoneal dialysis (CAPD) was 5%. Our APD population is still over and above the proportion reported by ANZDATA of 57%. This has been a deliberate strategy to enhance the appeal of PD for our patients thereby increasing the number of home patients.









Comparison with:

The ANZDATA 32nd Annual Report 2009 (data to Dec 2008)

- ANZDATA results show an increase in the prevalence of people using automated peritoneal dialysis (APD), up 9% Australia wide. The St George peritoneal dialysis unit continues to increase the numbers of patients on automated peritoneal dialysis, in December 2009 the APD population increased by 9% from 2008 while the CAPD population continues to decline; down by 9% from December 2008.

APD	*ANZDATA 57% (1249/2205)*	*St George 95%*
CAPD	*ANZDATA 43% (956/2205)*	*St George 5%*

Patient Flow – Peritoneal Dialysis

Balance carried forward: Peritoneal dialysis patients as at 01.01.2009 (n=56)

In	New Patients	21	
	New patient transfer from Haemodialysis	5	
	Returns from HD	2	
	On hospital IPD 31.12.2009	1	
	In Subtotal		29
Out	Transplants	3	
	Transfer to other units	2	
	Transfer to Home Haemodialysis	0	
	Temporary Transfers to Haemodialysis	1	
	Permanent Transfers to Haemodialysis	8	
	Return of renal function	1	
	Withdrawal from dialysis	6	
	Deaths on CAPD	7	
	Out Subtotal		28
	Net Loss	**-1**	
	PD patients at end of 2009 (includes hospital IPD)		**57**

Peritoneal Dialysis activity rates using the ANZDATA 32nd annual report for comparison

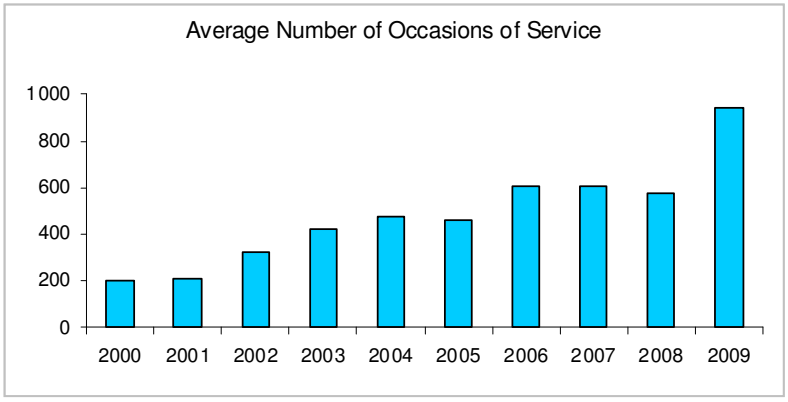
	St George 2008 (%)	St George 2009 (%)	ANZDATA 2009 (%)
Transplants	2	5	8
Change to haemodialysis permanent	28	14	21
Change to haemodialysis temporary	9	2	5
Deaths on Dialysis (PD)*	10	12	10
Deaths due to withdrawal*	5	11	3

Note: The rates are calculated using the total number of patients on peritoneal dialysis at 31.12.2009 (n=57), the method used by ANZDATA to calculate their rates.

Patients changed to haemodialysis for a variety of reasons; surgery including hernia (n=1), infection (major cause) (n=4), dialysate leak (n=2), changed mind (n=1), access problems (n=1).
The percentage of deaths on peritoneal dialysis is 2% higher than the ANZDATA Australian rate; the withdrawal rate is 6% higher than the previous year and 11% higher than ANZDATA 2009 (ANZDATA 2009).
The percentage of permanent transfers to haemodialysis reduced by 14% from 2008 and is lower than ANZDATA 2009. Temporary transfers have also reduced from 2008 and are lower than ANZDATA . There are less PD patients changing modality to haemodialysis in 2009, but we do continue to have patients that change their minds once training commences which has prompted the commencement of a pre theatre visit to the PD unit for education and assessment. This will be evaluated during the year.

Workload

In 2009 the PD unit provided 158 training days for PD patients with training time varying from 3 - 30 days (average 12 days). There were 11318 occasions of service; these include nurse outpatients, doctor outpatients, home visits, patient/staff education and phone contact. Data collection is evolving with an aim to become paperless.



The CAPD clinic provides services to inpatient and outpatient peritoneal dialysis patients; dialysis and transplantation clinics, post operative Tenckhoff insertion inpatient follow-up, inpatient dialysis support, home visits, phone contact and dialysis training in conjunction with ongoing patient education.

Admissions in 2009

There were 153 hospital admissions over 2009 which can be broken down into the categories in the following table.

Peritonitis related	34	Drain problems	1	Hernia repair	2	Leaks	3
Exit site infection	3	Blocked catheter	3	Vascular access	2	Amputations	4
PD Catheter theatre	41	Other medical reasons	38	Contamination	2	Under dialysis	3
Hospital IPD	5	Transplant	3	Non renal admission	6	Respite care	1
Fluid overload	2						

On analysis of the peritonitis admissions, average length of stay was 10 days with a minimum of 3 days and maximum of 21 days. Patients who required >10 days generally had other problems requiring longer stays for complex medical, respite or psychological reasons. Medical reasons are the second major factor in PD patient admissions, these admissions include myocardial infarctions, cerebral vascular incidents, falls, pneumonia, constipation, UTI and accident trauma.

PD Dialysis Adequacy, Biochemical and Haematology targets

Aim

1. To compare dialysis adequacy using haematological markers, biochemical markers and Kt/V with previous audits; October '09 (54), April '09 (56), October '08 (58), April '08 (47). These are performed at 6-month intervals as per the CARI recommended guidelines with the exception of dialysis adequacy, which is conducted annually in October unless required earlier.

2. To ensure all patients have had a PET test performed to establish a baseline membrane transporter status.

3. To provide members of the renal team with individual patient's dialysis adequacy and biochemical and haematological marker results.

Background

An audit of biochemical and haematological markers and dialysis adequacy (Kt/V) was conducted 6 monthly for the current dialyzing PD patients and compared to previous audits.

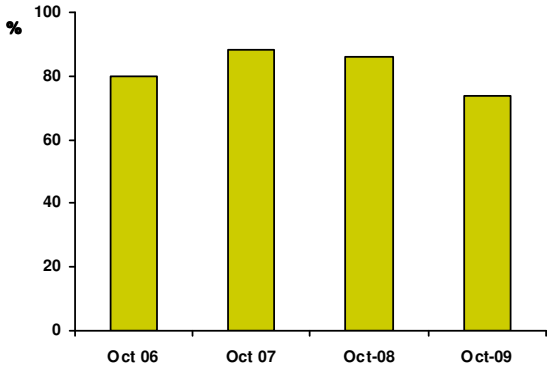
Method

The CAPD clinic nurses and consultant renal physicians arrange the collection LFT, UEC, FBC, Iron studies, PTH, Mg, Ca, PO_4 and Lipids as per routine 6 monthly bloods for PD patients.

Kt/V testing was coordinated by the CAPD nurses as per protocol as was the PET testing.

The renal CNC collates these results into spreadsheets using Microsoft Excel and Minitab v15 or SPSS v17 for statistical analysis. These results are compared to the previous year and measured against the benchmark set by the CARI guidelines (CARI 2006). If any action is required, a meeting is organised with the peritoneal dialysis unit and actions are taken to resolve issues. A unit member will then be nominated to take responsibility for the action while the CNC will follow up and report the results six monthly.

Percentage of patients who achieved a Kt/V ≥ 1.6

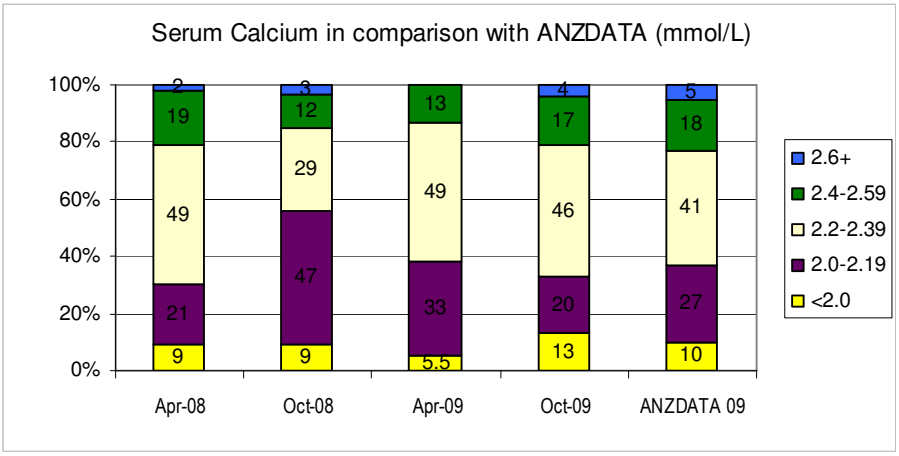


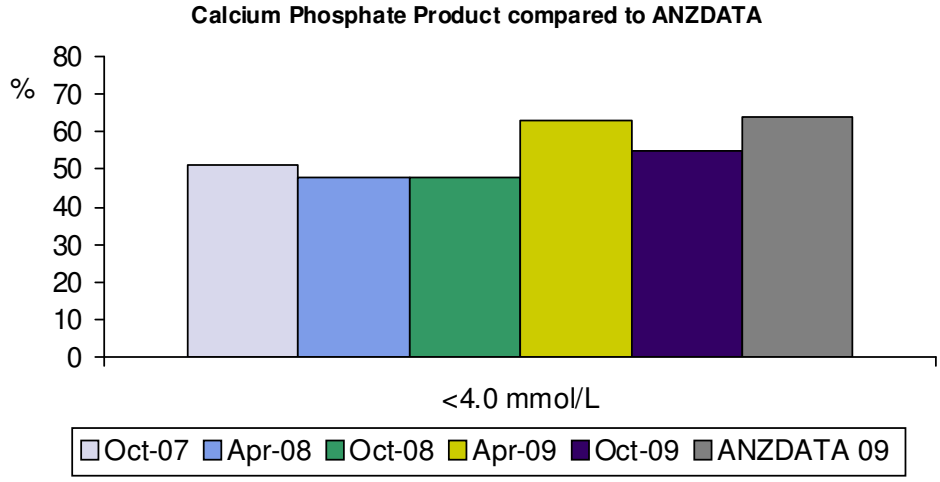
Statistics:

Oct 08 Mean: 2.36, SD 0.8
Oct 09 Mean: 2.16, SD 0.7

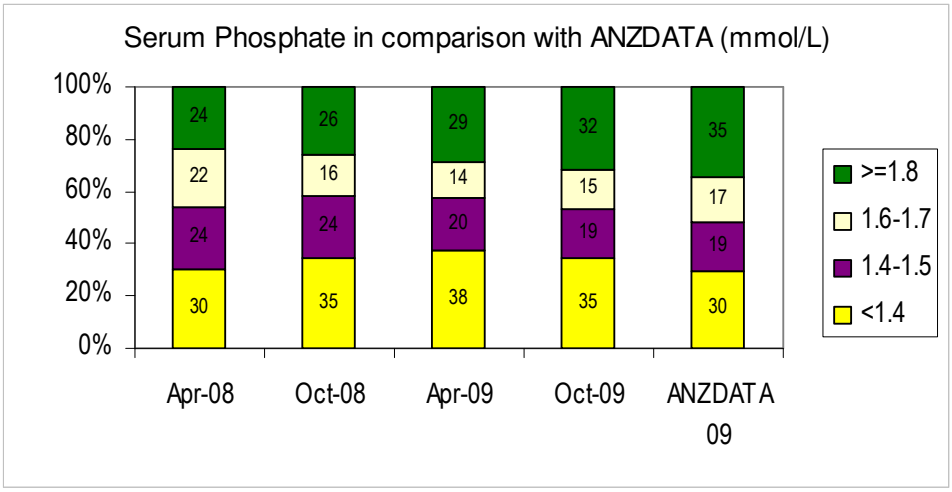
Results: % of patients falling within the target range

Parameter	Target	Apr 08	Oct 08	Apr 09	Oct 09	ANZDATA 09
Ca	2.25-2.58 mmol/L	55	33	50	46	-
Corr Ca	2.1-2.4 mol/L	48	48	46	34	-
PO4	0.8-1.6 mmol/L	52	57	55	52	49
$CaPO_4$	<4.0 mmol/L	60	60	63	55	64
Ferritin	200-800 ug/L	58	64	67	71	52
Fe Sats	20-50%	74	59	72	78	68
Mg	0.74-1.03 mmol/L	58	53	57	60	-
Albumin	33-48 g/L	43	28	41	20	-
Bic	20-30 mmol/L	92	90	89	83	-
PTH	10-15 nmol/L	14	11	18	23	-
KT/V	≥ 1.6		86		74	-
CCL	>50L (L & LA) or >60L (H & HA)[1]		76		62	-





[1] Transporter status: L=low transporter, LA=low average, H=high, HA=high average



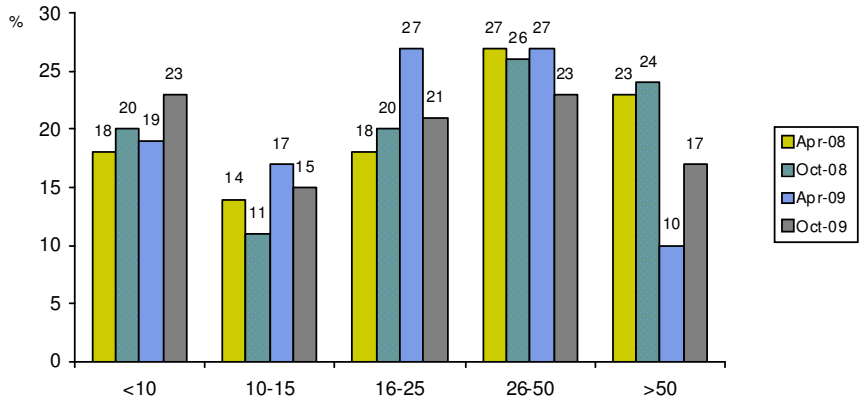
Calcium and Phosphate

- Calcium results show fluctuation over 2009 with results slightly better than the 2009 ANZDATA annual report (ANZDATA 2009). The Oct 09 average calcium was 2.25 mmol/L compared to 2.21 mmol/L in Oct 08.
- Phosphate results indicate that PD patients phosphate control has deteriorated slightly with a higher percent >1.5mmol/L, but the mean results show no change (mean results 1.6mmol/L in both Oct 08 and 09).

PTH

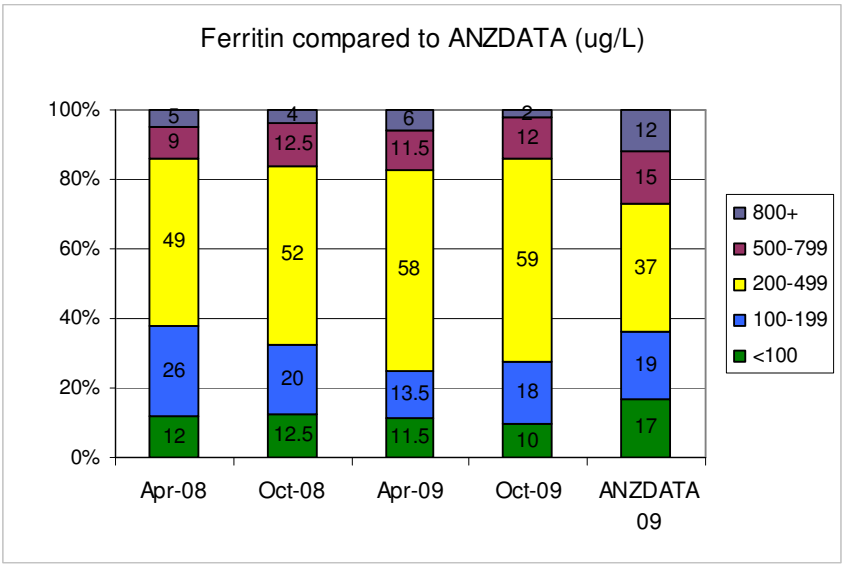
- In October 2009, 15% of peritoneal dialysis patients had a PTH within the recommended limits set by CARI of 10-15 nmol/L, 23% had a level less than 10 while 21% were between 16-25 and 40% were >25. There was a reduction in the percent of patients with higher PTH in 2009.
- The maximum recorded PTH in October '09 was 183, the mean was 27.8 (median 28) nmol/L.

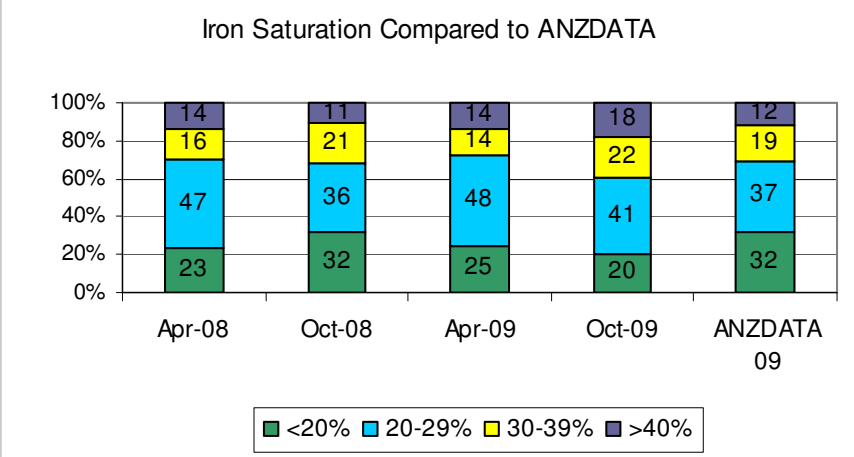
PTH (nmol/L)



Iron

- The CARI guidelines recommend the administration of supplementary Iron to prevent iron deficiency and to achieve and maintain an Hb concentration of 110-120 g/L (CARI 2006), with or without the use of an erythropoiesis-stimulating agent. Bolus administration of IV iron (Ferrosig 500mg) is easy to administer and is the treatment of choice in the St George renal unit. The Ambulatory Care unit administers this by appointment after the patients have been prescribed the drug by the renal registrar or consultant. Nurse initiation of this process commenced in early 2008 remains an ongoing project.
- There has been no statistically significant improvement in the Ferritin and Iron Saturation results, but the Ferritin graph demonstrates an increase in the percent of patients within the range 200-800ug/L since nurse initiation commenced in 2008. Results for both Ferritin and Iron Saturation appear better than those benchmarked by ANZDATA for all patients (regardless of ESA usage).

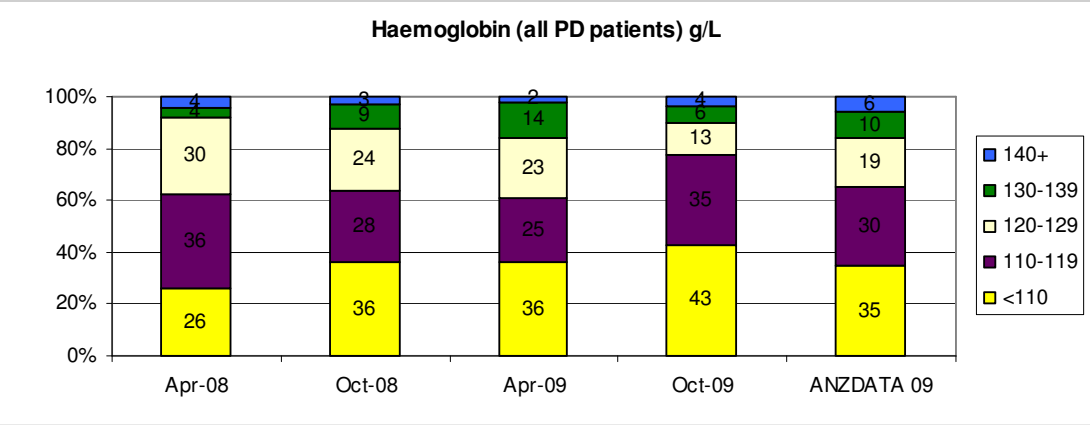


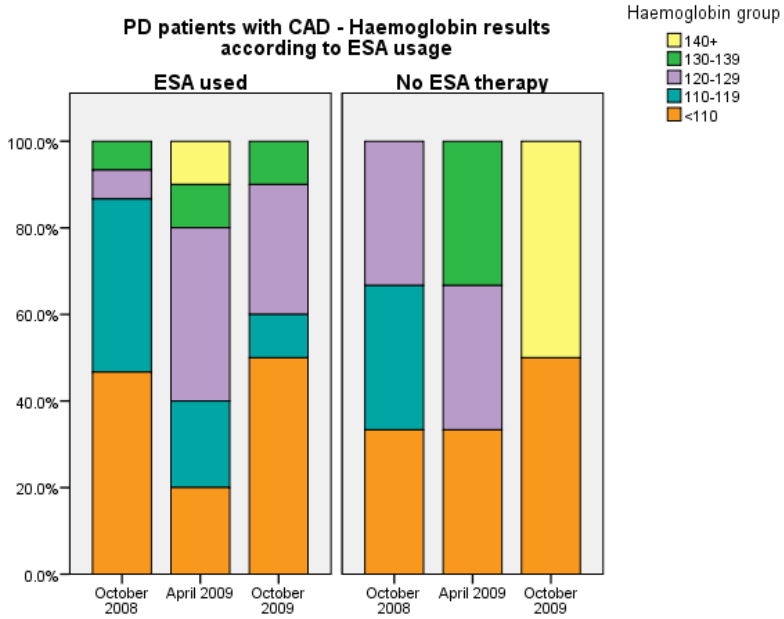


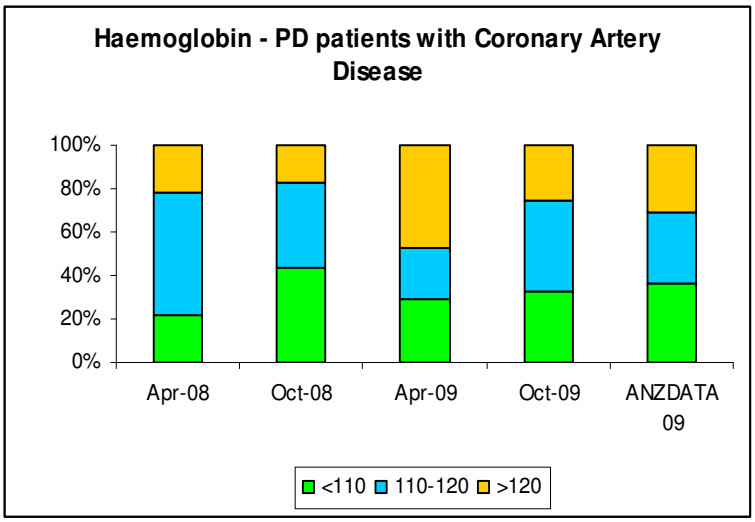
Haemoglobin

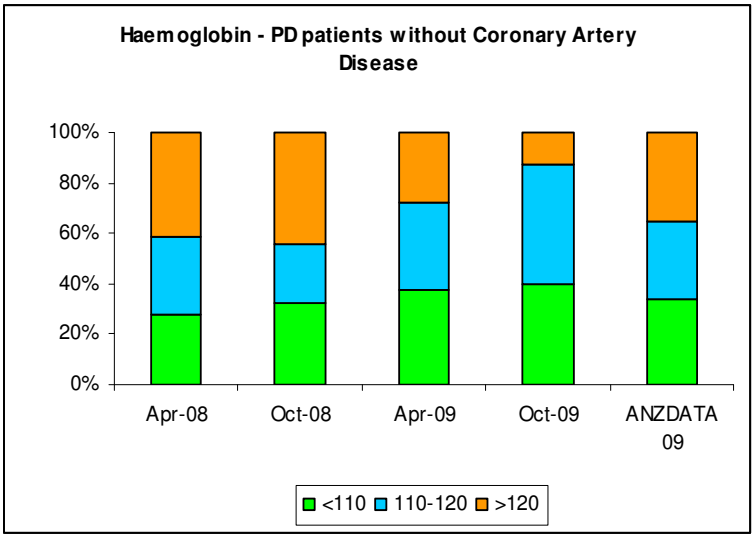
Haemoglobin (Hb) has been examined using cardiovascular disease (CAD) as a determining factor. Erythropoiesis-stimulating agent (ESA) is analysed amongst the known coronary artery disease (CAD) patients due to evidence of increased risk of adverse events when the Hb is greater than 130 g/L (NKF-KDOQI 2007).

- The October 2009 PD population showed an increase in the percent of patients with haemoglobins less than 110g/L, but reduced percent of patients with haemoglobins greater than 120g/L compared to ANZDATA.
- CAD patients on an ESA show a lower percent of patients with a haemoglobin between 110-119g/L and an increase in the 120-129g/L compared to Oct 08. There were only two patients with CAD not on an ESA in Oct 09.



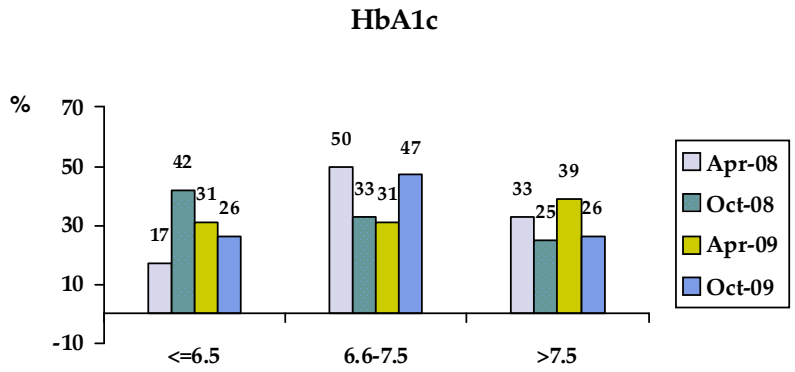






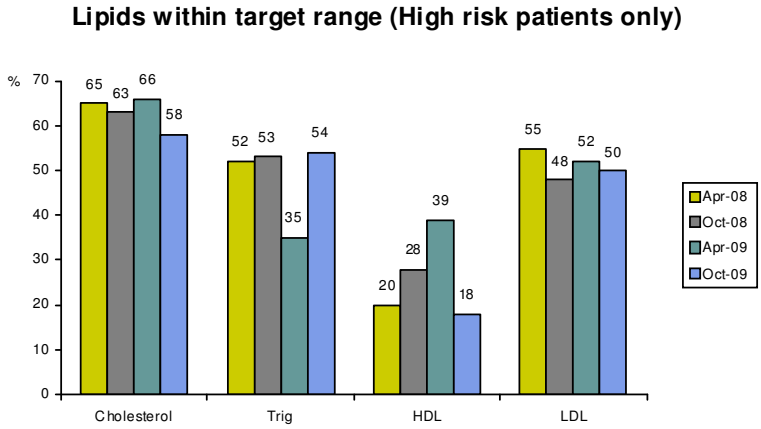
- In October 2009, 32% of the patients were known or suspected of having coronary artery disease (CAD).
- Analysis of haemoglobins in CAD and non CAD patients in 2008/09 reveal a greater percentage of patients with haemoglobin less than 110g/L, improving haemoglobins in the non cardiac disease group, but some fluctuating high haemoglobin levels within the known cardiac disease group indicating the need for continued monitoring and action required (ESA management) for this group where possible. Eight PD patients with CAD, and 15 without CAD, had an Hb <110g/L. Management of these patients usually occurs during clinic visits, this is due to pathology being ordered at this time. Patients and carers find it confusing when they are sent pathology forms outside of these visits resulting in a flood of phone calls to the unit when this has been attempted in the past. The inability to coordinate pathology similarly to haemodialysis makes haemoglobin management more intricate.
- Monthly patient case management meetings with individual nephrologists implemented in late 2009 are an ideal time to ensure PD patients Hb, ESA therapy, and other biochemical and adequacy markers, are managed more effectively.

HbA1c (Glycosylated Haemoglobin)
Measuring the HbA1c gives an average glucose level of the past 8-12 weeks. October 2009 showed an improvement in glucose control in the diabetics. New non-dialysis studies suggest an HbA1c <7 is good.



Lipids
Lipids are collected for high-risk patients (having or suspected of having: diabetes, coronary artery disease, cerebrovascular disease, peripheral vascular disease), 57% of PD patients were classified as high-risk in October 2009.

Triglyceride levels have improved in 2009 while Cholesterol, HDL and LDL levels deteriorated, no statistical significance was found using Kruskal-Wallis Test.



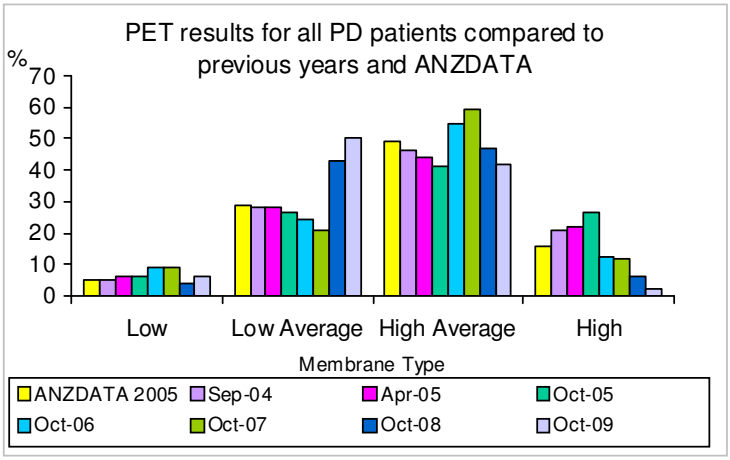
PET (Peritoneal Equilibrium Test) Results

PET measures the peritoneal membrane type, which is important to know when individualizing patient dialysis prescriptions. Each membrane type has different transport characteristics, which determines what PD prescription/modality (APD or CAPD) would provide the patient with the best outcomes.

The first PET is performed approximately 6 weeks after initiating peritoneal dialysis.

The St George Hospital peritoneal dialysis unit performs one PET on each peritoneal dialysis patient after dialysis treatment commences and further tests are undertaken if a change in transport status is suspected. CARI recommends an annual PET if there is clinical evidence of a change in transport status (eg clinically significant decrease in ultrafiltration or unexplained fluid overload) (CARI 2006).

PET results show an increased percentage of patients with low average (LA) membranes. Due to the majority of our patients using APD which usually uses short dwell times, patients programs are adjusted to compensate for low or low average membranes; this is to keep patients on their choice of dialysis as long as possible until dialysis solute clearance or ultrafiltration becomes inadequate and a change to CAPD or APD with a day dwell is required.



INFECTIONS IN PERITONEAL DIALYSIS

Aim

1. Identify peritonitis rates and exit site infection rates in the peritoneal dialysis population, expressed as incidence per patient month, peritonitis free dialysis time and number of episodes per patient years.
2. Identify number of episodes per patient.
3. Identify causative organisms.

Background

Data on peritoneal infections are collected using the RISC and POET databases, and a review of the patient records. These statistics are collected retrospectively on a yearly basis and compared to the previous results.

Method

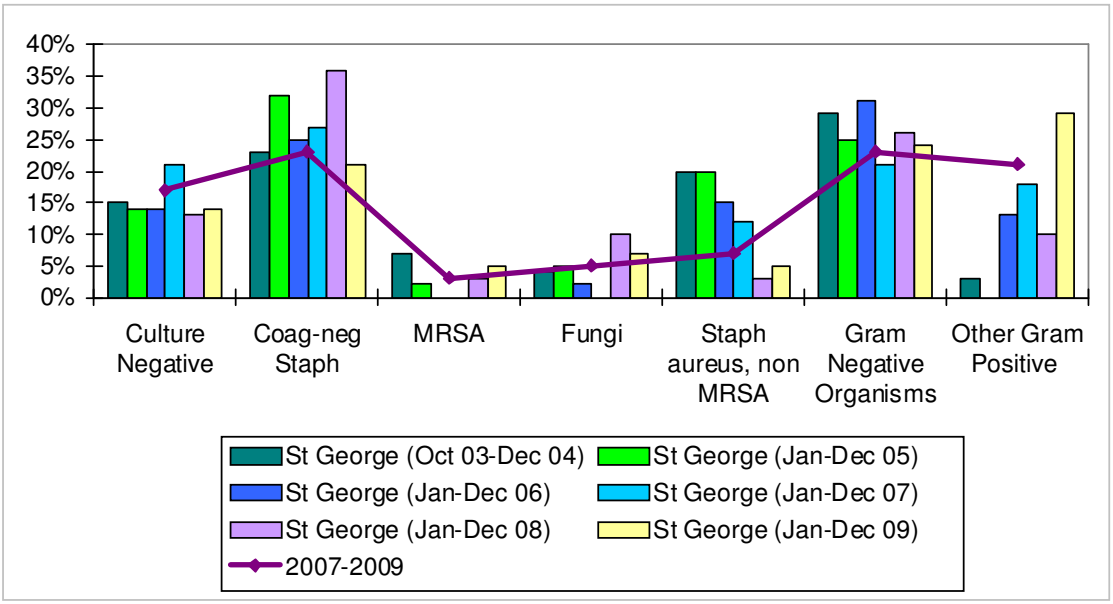
1. Review PD record books for episodes of peritonitis and exit site infections.
2. Review the Poet 2.1 database for episodes.
3. View patient records for admission and treatment information.
4. Peritonitis Episode Forms (ANZDATA) are used to collect information regarding every peritonitis event, to accurately track episodes and treatments. This data is then analysed using the statistical program Minitab v15.
5. Recurrent infections, defined as 'within four weeks of the last antibiotic dose (or within five weeks if intermittent Vancomycin used) for the same organism' (ANZDATA 2008) are classified as the same episode, and infections that occurred while not on peritoneal dialysis are not included as per ANZDATA methods unless specified.

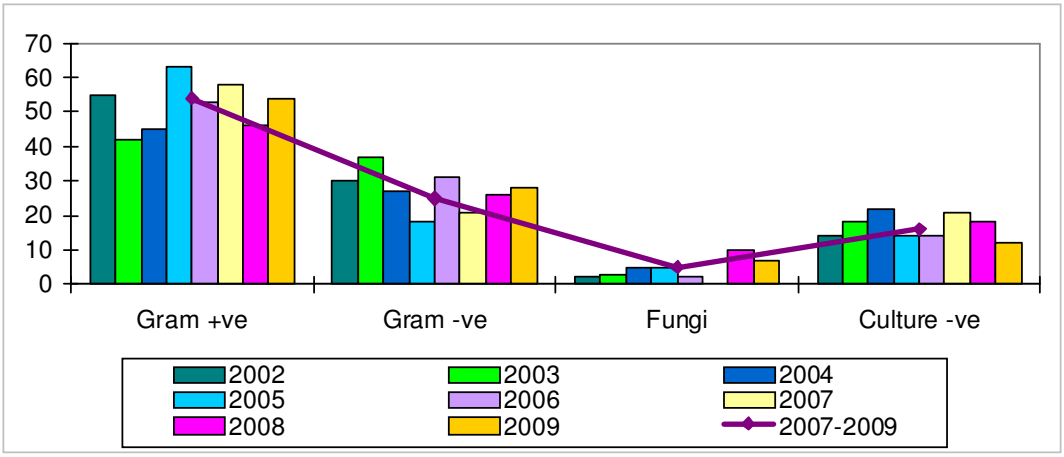
Outcomes

- The rates of infections from 1998 to 2009 continue to show improvement.
- Causative organisms for peritonitis infections show higher fungal and gram negative organisms but less Staph compared to ANZDATA in 2008.

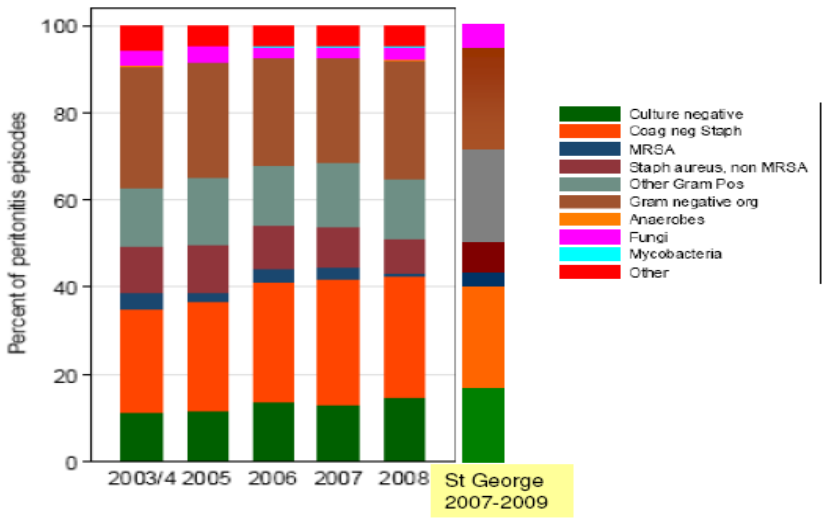
	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009
Total patients	72	71	62	79	97	92	74	67	65	74	85	83
Peritonitis episodes	118	81	69	45	51	62	42	34	40	28	27	26
Patients with at least 1 episode of peritonitis	n=47 65%	n=42 59%	n=26 42%	n=26 33%	n=37 38%	n=38 41%	n=32 43%	n=31 46%	n=28 43%	n=21 28%	n=22 26%	n=21 25%
Patients with at least 1 episode of Exit site infection	n=39 54%	n=43 60%	n=33 53%	n=21 27%	n=32 33%	n=38 41%	n=14 19%	n=16 24%	n=14 22%	n=12 16%	n=12 14%	n=13 16%

Peritonitis Causative Organisms





Percentage of Peritonitis Episodes



Compared to ANZDATA our peritonitis organisms show less gram positive, more Coag Neg Staph and slightly more gram negative and less fungal infections. ANZDATA 2009 reports a trend towards less gram negative organisms.

ANZDATA graph from chapter 6 at http://www.anzdata.org.au/v1/report_2008.html

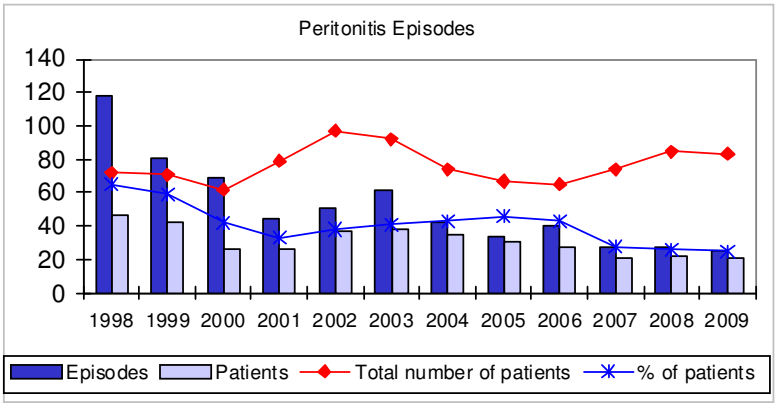
Change of treatment as a result of peritonitis

The peritonitis data is measured to determine the rate of transfer to haemodialysis *as a direct result of peritonitis*. The results are listed in the following table:

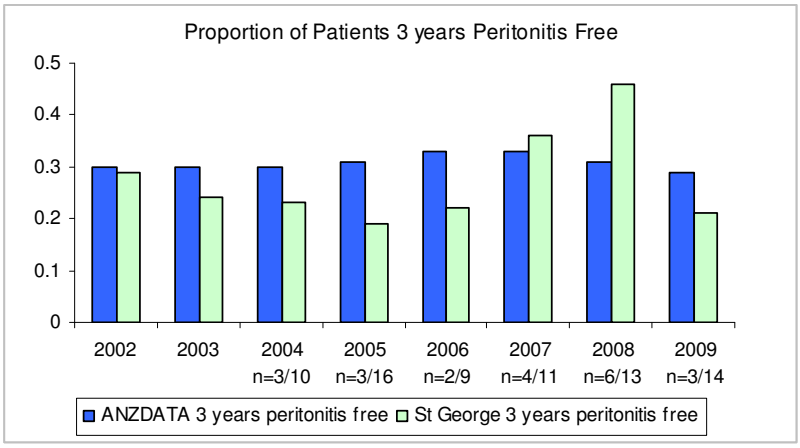
Change in treatment as a direct result of peritonitis (%)	2005	2006	2007	2008	2009*
Interim Haemodialysis	9	9	10	6	0
Permanent Haemodialysis	11	13	13	18	15(5/33)
Catheter removed	20	22	20	24	15 (5/33)

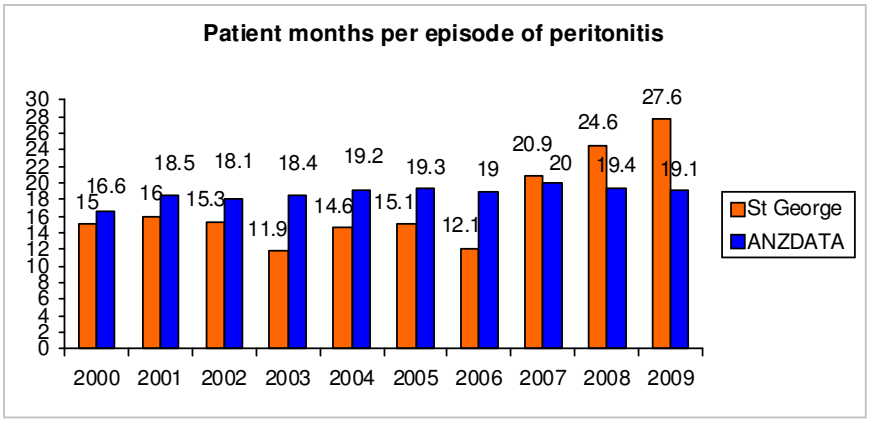
**includes recurrent infections*

Peritonitis episodes and rates comparing previous years and ANZDATA



- The number of episodes of peritonitis and the number of patients who had peritonitis over the years 1998 – 2009 has shown progressive improvement. There are significantly less infections since the commencement of data collection in 1998. This can be attributed to better connection systems and patient training. Since data collection commenced we have been able to objectively examine change over time.
- The proportion of peritoneal dialysis patients who are 3 years peritonitis free has decreased to 21% of patients who have been on dialysis >3 years, this is a 25% decrease from 2008. This is related to loss of long term patients who transferred to Hdx, to other units, died or unfortunately developed peritonitis.





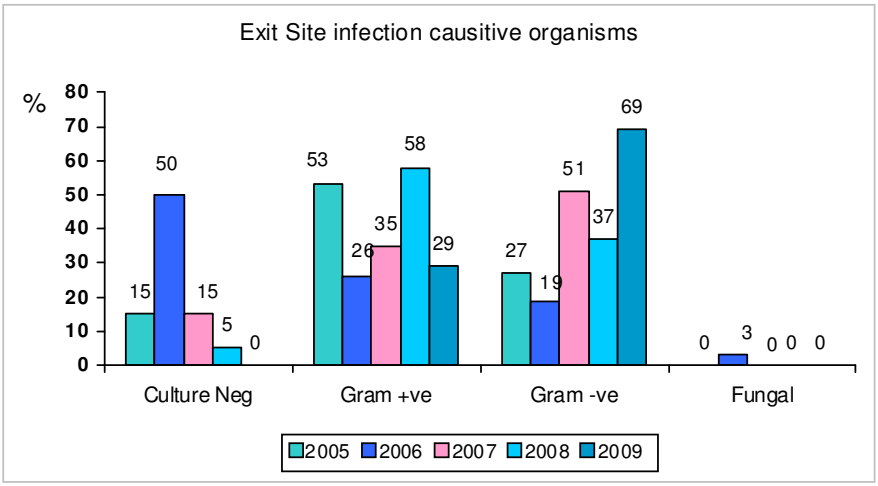
- Patient months per episode of peritonitis compared to ANZDATA Australian results show improvements for the second year in a row, an improvement over and above the ANZDATA result meaning there is a greater length of time to a peritonitis episode. This result may possibly be due to the high percentage of patients using APD. The peritonitis rate over 3 years, 2007 – 2009 is 1/23.9 months. ANZDATA 2009 reports the APD rate at 1 per 20.3 months, St George APD rate over 2007-2009 is 1 per 23.8 per patient months. ANZDATA peritonitis free survival is calculated to the date of first peritonitis.

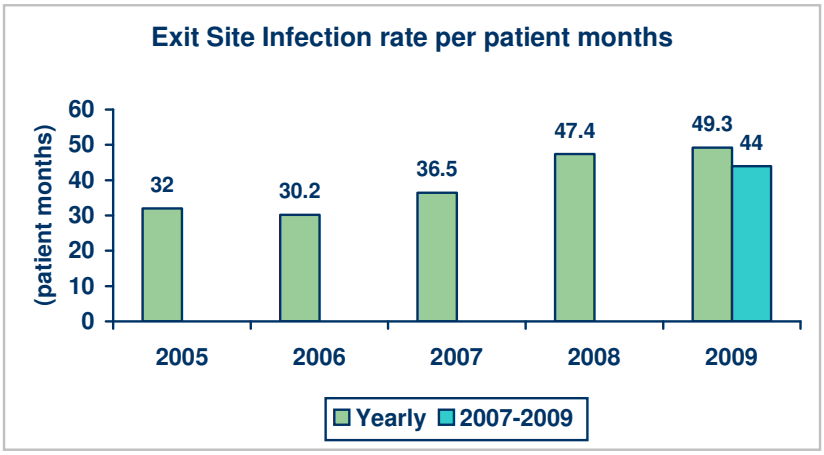
Comments

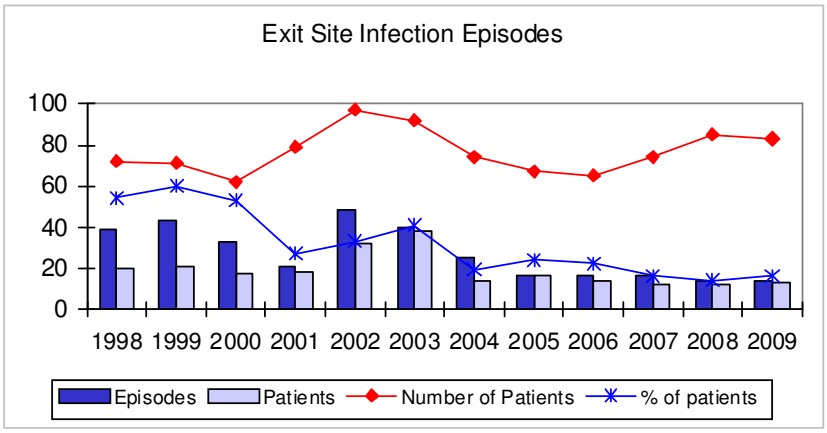
- ANZDATA results are the benchmark used for comparison with St George results. The ANZDATA peritonitis report covers all age ranges and we are unable to present these results without the paediatric data included, unlike other areas of the report where this data can be excluded.
- The peritonitis incidence per patient months has improved to 1/27.6 months. This betters the benchmark set by the Australian 2009 ANZDATA results.
- The percentage of patient's peritonitis free at 3 years has fallen to 21%.
- The peritoneal dialysis unit staff employed a strong focus on home visits in late 2009 to identify and rectify any problems that may contribute to infections in conjunction with identifying gaps in education. These home visits have been evaluated after 3 months and the results of these will be comprehensively reported to the renal department.
- Comprehensive pre Tenckhoff insertion education commenced to identify any problems such as poor eyesight, storage problems, social problems, strength or dexterity problems or lack of acceptance of dialysis. This was implemented in order to have early rectification of problems prior to surgery and reduce possible infection risks.

Exit Site Infections (ESI)

The following graphs represent the exit site swab results from 2005 to 2009 and the numbers of patients / episodes of exit site infection. Exit site infections have reduced significantly since data collection began in 1998. There are significantly less repeat infections and a continual decline in the percent of patients who have infections. The percent of patients who get ESI has reached a plateau despite increased numbers of patients.







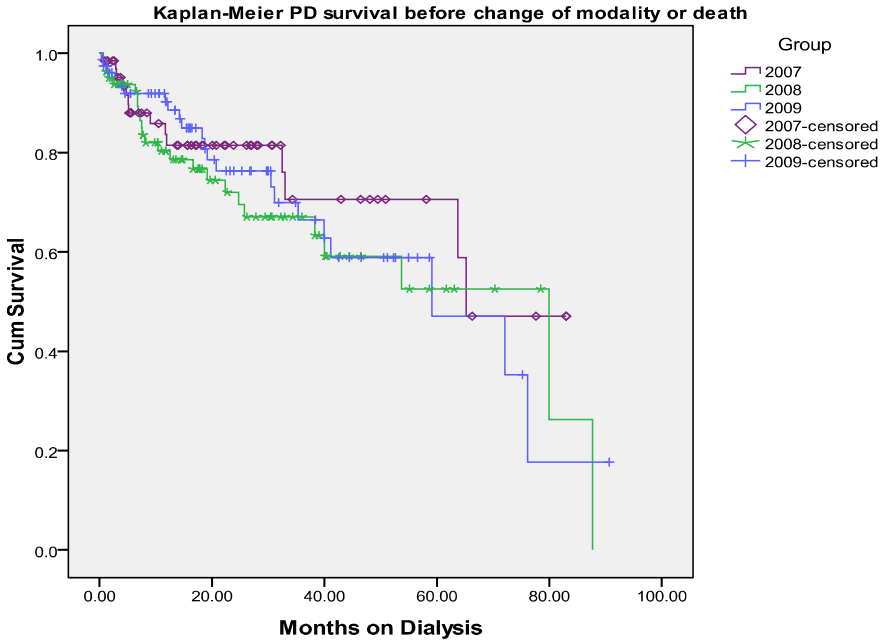
Comments:
ANZDATA does not collect data on Exit Site Infections; therefore there is no Australian benchmark data with which to compare. However, our Unit shows continuous improvement in this outcome.

Technique failure

- Nine patients transferred to haemodialysis either temporarily of permanently during 2009, this is a reduction from 2008. St George has a significantly lower percent of patients that change modality for social reasons than ANZDATA.
- ANZDATA (2009, p. 6.19) reports the most common primary cause of technique failure (ceasing peritoneal dialysis) as 'social reasons' (45%) and infections as the second most common cause (26%). Our primary cause of failure in 2009 is 'total dialysis failure' (44%) originating from blocked catheters, hernias and dialysate leaks and infective reasons (44%). Numbers of failures are low compared to 2008.

Primary reason for technique failure	***St George 2007***	***St George 2008 n=21***	***St George 2009 n=9***	***ANZDATA 2009***
Infective	36%	25%	44%	26%
Total Dialysis/Technical Failure (inadequate dialysis, leaks, surgery, mechanical)	57%	65%	44%	40%
Social (patient choice, failed training)	7%	10%	1%	45%

Technique survival and Survival on Peritoneal Dialysis



Excluded from analysis are transplants and transfers to other hospitals, included are deaths which include withdrawal from dialysis.The time at which half the patients have failed technique or death is between 4 and 5 years.

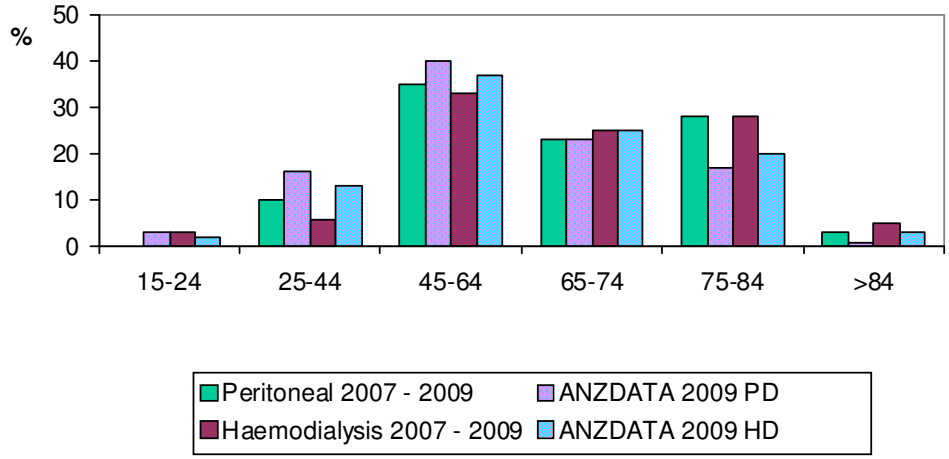
2009 is showing improved early survival up to approximately 18 months compared to previous years, but then a fall at this point. In 2009 a pre Tenckhoff insertion education program was introduced along with the piloting of a home visit follow up program. Results in patient dialysis survival will be monitored in light of these changes. The 2007 cohort shows greater long term technique survival.

Acceptance onto Dialysis

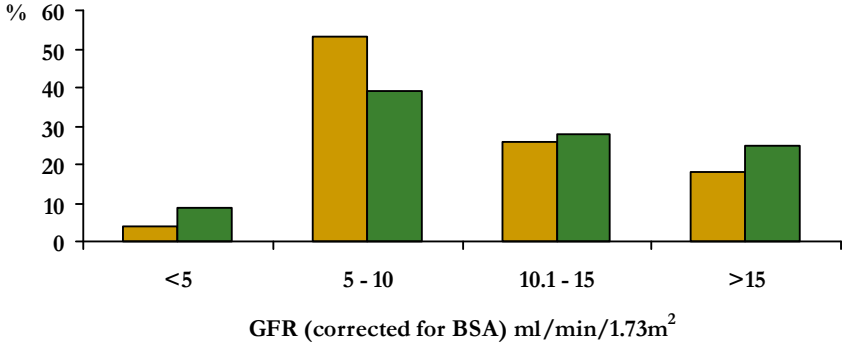
21 new patients commenced peritoneal dialysis in 2009, while 34 new haemodialysis patients commenced. Patients are analysed according to their first mode of dialysis only and must have had dialysis >30 days.

- In 2009 there was one late referral for peritoneal dialysis (4%) and 10 late referrals for haemodialysis (29%).
- Mean age at commencement of both HD and PD in 2009 was 67 years.

Age groups for new patients accepted onto dialysis 2007 - 2009



Peritoneal Dialysis and Haemodialysis GFR corrected for BSA 2007 - 2009



Glomerular Filtration Rate (GFR)

The calculations are prepared using available patient details at commencement of dialysis. The data used for this calculation is height, weight, age, sex and creatinine. This data is then calculated with a GFR calculator using the Cockroft Gault formula.

Breakdown of baseline Characteristics of new dialysis patients compared to ANZDATA 2009 annual report

		St George Haemodialysis 07-09 (n=104*)	HD ANZDATA 2009	St George Peritoneal dialysis 07-09 (n=20*)	PD ANZDATA 2009
Age	(Average age in years)	65.3	60.4†	66	60.4†
Gender	Male	64%	61%	52%	56%
	Female	36%	39%	48%	44%
Late Referral	(< 3 months before first treatment)	27%	22%†	10%	22%†
Co-morbidities	Smoking (Current and former)	52%	54%	44%	50%
	Chronic Lung Disease (yes and suspected)	19%	18%	0%	16%
	Cerebrovascular Disease	8%	16%	15%	14%
	Coronary Artery Disease	30%	43%	37%	33%
	Peripheral Vascular Disease	13%	30%	15%	24%
	Diabetes	38%	47%	53%	41%

*Excludes patients who had previous mode of dialysis. † Total dialysis population (Hd + PD) ANZDATA 2009 (ANZDATA 2009) report

Body Mass Index (BMI)

St George Hospital new patients*		PD 2007 - 2009	HD 2007 - 2009
Body Mass Index	<20	13	10
(kg/m)	20-24	27	20
	25-30	32	33
	>30	29	38

Higher BMI is associated with higher rates of technique failure and death in Australia and New Zealand. (ANZDATA Registry 2004 Report: Pg 60) **BMI <20 indicates underweight, 20-25 normal, 26-30 overweight and >30 is obese.** *Excludes patients who had haemodialysis prior to peritoneal dialysis.

Identified strengths and weaknesses in PD management

1. Iron management has been a weakness over many years due to the reliance on patients to make supplementary visits to the hospital for iron infusions (first dose requires a full day admission). Nurse initiated iron commenced in 2008 and requires the staff to contact patients and organise admissions to ambulatory care. Results so far show positive changes, and it is anticipated that this positive change will continue bit by bit due to the responsibility on patients to attend appointments.

2. The higher rate of APD in the St George dialysis unit may be an influential factor in maintaining infection rates below that of ANZDATA, though our infection rates are still below ANZDATA patients receiving APD only. APD is not suitable for all patients, but it does offer patients more freedom during the day for normal activities and employment. The rate of APD is a major influence on infection admissions where patients must either be trained to administer their own antibiotics through a temporary change to CAPD, or remain admitted until the infection has cleared due to learning limitations. This area has been identified as an issue where strategies to reduce these admissions will be discussed and implemented where appropriate.

3. The percent of patients transferring to haemodialysis through technical failure (leaks, surgery and mechanical) has improved in 2009. These transfers can be accounted for primarily through dialysate leaks, surgery and mechanical problems which is similar to previous reports.

4. The rate of failing PD due to social reasons is significantly lower than the rate reported by ANZDATA indicating our patients are suitable for the program and are able to manage their chronic disease effectively. In the past, social failures included an inability to be trained and changing minds during training.

5. Phosphate control is a continuing issue for patients, but our results are better than those reported by ANZDATA 2009. Continued education of the patients and staff is important to ensure medications are taken correctly and that patients do not get confused with conflicting information; this education is covered by the dietician, but it is important other staff convey the same information.

6. The increasing age of peritoneal dialysis patients can add to the complexity of training along with educating patients from non English speaking backgrounds. Training is individualized to patients and carers needs and is provided on an ongoing basis where needs are identified during home visits and clinic visits.

Predialysis Management

Aim

The aim of this report is to provide data to the department showing predialysis clinic attendances and outcomes compared to previous years. The report also provides the reader with information regarding the conduct of the clinic.

Overview

The predialysis clinic has been operating since April 2002. The clinic is held on 4 west on Tuesday mornings. Coordinated by Shelley Tranter (Renal CNC) and attended by Maria Chan (dietician), Anastasia Anastasiou (Renal Social Worker) and the renal pharmacist. All new patients are provided with dialysis options education and pharmacy, social work and nutritional assessment. A comprehensive letter and assessment is sent to the nephrologist. Patients return to the clinic for follow up at 4-6 weeks and yearly or as required. Since inception 344 patients have attended and been tracked through the clinic.

2009 data

The predialysis clinic was very busy in 2009 with 75 new attendees and 51 follow up appointments compared to 2008 where there were 41 new attendees and 14 follow up appointments. The biggest change in 2009 was the introduction of electronic letters, enabling all clinic staff to complete letters in a timely and effective manner. All clinic letters are stored on Risc doc, in PDF format.

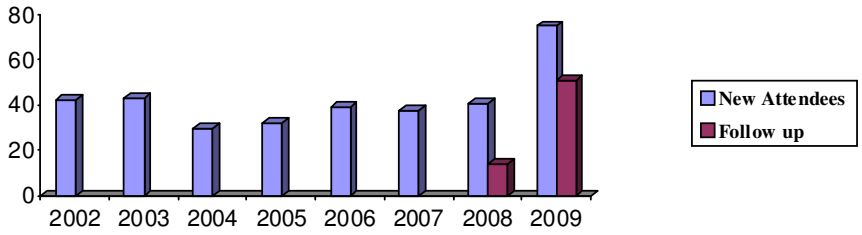


Figure 1 Yearly new attendees for predialysis clinic since inception in 2002

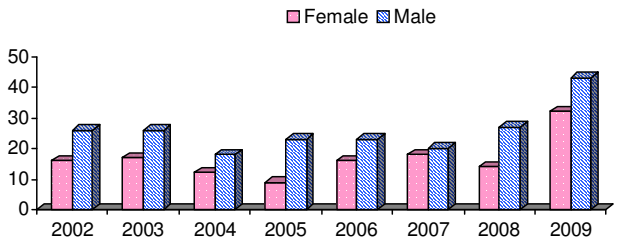


Figure 2 Gender of clinic attendees

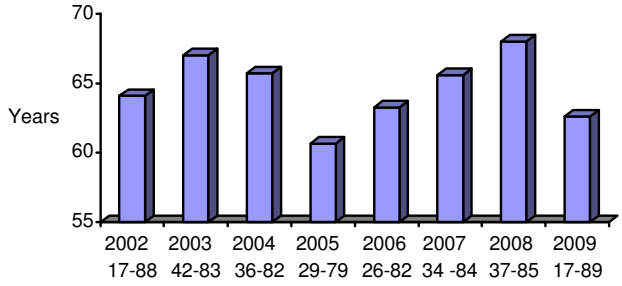


Figure 3 – Average age of patients attending predialysis clinic which is down in 2009.

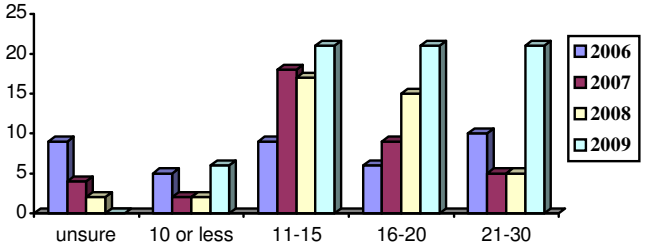


Figure 4 eGFR of new patients on referral to clinic. There has been a slow shift to the right of the graph over the years

The guideline for referral to the Pre dialysis Clinic is

- Creatinine >300, and/or
- eGFR < 25.

Once a patient is referred to the Predialysis Clinic they are:

- Tracked on a database which is updated as new information e.g. doctors letters or blood results are available.
- The database is found on RISC doc and can be accessed by renal staff.
- Patients are flagged at 400 creatinine and GFR 15
- Alerts the Vascular Access Nurse to check for vascular referral in patients on the haemodialysis pathway.
- Alerts PD staff to do comprehensive assessment (new initiative)

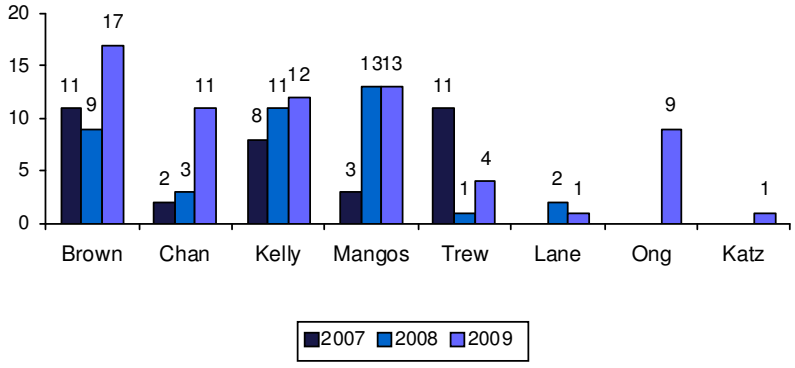


Figure 5 Attendance at predialysis Clinic by consultant

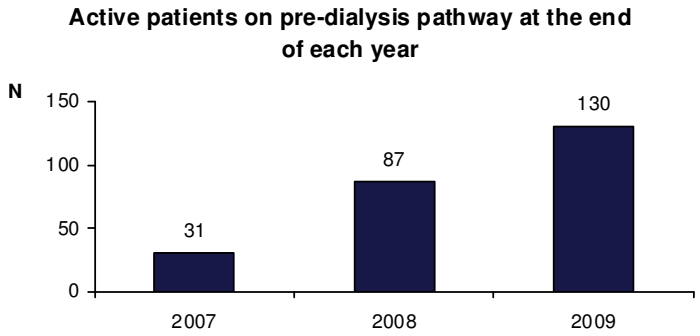


Figure 6. Cumulative number of patients remaining on dialysis pathway at the end of each year.

Of the 32 ESRF patients who commenced haemodialysis in 2009, 11 had attended the clinic pre dialysis. 22 of the 24 patients who started peritoneal dialysis as the first dialysis therapy had been to the clinic for education and assessment. This reflects an ongoing problem with late referrals to the renal unit.

Of the 75 new patients seen in 2009	**N-75**	
Actively sought a non dialysis pathway	14	18%
Plan for PD	25	35%
Plan for home haemodialysis.	9	13%
Plan for incentre/satellite	4	5%
Pre-emptive transplant	3	4%
Undecided or decision not final	20	25%

Plans for 2010

1. Patient and family satisfaction is being measured for the Predialysis Clinic in 2010. Patient satisfaction will be a regular measure of the clinic and an action plan will be developed to address any shortfalls.
2. An outcomes study is currently being conducted. The patients who attend the Predialysis Clinic will be compared with patients who are supported in the Renal Palliative Care Clinic with patients planned for dialysis vs not for dialysis patients. Measures will include symptom burden, quality of life, satisfaction and other biochemical measures which are all part of usual practice within the department.
3. Benchmarking with other major predialysis services (NSW) will commence in mid 2010, the following are those benchmarks:
    - By commencement of RRT 80% of patients will have had review in Predialysis assessment and education program greater than 3 months previously and within 12 months.
    - Hepatitis B vaccination – by commencement of RRT 50% of patients attending the pre-dialysis clinic will have completed a course of hepatitis B vaccinations.
    - 70% of patients who are known to the unit and have attended Predialysis assessment and education program, commence planned dialysis choice.
    - Timely referral to Predialysis Program
      50% eGFR > 20
      70% eGFR > 15-20

Renal Palliative Care

Aim

The aim of this report is to provide data to the department showing Renal Palliative Care Clinic attendances and outcomes which will be compared in future reports. The report also provides the reader with information regarding the conduct of the clinic.

Overview

2009 was a busy year for the integration of palliative care into renal medicine. The department has been working closely with Dr Frank Brennan and Dr Jan Maree Davis from the Palliative Care Service. Shelley Tranter, Liz Josland, Anastasia Anastatiou and Maria Chan comprise the renal pallcare group and they meet monthly with the palliative care consultants to discuss and implement palliative care initiatives.

Dr Brennan has been lecturing widely on the integration of palliative care into renal medicine and this is a very popular topic. For this reason the department will be hosting a **Renal Palliative Care Forum** on the 13th August 2010. Doctors, nurses and allied health will be invited from NSW and nationally for the event.

A dedicated palliative care area has been developed on the renal department website and includes the research, guidelines, patient information and education and presentations so that it is made available to all staff and other renal units.

Perhaps the biggest initiative in the department in 2009 is the **Renal Palliative Care Clinic** which commenced in March 2009, runs twice a month and is staffed by Dr Frank Brennan, a renal registrar and the renal clinical nurse consultant. The clinic also receives support from the renal social worker and dietician.

There are five main categories of patients who are referred to the clinic:

1. Patients who have chosen a not for dialysis pathway or need assistance in decision making around choosing dialysis or not.
2. Patients who are on dialysis and have cancer or other terminal conditions.
3. Patients on dialysis who are experiencing symptoms which are difficult to manage.
4. Patients on dialysis who need assistance in decision making regarding withdrawing or continuing with dialysis.
5. Pre-dialysis patients who are experiencing symptoms which are difficult to manage.

	Attendance reasons up to Dec 31, 2009	**n**	**%**
1	Not for dialysis or need assistance to make decision whether to have dialysis or not	30	70
2	On dialysis but also have another terminal condition	5	12
3	On dialysis with difficult to control symptoms	6	14
4	Patients considering withdrawing from dialysis	1	2
5	Pre-dialysis patients with difficult to control symptoms	1	2

Clinic Attendances and Outcomes

There have been 112 visits to the clinic for 43 patients seen since it commenced. The age of patients ranges from 48-91 with the average age being 78 years. There were 13 female and 30 male patients.

Symptoms at first visit	***n***	***%***
Feeling tired	32	18
Sleep problems	15	9
Constipation	8	5
Itch	22	11
Pain	18	11
Trouble breathing	4	2
Trouble breathing when walking	5	3
Feeling sad	6	4
Pass lots of urine at night	6	4
Fluid in ankles or legs	3	2
Tearing eyes	3	2
Nausea	9	6
Restless legs	20	12
Appetite changes	22	13

Table 1 shows symptoms evident at first visit for 43 patients who have attended clinic

As highlighted previously, the department is watching the outcomes from the predialysis and renal palliative care clinics. In the next report we should be able to report the QoL in groups, patient's satisfaction and the symptom burden using the Memorial Symptom Assessment Scale for the Palliative Care and Predialysis patients.

Renal Biopsies

Renal biopsy data for the year 2009

	Jan-Dec 2009	Jan-Jun 2009	Jul-Dec 2009
Number of biopsies	106	52	54
Inpatients	49 (46%)	22	27
Transplant biopsies	26 (24.5%)	15	9
Done by radiology	14(13.2%)	5	9
Total complications	10 (9.4%)	7 (13%)	3 (5.5%)
Macroscopic haematuria	1(1%)	0	1
Haemorrhage or haematoma	6 (5.6%)	4	2
Pain	6 (5.6%)	5	1
Transfusion	3 (2.8%)	2	1
Embolisation	2 (1.9%)	1	1

Comparison of complication rates from previous years

	2002	2003	2004	2005	2006	2007	2008	2009
Total Number	14	22	21	27	77	58	67	106
Complication rate	0%	10%	19%	19%	6%	9%	9%	9.4%

Comparison of specific complications expressed as % (n)

Year N (Year Total %)	2005 N=27 (19%)	2006 N=77 (6%)	2007 N=58 (9%)	2008 N=67 (9%)	2009 N=106 (9.4%)
Gross Haematuria, %(n)	0	1(1)	0	1.5(1)	1(1)
Haematoma, %(n)	4(1)	1(1)	2(1)	0	5.6(6)
Perinephric bleed – angioembolisation, %(n)	0	0	0	0	1.9(2)
Pain post procedure, %(n)	0	3(2)	2(1)	0	5.6(6)
Required blood transfusion	0	1(1)	0	0	2.8(3)

Comments:
Due to an increased observed rate of complications during the later part of 2008 and early 2009, the practice to keep patients admitted overnight after renal biopsy was initiated from April 2009. The complication rate has obviously reduced since this practice (5.5% during the later half of 2009). Now the procedure is done at the ambulatory care clinic and, following the biopsy, the patient is admitted for a 24 hour period of observation.

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