THE ST GEORGE HOSPITAL

RENAL DEPARTMENT ANNUAL REPORT AND QUALITY INDICATORS 2010

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Cover Photo: Renal Palliative Care Symposium presenters and organisers (L-R) Anastasia Anastasiou (Social Work), Dr Shelley Tranter (Renal CNC), Dr Frank Brennan (Palliative Care Consultant), Sue Stewart (NT Dept of Health and Families), Fiona Spargo (Melbourne Health), Elizabeth Josland (Renal Supportive Care CNC), Prof Mark Brown (Director of Renal Medicine), Assoc Prof George Mangos (Nephrologist)

Aim

A primary purpose of the report 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 regular presentations and discussions of these data at department meetings. A broad aim remains to compare our Unit's performance against benchmarks where they exist or 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 dialysis patients and supportive care of those patients who have chosen a maximum conservative care pathway.
10. Renal biopsy outcomes

Executive Summary

1. Peritoneal and Haemodialysis outcomes
a) *Peritoneal dialysis (PD)*: There were improvements were seen with dialysis adequacy; significant improvements occurred with patients iron stores and particularly iron saturation, serum magnesium, albumin and bicarbonate levels. There was a worsening of results seen in levels of serum phosphate, calcium x phosphate product (significant) and corrected serum calcium. Many results were similar or superior to ANZDATA with the exception of phosphate and calcium x phosphate product. Patient survival/technique survival is 90.0 at 1 year and 46.5 at 5 years compared to ANZDATA 88.7 and 43.2 respectively.

b) *Haemodialysis (HD)*: Significant improvements occurred over 2010 in HDL, LDL, iron saturation and ferritin levels, serum calcium, corrected calcium, albumin, serum phosphate, calcium phosphate product and PCR. Patients continue to dialyse adequately with 92% of HD patients achieving a Kt/V $\geq$ 1.2 and 92% achieving a URR $\geq$ 65%. Patient survival/technique survival is 89.2 at one year and 53.0 at 5 years compared to ANZDATA 86.8 and 46.5 respectively.

2. The NSW benchmark of 50% of dialysis patients using a home therapy was achieved in 42% of patients, making St George Hospital one of the best dialysis units for home vs. hospital based therapies in NSW. The total number of patients on a home based therapy (home haemodialysis and peritoneal dialysis) in NSW was 40%. Twenty six percent (*26%) of all STG haemodialysis patients dialyse at home (ANZDATA AUS=12%, NSW=18%).* ANZDATA shows a higher percent of patients on peritoneal dialysis (27% vs. 21% at STG) and satellite haemodialysis (36% vs. 14%). Unfortunately we continue to have a very high hospital haemodialysis number due to our inability to fund an additional satellite unit, but we achieved much better home haemodialysis numbers compared with NSW (21% vs. 13% respectively). The St George Hospital haemodialysis unit has a 'low care' in-hospital haemodialysis area (51% of hospital haemodialysis patients), with several patients earmarked for a satellite unit chair when funding is available. The NSW home haemodialysis benchmark target of 20% is currently being achieved. Targets for NSW home peritoneal dialysis and satellite haemodialysis benchmark target remains at 50%.

3. The unit continued to maintain its high standard for monitoring and managing its water quality. Water quality testing resulted in the removal of one portable RO (WRO) when a high CFU reading was detected. The WRO was disinfected then returned to service when results were within the accepted limits. There were no endotoxins detected in 2010 and all elements for water quality for all remaining haemodialysis equipment were maintained within AAMI limits.

4. Patients commencing haemodialysis with a functioning permanent access was lower in 2010 26% than in previous years 2009 36%, 2008 29% and 2007 31%. This was due to the increased number of late referrals (40% in 2010 compared to 30% in 2009). A reduced blood stream infection rate was seen amongst patients with arterial-venous fistulae (AVF) 3% in 2009 and 1.3% in 2010, and central venous catheters (CVC) 8% in 2009 and 3% in 2010. This

was perceived to be due to fewer patients using the buttonhole needling technique and because of the policy of early removal of CVCs. Blood stream infections increased amongst patients with an arterial-venous graft (AVG). Providing heightened and regular surveillance on our permanent access has reduced the number of thrombotic events in 2010.

5. The peritonitis rate surpasses the ANZDATA benchmark in months per patient episode. The peritonitis rate for St George is now 1/41.9 months in 2010 (1/24.7 over 3 years) compared to 1/19.2 for ANZDATA 2010. This is seen as a fantastic achievement in our peritoneal dialysis unit. Of the patients that have been on dialysis >3 years, 53% were peritonitis free. This was compared to 29% seen from ANZDATA. It is another improvement on 2009. The exit site infection rate was not as successful and fell from 1/49.3 months in 2009 to 1/37.2 months in 2010. It remains at 1/44 months over 3 years, which is unchanged from 2009).

6. *Patient numbers and demographics*
a) The peritoneal dialysis unit had a net loss of 6 patients over 2010. There were a total of 81 patients treated in 2010 compared with 83 in 2009. There continued to be a rise in patients starting automated peritoneal dialysis (APD) (an increase of 1%). In 2010, ANZDATA showed a 2% increase in numbers of patients on APD.
b) St George shows a higher rate of 75-84 year olds commencing peritoneal dialysis (31%) and haemodialysis (27%) as their first mode of dialysis over 2008 to 2010 compared to ANZDATA (17% PD and 12% HD). ANZDATA also showed the largest decreases in the 65-84 year age group. New patients over 2008 – 2010 had an average BMI of 26.3 in PD and 29.5 in HD. Patients starting dialysis had less overall co morbidities than ANZDATA with the exception of diabetes.
c) The total haemodialysis activity level for St George patients (in-centre and satellite) increased by 3% from 22,207 sessions in 2009 to 22,926 sessions in 2010. St George had 59% of dialysis patients using hospital haemodialysis (hospital and satellite), an increase of 3% since from 2009. ANZDATA 2010 showed a 6% decrease in patients using haemodialysis.
d) The average age of patients commencing haemodialysis at St George over 2008 - 2010 was 65yrs, for PD patients the average age was 66 years. ANZDATA 2010 reports the average age for all new patients as 60.7 years. ANZDATA 2010 reports a decrease in all age groups for all new dialysis patients.

7. Dialysis patients of STG 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 with the dialysis patient.

8. The Pre-dialysis clinic has been operating since April 2002. In 2010 there were 67 new attendees and 67 follow up appointments compared to 2009 when there were 75 new attendees and 51 follow up appointments.

9. There have been 338 visits to the renal supportive care clinic since it commenced in March 2009, 218 of these visits were in 2010. The average age of patients is 77 years with 59% of attendees being male.

10. There were 85 renal biopsies performed in 2010. Complication rates have risen slightly in 2010 to 11.8% from 9.4% in 2009.

Key Performance Indicators

ISSUES FOR DISCUSSION AT BUSINESS MEETINGS AND ANNUAL REPORT	OUTCOME MEASURE	Responsible person	ACHIEVEMENT STATUS as at May 2011
			A = Achieved *PA = Partially Achieved* *NA = Not Achieved*
1. Medical Workload (Brown) • ESKD patients per nephrologist • JMO & registrar workload • Inpatient workload	1. An equitable distribution of consultant and JMO workload	**Brown**	**A.** Workload is equitable. Excluding obstetric medicine inpatient workload is 17pts –Brown/Mangos team; 18pts – Ong/Chan team; 14 pts – Kelly/Katz team.
2. Workforce (Brown) • Nephrologists at 1 FTE per 80 ESKD patients • Performance review nephrologists (annual) • All Dept. aware of nephrologist duties (annual) • Roster to reflect FTE and other duties • Allied Health and nursing at FTE benchmarks	2. One FTE nephrologist per 80 ESKD patients 3. Allied health and nursing workforce at FTE benchmarks	**Brown** **M Chan**	**A.** 393 ESKD patients (247 dialysis; 146 transplants) = 76 per nephrologist (benchmark 80) **PA** Benchmarks for allied health is largely unknown. This is being developed. For dietetics staff ratio is 1 to 120-150 ESKD patients. We currently have 1.6 FTE dieticians compared with required 2.6 FTE. 4 west HD has 36.4 FTE which equates to 1 HD nurse per 3 HD patients; this is at benchmark.
3. CKD (Katz) • DC summaries to patients at discharge • DC summaries to GPs at discharge • Clinic letters to GPs within 1 week • 'Flyer' to GPs re services (annual) • No. Patients treated per year	4. Discharge summaries on day of discharge and clinic letters within one week to GPs 5. 80% of patients with stage 4 CKD meeting target blood pressures 6. 75% of patients starting dialysis having attended predialysis clinic in the prior 12 months	**Mangos** **Katz** **Josland**	**PA.** **NA.** Database not yet available. Wishing to install Audit 4 program to aid this. **PA**. 61% of all patients (47% of Haemodialysis and 84% PD) started dialysis having attended the predialysis clinic.

ISSUES FOR DISCUSSION AT BUSINESS MEETINGS AND ANNUAL REPORT	OUTCOME MEASURE	Responsible person	ACHIEVEMENT STATUS as at May 2011
			A = Achieved *PA = Partially Achieved* *NA = Not Achieved*
• Patient numbers Renal/Pall Care clinic • Patient & family satisfaction with renal supportive care clinic (annual) • No. Patients with advanced care directives • Outcomes renal pall care vs. Pre-dialysis • No. ABPM performed per year • No. home BP device validations per yr • QA reporting on ABPM accuracy • No. interventional nephrology procedures • Safety & quality interventional nephrology	7. 75% of patients attending the renal supportive care clinic having stable or improved symptom burden within six months 8. 100% of renal supportive care clinic patients and haemodialysis/peritoneal dialysis patients over age 70 having a documented advanced care directive 9. Complications of renal biopsy, renal angiography and peritoneal dialysis catheter insertion is at all better than benchmark levels	**Brennan** **Brennan** **Sundaram**	Being assessed in 2011 **NA**. Process not yet in place; being developed for 2nd half of 2011 **NA**. Peritoneal dialysis insertion complications increasing: 2008 13% post op problems 2009 39% post op problems 2010 42% post op problems Renal biopsy complication rate increased at 12%
4. Staff Satisfaction (Brennan) • All staff with performance review (annual) • Review effectiveness of business meetings • Review effectiveness nursing/director meetings • No. staff funded to attend conferences • Staff satisfaction surveys (annual)	10. 80% of nursing, medical, Allied health and administrative staff satisfied with their job	**Brennan**	**NA**. Process for assessing this still being developed and assessment underway in 2011.
5.Hemodialysis (Katz) • Distribution of dialysis modalities • No. patients trained at St G for home HD	11. 50% of patients using a home dialysis modality	**Brown**	**PA**. 42% are dialysed at home (21% PD; 21% home HD)

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• HD QA targets reaching benchmarks • Vascular access outcomes at target • Patient 5 and 10yr survival at benchmark • QOL improving (bi-annual) • HD patient & family satisfaction surveys • No. patients using bus service • Nutritional parameters at benchmarks • Strength & exercise parameters at benchmark • List of medications nursing prescribed • Adequate meetings Nephrologist & HD staff • 100% patient orientation program upon commencement of dialysis • review effectiveness/outcomes of HDF therapy • Provide feedback to staff on biochemical targets Inc Kt/V, no. pts on HDF • Appropriate Hep B machine & patient management • Maximize space in waiting room allowing HD patients and clinic patients to access space	12. The percentage of patients commencing haemodialysis with a functioning fistula/graft at or better than national benchmark 13. Five and 10 year patient and technique survival at or better than national benchmark	**Martinez-Smith/ Katz** **Katz**	**NA**. The late referral rate for St George was higher (40%) than ANZDATA 2010 (21%). The ANZDATA 2010 (ANZDATA 2010) report indicates 54% of patients (excluding late referrals) have a functioning AVF or AVG at their first haemodialysis. Forty seven percent of St George patients had a functioning fistula at commencement (excluding late referrals) in 2010. The incidence of non-tunnelled CVC used for first dialysis (4%) decreased from previous years due to a preference in the use of tunneled CVC. The incidence of tunneled CVC use remains higher at St George (48%) compared to ANZDATA 2010 report (33%). **A.**5 yr ANZDATA report – patient survival 52% compared with 46% nationally. Technique survival is 51% vs. 43%.
6. Peritoneal Dialysis (Ong) • % patients using PD at NSW Health target • Patient 5 and 10yr survival at benchmark • Peritonitis & ESI rates at target • PD QA parameters at target • QOL improving (bi-annual) • No. & % patients with home R/V • Nutritional parameters at benchmark • Support PD staff and patients through redesign and building processes to ensure enough space is provided for PD service	14. Peritonitis rates at or better than national benchmark 15. Five and 10 year patient and technique survival at or better than national benchmark	**Ong** **Ong**	**A.** Our data for 2010 are 1 episode per 41.9 pt months vs. 1 per 19.2 months nationally. **A.** ANZDATA 5 yr rates only; patient and technique survival 51% and 31% respectively vs. 46% and 29% nationally.

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• Streamline pathway of bedside insertion of PDC's • Improve education level of 4S Renal CNE to facilitate staff education on PD practices/competencies • Develop PD problem solving posters for Emergency Department staff • Provide education to patients and staff on software changes to home choice machine • Support PD staff on projects re 6 monthly home visits and People on PD group (with SW)			
7. Transplantation (Brown) • Pt. & graft survival at benchmark • ECRS Pt & graft survival at benchmark • Surgical morbidity at benchmark • % patients receiving annual post-Tx review • No. & % Live donor transplants • Transplant QA at benchmark • % accepted and Time to LD transplant • Live Donor survival & morbidity at benchmark • % patients on waiting list attending annual R/V • % patients on waiting list attending education night	16. 1,5 and 10 year patient and graft survival at or better than national benchmark 17. BPAR rates within the first 12 months < 30%	**Brown** **Brown**	**PA** 1 yr graft survival 92 v 93 % 5 yr graft survival 82 v 83 % 1 yr patient survival 97% v 93 % 5 yr patient survival 90% v 92 % 10yr data not available – enquiry sent to ANZDATA **PA** 3 out of 19 (16%) 2010 patients. Cumulative rates being determined
8. Inpatient management (W Chan) • Infection rates published and at benchmark • LOS at benchmarks • Patient & family satisfaction surveys acceptable	18. Hospital lengths of stay for renal indications at or better than benchmarks	**W Chan**	**A.** Renal ward LOS 4.71 days vs. 6.18 days state benchmark

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			A = Achieved *PA = Partially Achieved* *NA = Not Achieved*
• Staff satisfaction surveys acceptable • Audit of equipment, cleanliness • Audit of same sex room policy • % staff with name badges • Staff involved in JMO / Reg term handover	19. Hospital ward infection rates at or better than benchmarks	**Fong**	**A.** MRSA acquisition rates were amongst the lowest in the hospital.
9. Nurse Education & Professional Development (Josland) • No (%) nurses competent in relevant field • No (%) nurses completed learning packages • No (%) nurses completed renal course • No (%) nurses attended external conference • No (%) nurses presented abstracts / papers • No (%) nurses achieved PG qualifications • No (%) nurses authored a paper		**Josland**	An average of 50% of nurses have completed learning packages, 31% have completed a renal course, 13% have attended an external conference, 7% have presented abstracts/papers, 27% of nurses have post graduate qualifications and 7% have authored a paper.
10. Patient safety & quality (Kelly) • Patient flow & Survival via Pre-dialysis clinic • 30% protocols reviewed annually • Nutritional benchmarks achieved • Patient flow & Survival via renal supportive care clinic • Hospital review of our QA program	20. 30% of haemodialysis, peritoneal dialysis, transplant and general protocols reviewed annually	**Kelly**	**PA.** reviewed in 2010 • 20% HD protocols • 68% PD protocols Uncertain for general nephrology protocols
11. IT (Mangos) • Staff satisfaction with Risc & RiscDoc (annual) • Functionality of Risc & RiscDoc (annual) • Implementation of Audit 4 or equivalent • Electronic prescription writing in place for all clinics • Website functionality & maintenance annual)			

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			A = Achieved *PA = Partially Achieved* *NA = Not Achieved*
12. Teaching (Lane) • JMO feedback (annual) • BPT feedback (annual) • Advanced trainee feedback (annual) • Student feedback (annual) • External invited presentations (annual) • Review of weekly clinical meetings (annual)	21. Satisfactory feedback on JMO/BPT/advanced training/student teaching and supervision	**Lane**	**NA.** No feedback available for BPT; retrospective data to be gathered for Advanced trainees; 67% response from JMOs – positive feedback; only 3/10 student feedback
13. Research (Ong) • Grant applications submitted / successful • Presentations at scientific meetings • PhD, other higher degree & ILP students • Publications • No. research projects, trials, recruitment • All staff in the Unit aware of ongoing research	22. Minimum of eight unit peer-reviewed publications and 10 presentations at conferences per year	**Ong**	**A.** An average of 22 publications per year for the past 10 years.
14. Finances (Brown) • Performance within budget • Applications for enhancements as needed • External financial support as needed	23. Renal cost centres adequately funded and run on budget	**Brown**	On budget

NSW Health 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.

Table 1: Comparison of St George 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 2010	***23***	***36***	***13***	***27***
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)
St George 2010 % (n)	**45 (111/247)**	**14 (34/247)**	**21 (51/247)**	**21 (51/247)**

Table 2: Indicators from NSW Health 2007, pp iii - iv. St George measurements indicate how these indicators are being measured and the results for 2010

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 40% in 2010. Peritoneal Dialysis overall late referral rate 6% in 2010. 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. 73% (27/37 excluding late referrals) of new dialysis patients attended the pre-dialysis clinic for education and assessment before treatment commenced in 2010.
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. 26% of patients' commenced haemodialysis with a functioning AVF; SVG or AVG. ANZDATA 2010 result was 34% (NSW) and 44% (Australia).
Patients with CKD requiring treatment, have access to clinically appropriate forms of treatment either in home, community or hospital	5. Proportion of patients dialysed at home.	5. Total STG dialysis population: Home=42% (21% home haemodialysis & 21% PD) ANZDATA NSW = 40% **26% of all STG haemodialysis patients dialyse at home (ANZDATA AUS=12%, NSW=18%)*

Principles	Indicators	St George Measurements
facilities, designed around individual patient needs, including transplantation services where clinically appropriate.	6. Travel time - Proportion of patients for whom travel time to their dialysis location is ≤ 1 hour.	6. 100%
Patients with CKD receive high quality, evidence-based, treatment services.	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	7. Not measured. 8. 92% URR ≥ 65% ANZDATA 2008: 92% URR ≥ 65% 9. St George: 14% >15 hours per week, 36% ≥15 hours per week. ANZDATA 2009: 35% dialyse ≥15 hours per week 10. 73% had a CCL >50L (88% had a Kt/V ≥ 1.8). ANZDATA has not published CCL or Kt/V results in 2009. 11. CVC infection rate 0.54/1000 catheter days compared to NKF-KDOQI 2006 benchmark <1.5/1000 catheter days 12. Peritonitis incidence per patient months was one episode per 41.9 months compared to 19.1 for the whole of Australia (ANZDATA). 13. Graft survival from transplant until death, return to dialysis or most recent date of follow up 2000-2009 Graft Survival 1yr 3yr 5yr STG 91.9 85.3 81.7 Aust 93.4 88.4 83.2 NZ 93.1 88.9 81.6
Patients with CKD at risk of suffering acute renal failure, have access to high quality hospital services in partnership with renal services.	14. Patient survival in dialysis treatment at 1, 3, 5 years. 15. Patient survival after Renal Transplant at 1, 3, 5 years.	14: Survival 2000 - 2009 Patient Survival 1yr 3yr 5yr STG Hdx 89.2 68.3 53.0 Aust Hdx 86.8 65.3 46.4 STG PD 90.0 59.7 46.5 Aust PD 88.7 63.3 43.2 15. Patient Survival from transplant until death or most recent follow up 2000 - 2009 Patient Survival 1yr 3yr 5yr STG 97.0 94.2 90.0 Aust 97.2 94.3 91.5 NZ 96.8 93.5 89.1

Haemodialysis

Written by: Elizabeth Josland and Tracey Blow

Haemodialysis: St George Hospital (STG) has a 34 chair in-centre service providing high level haemodialysis (HD) to 130 patients per month. In 2009-2010 financial year there were 17,962 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 the 2009 - 2010 financial year there were 4667 same day separations at the TSH facility.

Home Haemodialysis training is provided at the STG campus. There are currently 51 (21%) patients on home haemodialysis, which is better than NSW benchmark target. Satellite dialysis does not reach NSW benchmark targets with 14% compared with the desired 30% benchmark, but almost half of 'in-centre' patients are being dialysed in the 'low care' section of our haemodialysis unit; these patients could potentially be transferred to a satellite facility if one was available closer to STG. This would raise our satellite numbers to the NSW benchmark target and we would therefore achieve the desired NSW target for in-hospital HD. In-centre HD continues to be more than double the desired target.

Table 3: The current distributions of dialysis modalities

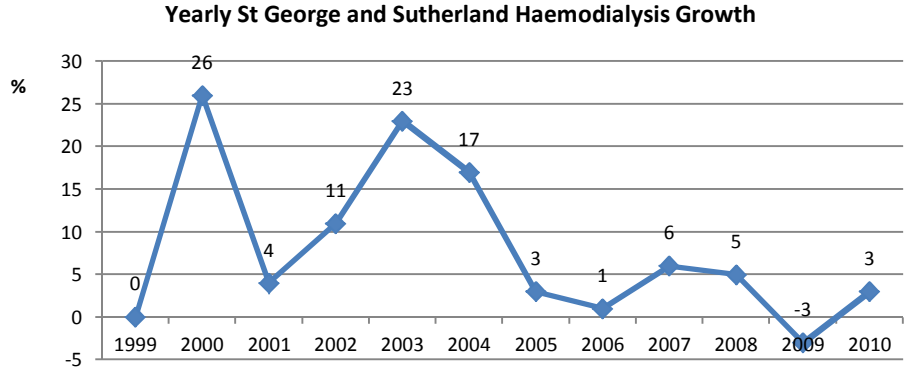
Dialysis modalities	n	%
PD	51	21[#]
Home Dialysis	51	21[#]
Satellite	34	14
In-centre	111	45
Total	**247**	

Home Therapies

There were a total of 196 HD patients at the end of 2010, with 26% being on home HD, 17% being at satellite HD, and 56% on in-centre HD.

Activity

The total haemodialysis activity level for St George patients (in-centre and satellite) increased by 3% in 2010 from 22,207 sessions in 2009 to 22926 sessions in 2010. 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	2010
		128	**141**	**144**	**109**	**108**
In	New Patients	39	28	33	32	35
	Transfers from other units	1	2	3	7	1
	Temporary transfer from PD	2	4	6	1	8
	Permanent transfers from PD	15	10	14	7	13
	Failed transplants	3	1	3	0	2
	Transfer from Home Hdx	1	4	2	1	1
	Transfer from Satellite			5	6	4
Subtotal		***61***	***49***	***66***	***54***	***64***
Out	Transplants	4	4	5	2	4
	Transfers to other units	5	2	2	6	2
	Transfers to Home Hdx	6	6	7	7	7
	Transfers overseas	1	0	0	1	1
	Transfers to PD	4	12	14	6	12
	Transfers to Satellite			39	6	7
	Regain Function			1	2	3
	Deaths (medical)	13	11	17	15	11
	Deaths (withdrawal)	13	11	16	10	14
Subtotal		***46***	***46***	***101***	***55***	***61***
Net Gain		**15**	**3**	**-35**	**-1**	**3**
In-centre haemodialysis patients at end of year		**143**	**144**	**109**	**108**	**111**

Satellite haemodialysis patients at beginning of year		2008	2009	2010
		0	**34**	**33**
In	New Patients	0	1	1
	Transfers from other units	2	1	3
	Transfer from PD	1	0	1
	Transfer from Incentre	39	6	7
Subtotal		***42***	***8***	***12***
Out	Transplants	1	0	2
	Transfers to Home Hdx	2	1	1
	Transfers to PD		1	1
	Transfers to Incentre	5	6	3
	Transfer to other units		1	0
	Deaths (medical)	0	0	2
	Deaths (withdrawal)	0	0	1
	Regain Function			1
Subtotal		***8***	***9***	***11***
Net Gain		**34**	**-1**	**1**
Satellite haemodialysis patients at end of year		**34**	**33**	**34**

Home haemodialysis patients at beginning of year		2006	2007	2008	2009	2010
		45	**51**	**49**	**50**	**54**
In	New Patients	7	1	5	1	3
	Transfer from PD	1	0	0	0	0
	Transfers from other units	0	0	0	3	
	Transfer from Satellite				1	1
	Failed transplants	0	1	0	0	0
	New Transfer from Incentre Hdx	6	6	6	5	4
	In training at the end of the year				2	1
Subtotal		***14***	***8***	***11***	***12***	***8***
Out	Transplants	7	1	6	6	8
	Transfers to other units	0	1	1	0	2
	Transfers to Incentre Hdx	1	4	2	1	1
	Transfers to Satellite	0	0	0	0	0
	Deaths	0	4	1	1	0
Subtotal		***8***	***10***	***10***	***8***	***11***
Net Gain/Loss		**6**	**-2**	**1**	**4**	**-3**
Home haemodialysis patients at end of year		**51**	**49**	**50**	**54**	**51**

Comments:

- On 31st December 2010, 34 (14%) STG patients were dialysing at the satellite unit. The ANZDATA 2010 survey indicated that 36% of NSW haemodialysis patients dialyse within a satellite facility. Full capacity for our satellite unit at Sutherland Hospital is 48 patients.
- Home haemodialysis completed for training 8 patients, there was 1 patient in training at the end of the year. Four in-centre patients, 1 satellite patient and 3 new patients were trained successfully in 2010.
- Twenty one percent of St George haemodialysis patients are dialysing at home compared to 13% in NSW as stated in the ANZDATA 2010.

Future Plans

- Development of a safe workload for ESKD patients (maximum 100 dialysis or transplant patients per 1 fte Nephrologist)
- Further development of home haemodialysis training to increase the number of staff with the ability to train patients and extend the role to allow self-sufficiency.
- 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.
- Establish a Nurse Practitioner role to assist with CKD management.

Biochemical and haematological targets and dialysis adequacy

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: Calcium, Phosphate, Corrected Calcium, Calcium x Phosphate product, Albumin, Magnesium, Haemoglobin, Iron studies, Bicarbonate and dialysis adequacy (Kt/V and URR).
- Audit results are also compared to previous audit results and the ANZDATA 2010 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 PASW 18 statistical program.

Outcomes & Recommendations:

Haemoglobin

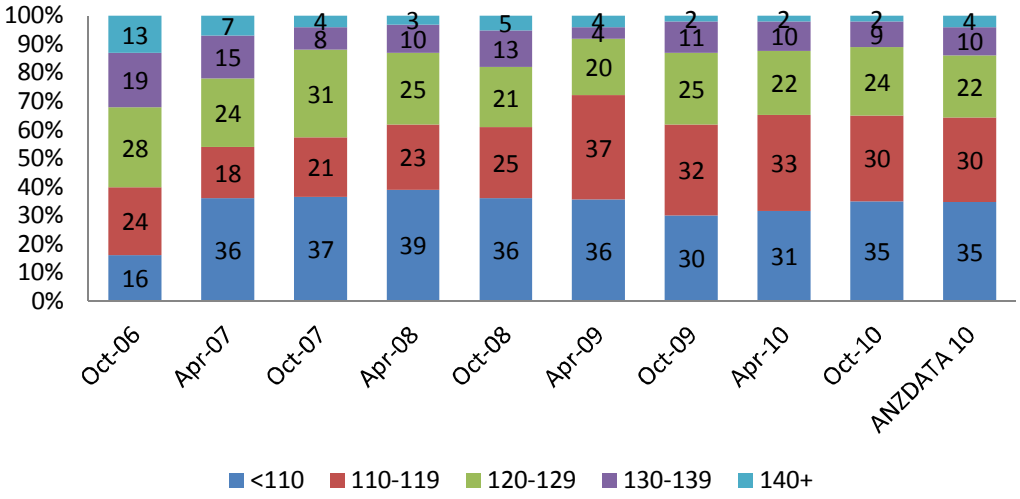
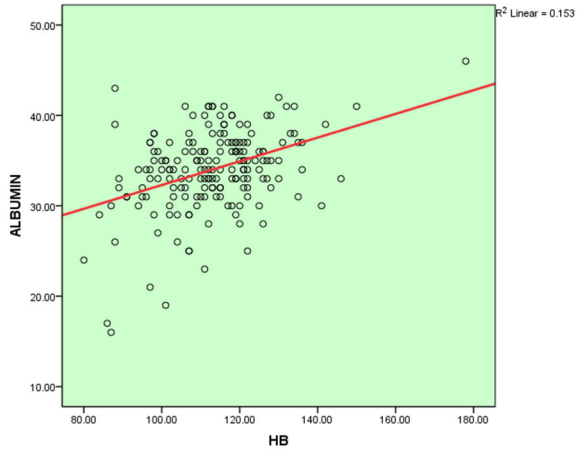


Figure 1: Haemoglobin for all haemodialysis patients

There is a weak but significant correlation between albumin and haemoglobin. When analysed using Pearson chi-square, albumin significantly influences the haemoglobin result.



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 higher haemoglobin without ESA should have their haemoglobin reduced. Newer targets suggested for chronic ESKD are between 100-120g/L. This is the target which is currently being used in the unit.
- The average haemoglobin for all patients during the latest audit was 111, SD 13.8, min 72, max 157.
- KDOQI recommend Hb targets in dialysis patients receiving ESA should not exceed >130g/L (KDOQI 2007).
- Overall, 30% of patients had the desired haemoglobin. All haemoglobin ranges are similar to ANZDATA in October 2010.

Lipids

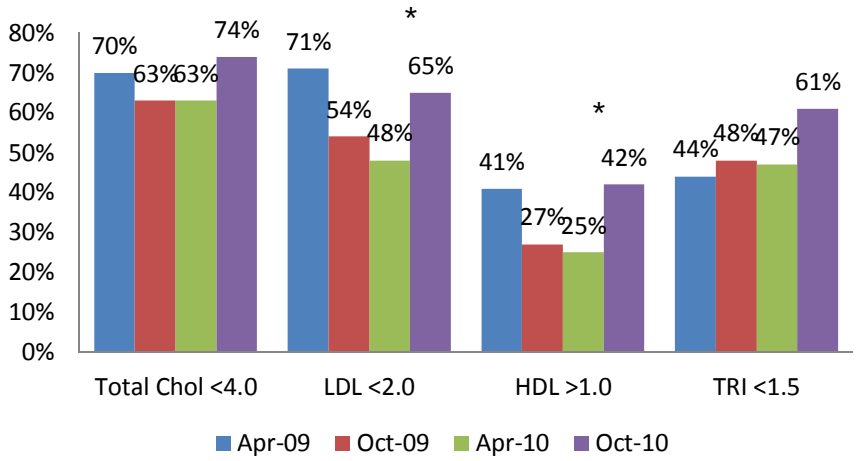


Figure 2: Lipids: high risk patients only (any ANZDATA co-morbidity excluding chronic lung

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 improved significantly in 2010. HDL: χ^2=10.6, df=3, p=0.01. LDL: χ^2=13.5, df=3, p=0.004.
- Data is collected only on high risk patients, those with, or suspected of having, CAD, PVD, CVD or Diabetes. Sixty seven percent of in-centre and satellite haemodialysis patients were considered high risk during October 2010 audit.

Total Iron Studies

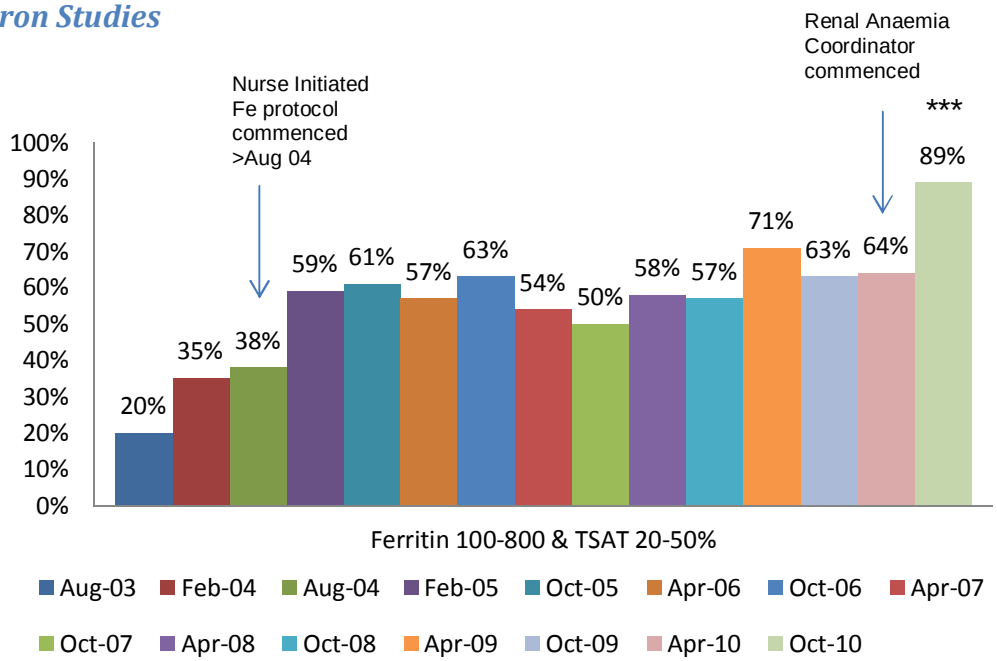


Figure 3: Percent of haemodialysis patients with normal iron studies

Ferritin

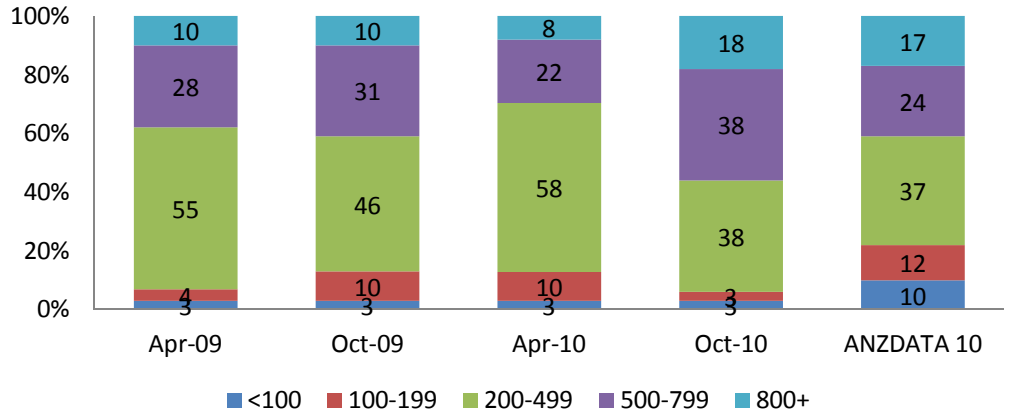


Figure 4: Ferritin compared to ANZDATA

Transferrin Saturation

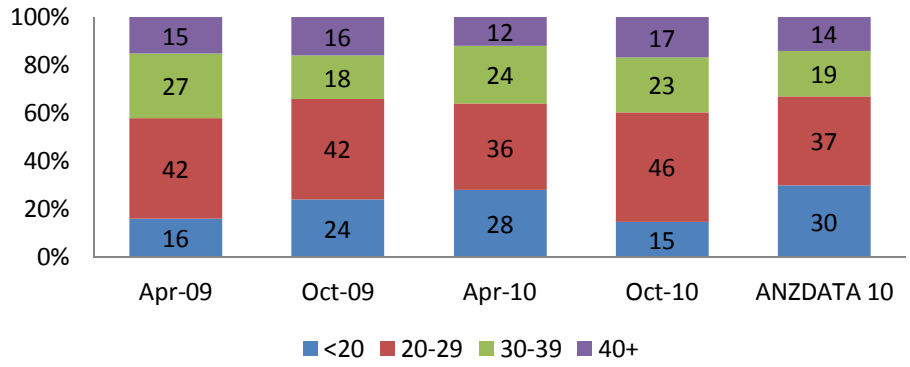


Figure 5: Transferrin Saturation compared to ANZDATA

Comments:

- Eighty nine percent of all patients in October 2010 were iron replete compared to 63% in Oct 09. Iron replete refers to ferritin levels between 100-800ng/mL as well as iron saturation between 20-50%. This graph demonstrates significantly improved results with improvements seen in 2004 due to nurse initiated iron, and 2010 following the appointment of a renal anaemia coordinator.
- Eighteen percent of patients in October 2010 had a ferritin level >800ng/L which has increased from previous audits, but is similar to the ANZDATA 2010 report. There is a higher percent of patients with a Ferritin level within the normal range of 100-800 compared to ANZDATA 2010.
- Transferrin Saturation results in Oct 2010 show less patients have a low level (<20%) compared to ANZDATA 2010.

Corrected Calcium and Albumin

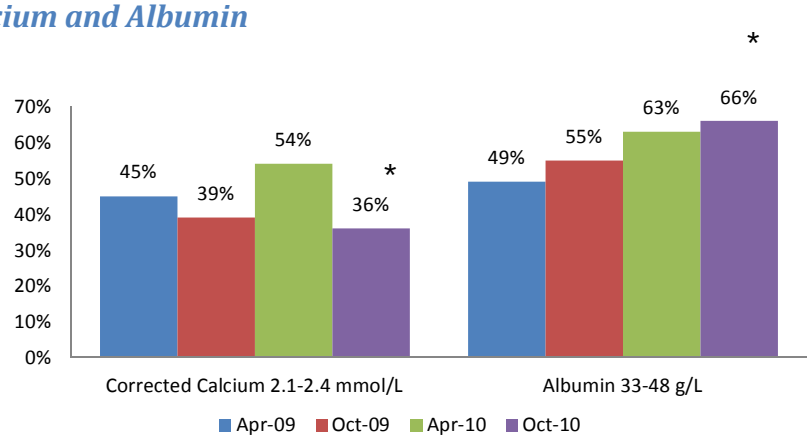


Figure 6: Percent of haemodialysis patients with normal corrected calcium and serum albumin

Comments:

- Chi square test shows significant differences in corrected calcium results between April 2009 and October 2010 (χ^2=12.7, df=6, p<0.05).
- Albumin shows significant improvements since April 2009 (χ^2=10.5, df=3, p<0.05).

PTH

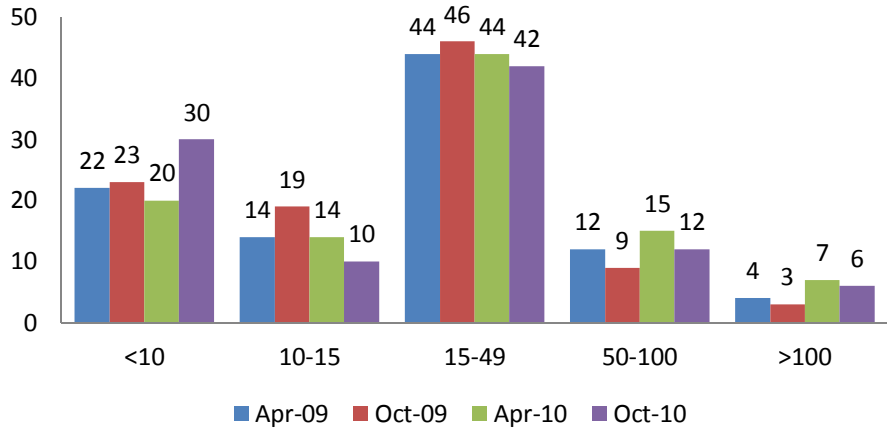


Figure 7: PTH in haemodialysis patients

Comments:

- There are more patients with a PTH <10 in October 2010 due to patients with parathyroidectomies being included in the 2010 data collection and the fact that and more patients on cinacalcet medication.
- There is a fair amount of variability in the readings between serum levels of serum calcium and phosphate. This is not explained.

Serum Calcium, Phosphate & CaPO⁴ product

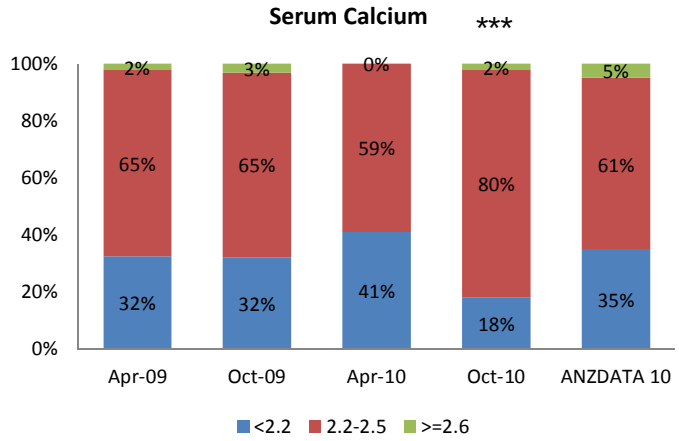


Figure 8: Serum Calcium compared to ANZDATA

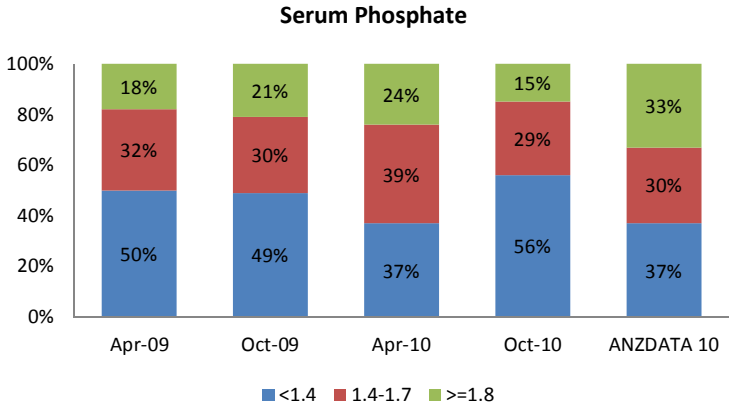


Figure 9: Serum Phosphate compared to ANZDATA

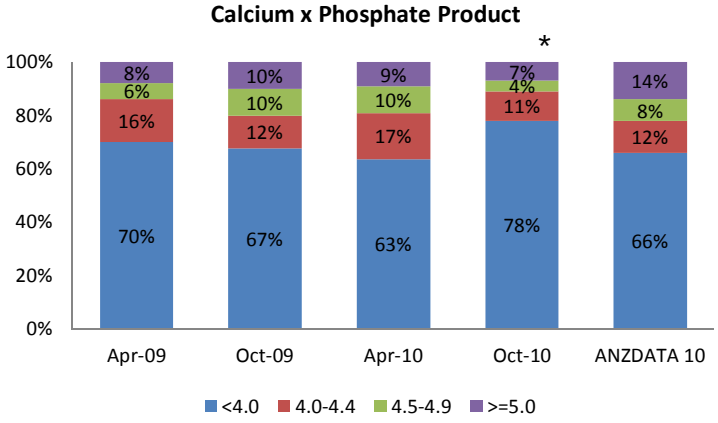


Figure 10: Ca*PO^4 Product compared to ANZDATA

Comments:

- There is a significant improvement in serum calcium in October 2010 (Kruskal Wallis: χ^2=20.8, df=3, p<0.001).
- Calcium phosphate product has significantly improved in October 2010 (Kruskal Wallis: χ^2=7.9, df=3, p<0.05).
- Serum phosphate has also had a significant improvement in October 2010 (Kruskal Wallis: χ^2=10.3, df=3, p<0.05)
- These results are all superior to the ANZDATA 2010 benchmark.

HBA1C

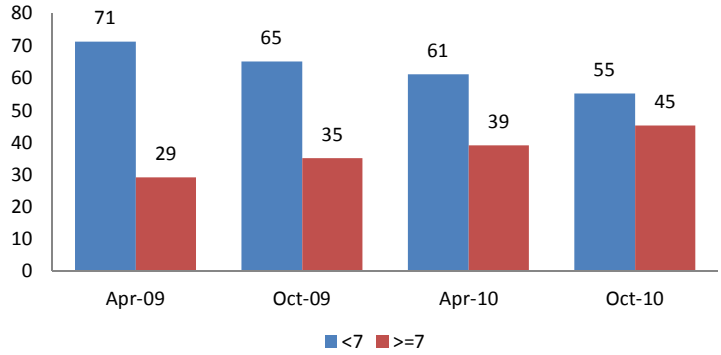


Figure 11: HbA1C results for haemodialysis

Comments

- Data on glucose control was collected on 63 (46%) patients with diabetes during the October audit. There is an increasing trend for results >7% suggesting inadequate glucose control in this group of patients. However, it is important to recognise that the use of HbA1c in renal failure has been questioned and has been shown to inaccurate in some studies (Peacock, T. Shihabi, Z et al. 2008 and Inaba, M. Okuno, S et al 2007). Although it remains very important to avoid preventable complications associated with poor diabetic control. The best practice guidelines for evaluating diabetes control in haemodialysis remains uncertain and using serum fructosamine as an alternative is not routinely advised at present.

Adequacy

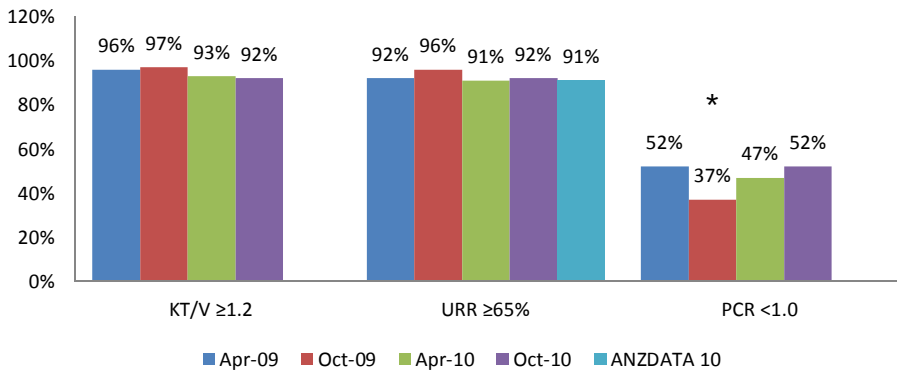


Figure 12: Haemodialysis dialysis adequacy results compared to ANZDATA

Comments

- Dialysis adequacy continued to be achieved and in fact has improved upon earlier reports. It remains similar to the ANZDATA 2010 haemodialysis results for URR. PCR also significantly improved over 2009/2010 (χ^2=8, df=3, p<0.05).

Identified strengths and weakness:

- The unit continued to achieve better than national results in most outcome targets. This reflects well for our patients and renal department staff who have to work together to provide this high standard of care.
- Where previous weaknesses have been detected, efforts have been made to improve. This has occurred in areas such as anaemia management. It is also evidenced by the fact that the unit has shown improvements in many dialysis outcome targets from 6previous years.
- The allocation of a 0.21 FTE CNS anaemia co-ordinator position commenced in 2009 aimed at providing closer anaemia surveillance and ESA management. This position has impacted significantly to improve anaemia management of the dialysis patients.
- Improvements need to be achieved to ensure better diabetes control.

Haemodialysis Water Quality

Background and Activity Levels

- The water quality was audited on 4 West in-centre 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) were used to provide a standard to monitor water quality.
- Full element analysis was conducted biannually and endotoxins are collected yearly.
- Gambro performs the task of collecting water specimens and following up abnormal results along with equipment maintenance. Any abnormalities and issues are reported.
- 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

Table 4: St George Hospital Dialysis Unit Microbiology Reports for 2010

St George Hospital dialysis		
Date	**H2O (<200 CFU/mL)**	**Endotoxin (<2 EU/mL)**
Jan 2010	WRO 1191 elevated 200 CFU, removed, disinfected, retested OK Rest of tests within AAMI standards	
Mar 2010	WRO #803 38 CFU #1828, 1191, 1188, 1498 <1 CFU	
Apr 2010		<0.03 EU/ml
May 2010	#803 loop RO water 2CFU #1828, 1191, 1188, 1498 <1 CFU	
July 2010	#1498 taken from loop 1 CFU #803 taken from loop 2 CFU 1188, 1191 <1 CFU	
Sept 2010	#803 24 CFU #1191, 1188, 1200, 1828 (loop) <1 CFU	
Nov 2010	Loop <1 CFU #1188, 1498 <1 CFU #803 27 CFU #1191 4 CFU	

Table 5: Sutherland Dialysis Unit Water Microbiology Reports for 2010

Sutherland Satellite Unit (TSH)		
Date	**H2O (<200 CFU/mL)**	**Endotoxin (<2 EU/mL)**
Feb 2010	<1 CFU	
Mar 2010	<1 CFU	<0.03 EU/ml
May 2010	<1 CFU	
Jul 2010	<1 CFU	
Sept 2010	<1 CFU	
Nov 2010	<1 CFU	

Table 6: St George (STG) and Sutherland (TSH) Hospital Elements Testing for 2010

Date	Element Testing
May 2010 (STG)	Within limits WRO 803 was just on chlorine limit 0.05 mg/L
May 2010 (TSH)	Within limits
June 2010 (STG)	Within limits
Dec 2010 (STG)	Within limits
Dec 2010 (TSH)	Within limits, and carbon filters changed.

Comments:

- The guidelines indicate action is required when results are >50CFU/mL. Microbiology water samples taken throughout the year resulted in the removal of one portable RO (WRO) which was retested and returned to service when results returned to normal.
- Element testing including Aluminium testing occurs twice per year; results were within the guideline recommendations.

Identified limitations and strengths:

- Hi flux dialysis commenced in 2009 due to good water quality on a selected group of patients after consultation with nephrologists and this continued in 2010.
- Gambro has performed the water testing throughout 2010 for both St George and Sutherland units. Gambro communicates water testing results via email to the NUMs.

Vascular Access

Written by Yanella Martinez-Smith and Kristy Roh

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 2010 as well as current home, in-center and satellite haemodialysis patients.

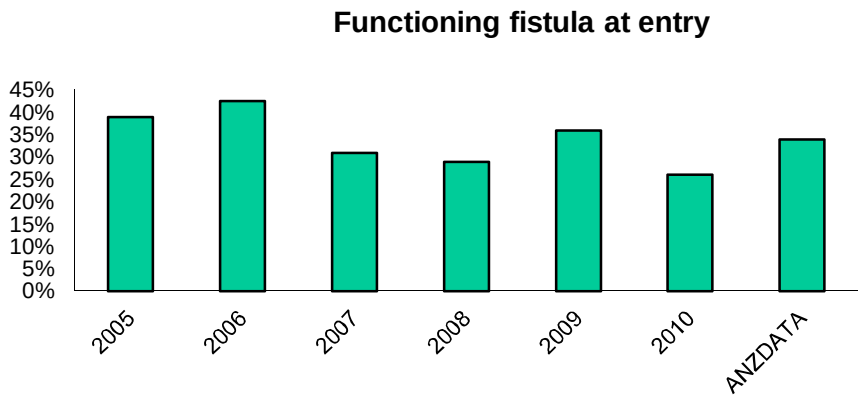
How did we Record, Store and Analyse the Data?

- Data was collected from operation reports at St George public and private hospitals and during follow up visits.
- Data is stored in RISC and Excel databases.
- Data was collected on access at first haemodialysis during 2010 and for all current patients' access on 31st December 2010.

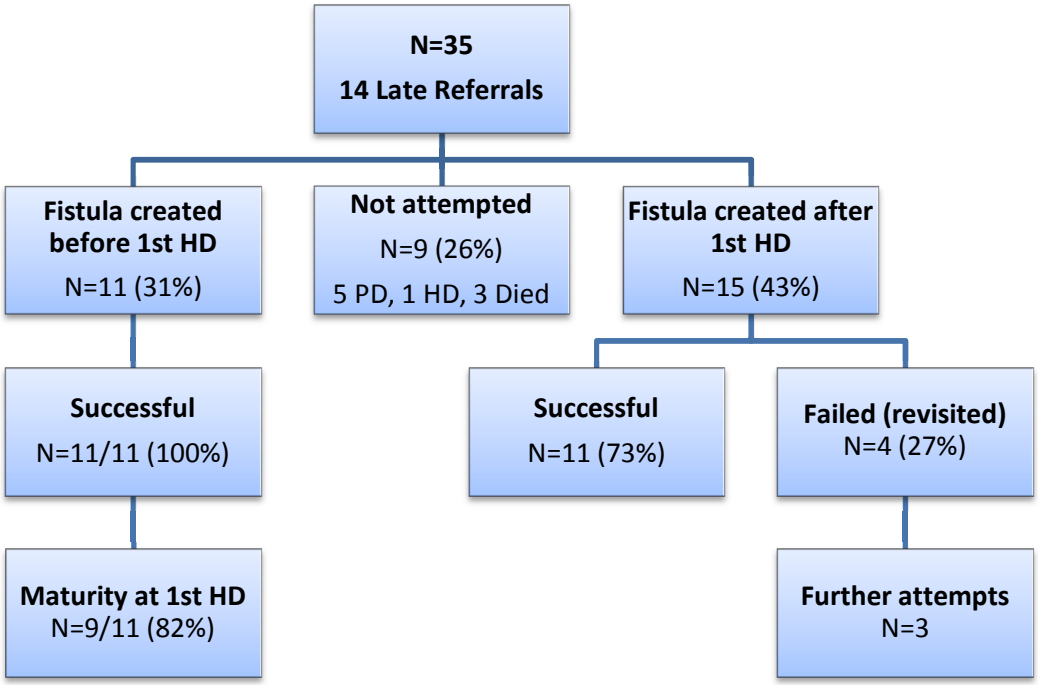
Data Benchmark

- Data was benchmarked against ANZDATA 2010 report, KDOQI 2006 guidelines, CARI vascular access guidelines, European Best Practice Guidelines (EBPG) 2007.

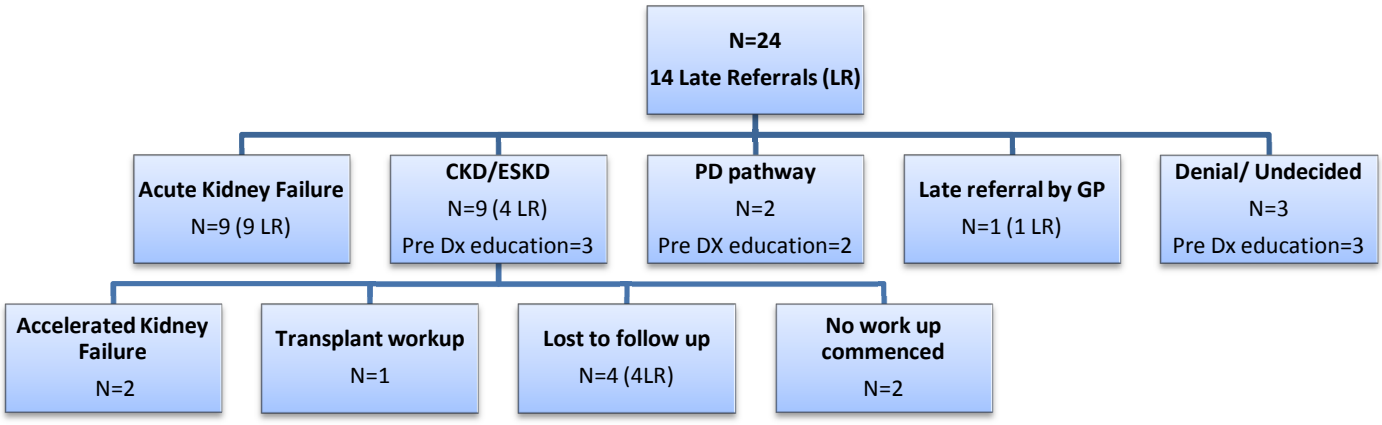
Vascular Access at Commencement of Haemodialysis

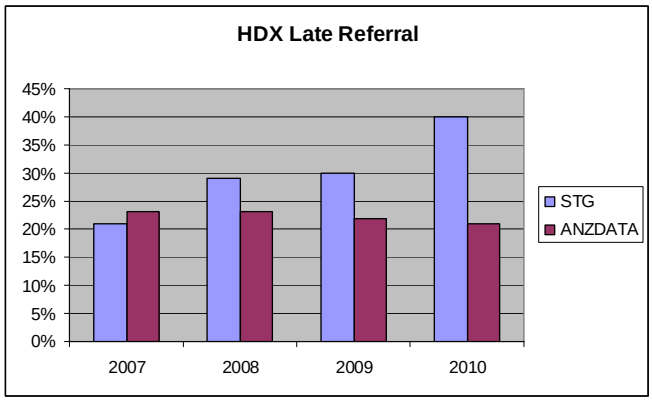


Fistulas in patients starting Haemodialysis in 2010



No access created before 1st haemodialysis



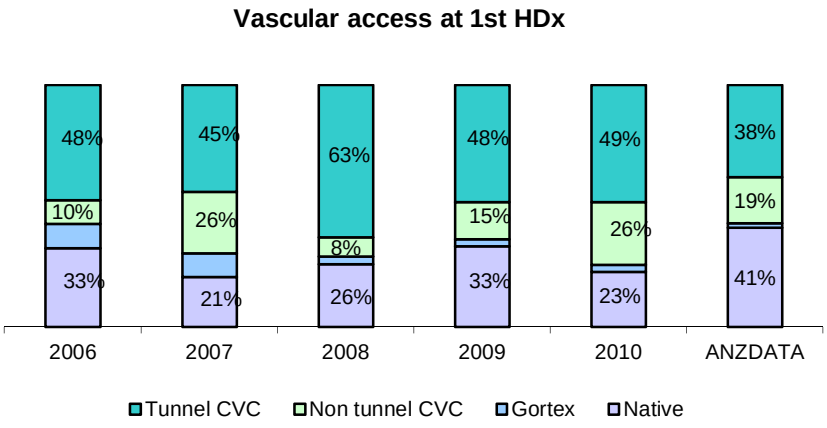


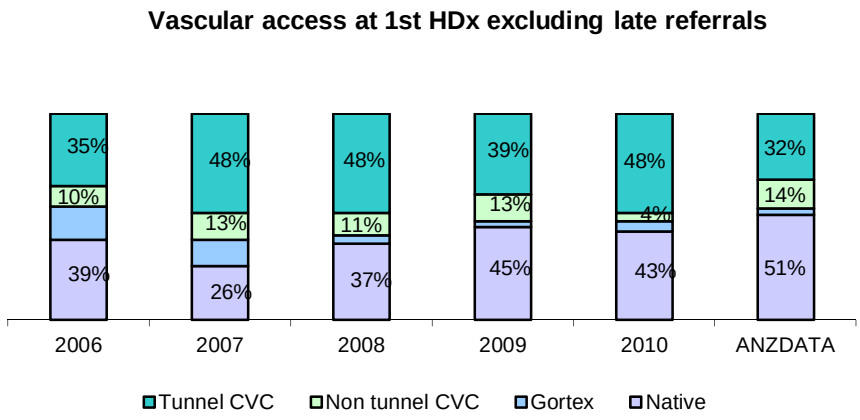
Comments:

- The late referral rate reflects patients who were referred to nephrologists less than three months prior to commencing dialysis. The late referral rate for St George was higher (40%) than ANZDATA 2010 (21%). In 2010 there was a higher incidence of patients presenting with acute kidney injury (AKI) or acute deterioration in renal function that required ongoing haemodialysis. The factors for AKI or deterioration have not yet been evaluated.
- Twenty four patients (70%) had no access created before their first haemodialysis, fourteen of who were late referrals from ARF or were lost to follow up within the health system.

Identified strengths and weakness:

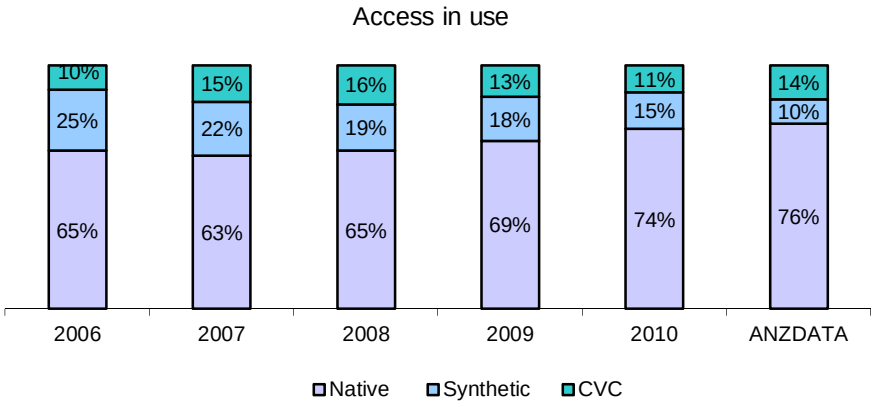
- A higher rate of late referral patients over 2007 - 2010 reduced the overall number of patients commencing dialysis with a mature functioning fistula.
- A review of patients who did not have a functioning access was evaluated and discussed at length in department meetings and it was considered that in future patients should be referred earlier with both pre dialysis education and access planning.





Comments:

- The ANZDATA 2010 (ANZDATA 2010) report indicates 54% of patients (excluding late referrals) have a functioning AVF or AVG at their first haemodialysis. Forty eight percent of St George patients had a functioning fistula at commencement (excluding late referrals) in 2010.
- The incidence of non-tunnelled CVC used for first dialysis (4%) decreased from previous years due to a preference in the use of tunnelled CVC. The incidence of tunnelled CVC use remains higher at St George (48%) compared to ANZDATA 2010 report (33%).



Comments:

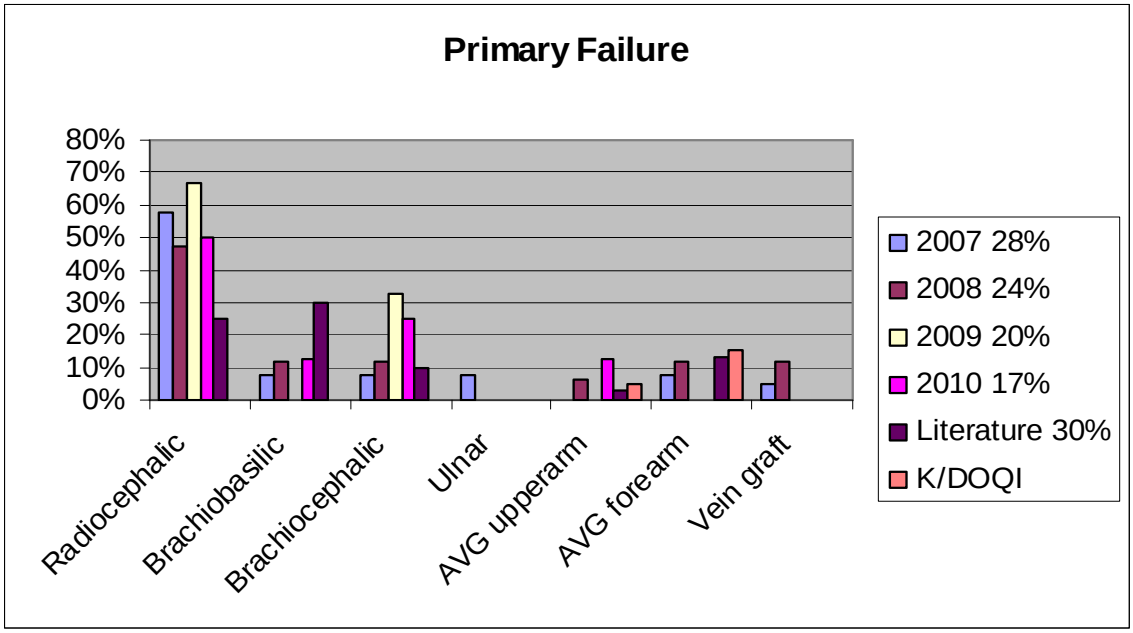
- The KDOQI 2006 evidence based practice guidelines (NKF-KDOQI 2006) recommends fistula use in 40% of prevalent patients. Seventy-four percent of patients at St George have a native fistula.
- The KDOQI 2006 guidelines (NKF-KDOQI 2006) suggest <10% of chronic haemodialysis patients have a permanent catheter. Eleven percent of patients have a CVC, of this group 2% rely on a CVC as their permanent haemodialysis access which has decreased from 2009.
- 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).

Access Infection Rates

	Cumulative Blood stream infection (BSI) range AVF	Cumulative Blood stream infection (BSI) range AVG
2010	**(1.4%) 0.11-1.16 BSI/100 pt months**	**(13%) 0.39-3.92 BSI/100 pt months**
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:

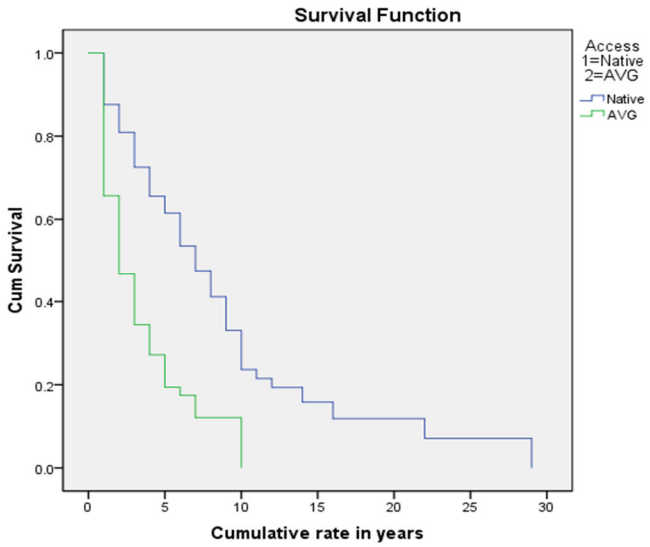
- The KDOQI 2006 guideline recommends a fistula infection rate <1% and graft infection rate <10% during the use-life of the access (NKF-KDOQI 2006).
- In 2010, 13% AVG patients had blood stream infections (BSI) and 1.4% in AVF patients had BSI. An increased infection rate occurred amongst the AVG population.
- A decreased infection rate in 2010 occurred amongst AVF patients as the buttonhole technique for vascular access with haemodialysis was abandoned on several patients.
- 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.
- Permanent vascular access BSI rates are submitted biyearly to the NSW Health department ACHS Indicators.



Comments:

- Fifty eight new access or first access were formed and a further 10 fistulas/gortex were revised in 2010. The primary failure rate of these accesses continues to reduce in 2010.
- 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 (NKF-KDOQI 2006).

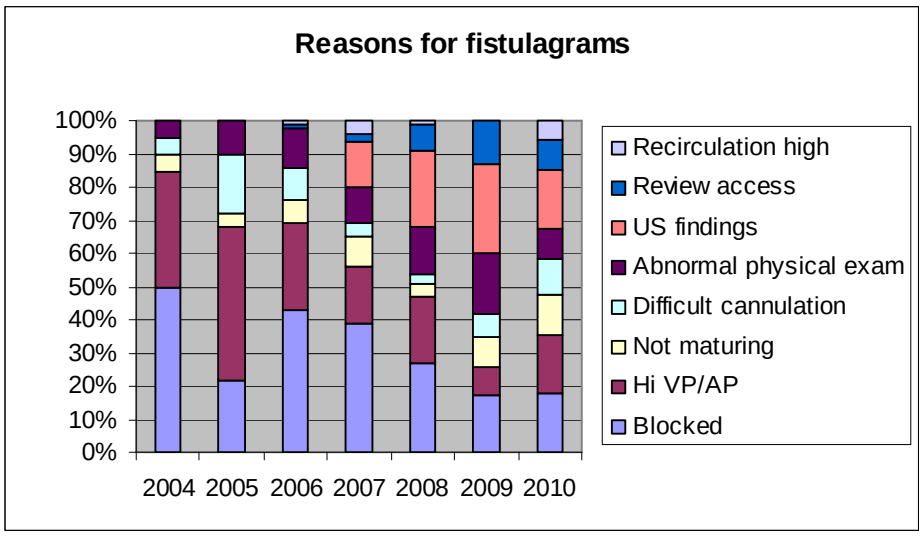
- An increase in brachiocephalic fistulas performed in 2010 has reduced the number of primary failure especially amongst radiocephalic fistulas. The literature reports a primary failure rate of 30%.



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 radiocephalic fistulas of 53% at 5 years and 45% at 10 years. PTFE grafts at 1 year 67%, 2 years 50% and 4 years 43%. The KDOQI 2006 guidelines only provides rates for AVG which are 70% at 1 year, 50% at 2 and 3 years.
- The KDOQI 2006 guidelines 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 1.8 years and AVF 6.6 years, slightly lower than previous years.
- 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	2010
First access	48	26	35	46	46
Revision	30	25	13	14	10
New access	9	13	23	20	12
Thrombectomy	5	13	14	10	13
Other access surgery (ligation, evacuation haematoma, excision, abscess drainage, fistulaplasies)	5	13	6	11	23
Fistulagram	80	95	100	115	73

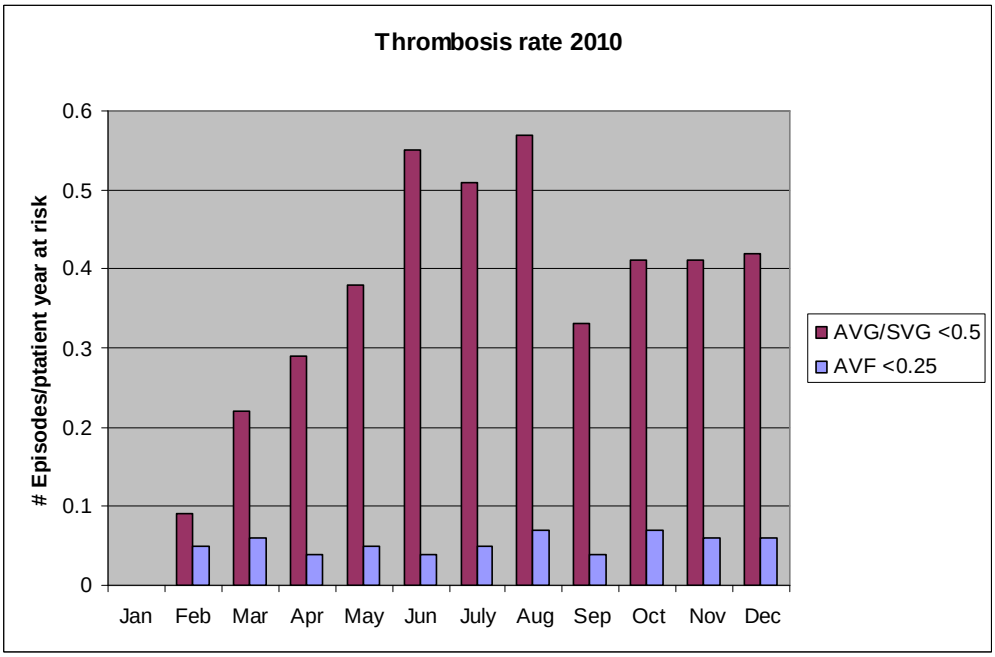


Comments:

- An increase in pre-emptive fistulagrams has occurred since 2007 due to a greater focus on access monitoring and surveillance is undertaken amongst the unit.
- In 2010, 73 fistulagram procedures were performed either in theatre or at St George Private, resulting in a 88% immediate salvaged rate for AVF and 89% immediate salvaged AVG.

Identified limitations and strengths:

- Collaboration and increased utilisation of an experienced interventional radiologist services at St George Private has seen an increase of 29% in AVG salvage rates since 2006. This service is provided by Dr Clarke.
- A reduced number of patients using the buttonhole technique have reduced the BSI rate amongst patients with AVF.
- The primary failure rate has reduced as a result of all patients undergoing venous mapping pre access creation.



Thrombosis events			
	AVF	**AVG**	**Ave/month**
2010	8	21	2.4
2009	10	24	2.8
2008	14	25	3.3

Comments:

- The KDOQI 2006 guidelines recommend a fistula thrombosis rate of less than 0.25 episodes/pt-year at risk and graft thrombosis rate of less than 0.5 episodes/pt-year at risk (NKF-KDOQI 2006).
- The benchmark for thrombosed grafts was not meet in 2010 due to multiple thrombotic events in two patients. It was identified the use of Megace to treat cancer in one patient factored in the thrombotic events.

Identified limitations and strengths:

- The increased surveillance amongst access is resulting in a reduced thrombosis rate since 2008.

Central Venous Catheters

Background

- Central venous catheters (CVC) are required to provide temporary access for haemodialysis patients
- Data relates to patients with acute kidney failure requiring haemodialysis as well as end stage kidney failure patients.
- Infection and complication rates of CVC are monitored and reported.

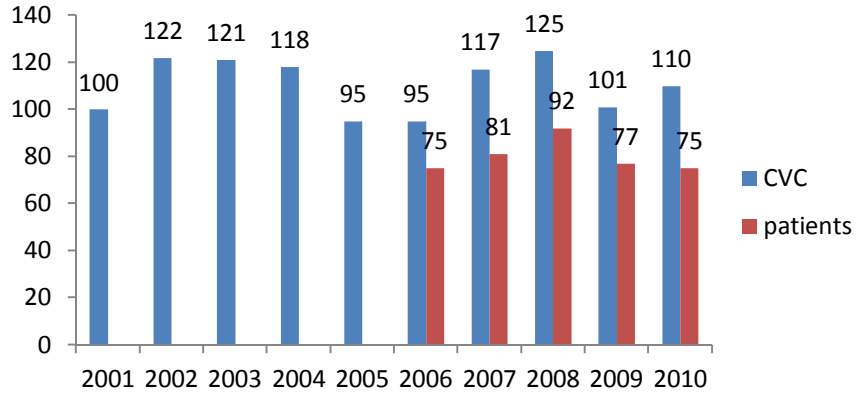
How did we Record, Store and Analyse the Data?

- 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.

Data Benchmark

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

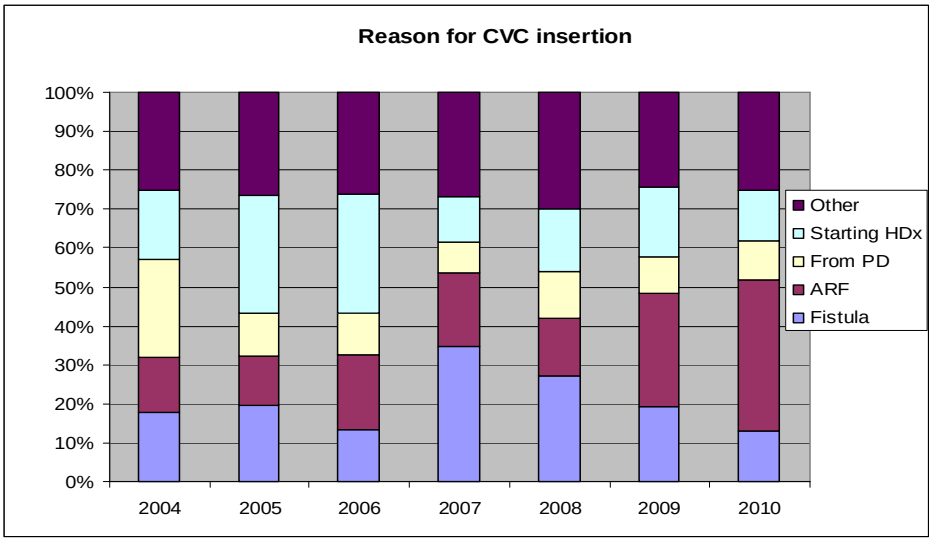
Activity Level



Comments:

- The number of catheters inserted for haemodialysis has increased from year 2009. The type of catheters inserted in 2010 remains predominantly Bard hemi-glide tunnelled cuffed internal jugular catheters (67%). The remainder were temporary Arrow non–tunnelled femoral catheters.
- The KDOQI 2006 guidelines recommends <10% of chronic haemodialysis patients should have a permanent catheter (NKF-KDOQI 2006). In 2010, 3% of St George haemodialysis patients relied on a CVC for permanent access due to poor vascular access.

Reason for insertion of catheters



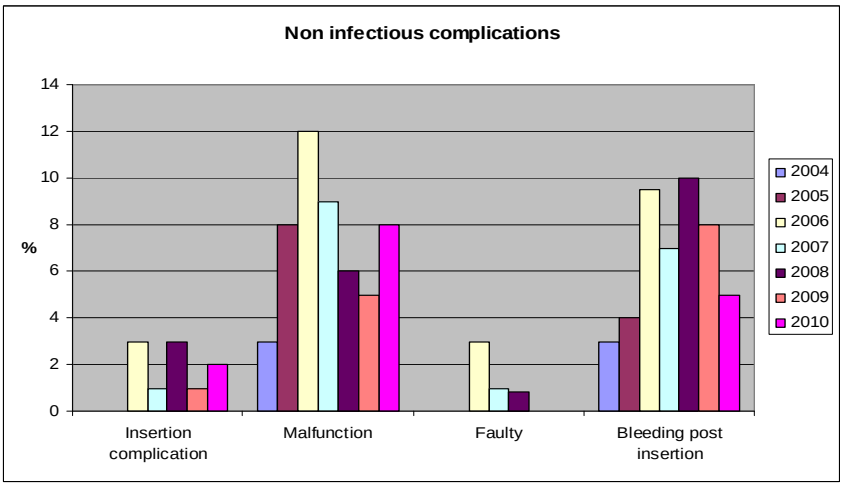
Comments:

- The occurrence of CVC insertion related to fistula complications and to commence haemodialysis continues to reduce.
- The number of patients transferring from PD and requiring a CVC was similar to previous audits.
- The classification of 'Other' includes replacing a non-tunneled catheter with a tunneled, malfunction of the catheter, occlusive thrombus and replacing an infected catheter.

Identified limitations and strengths:

- The regular monitoring and surveillance of vascular access through performing a vascular access risk assessment or ultrasound to detect early access complications has impacted on the number of CVC inserted.

Complications related to insertion

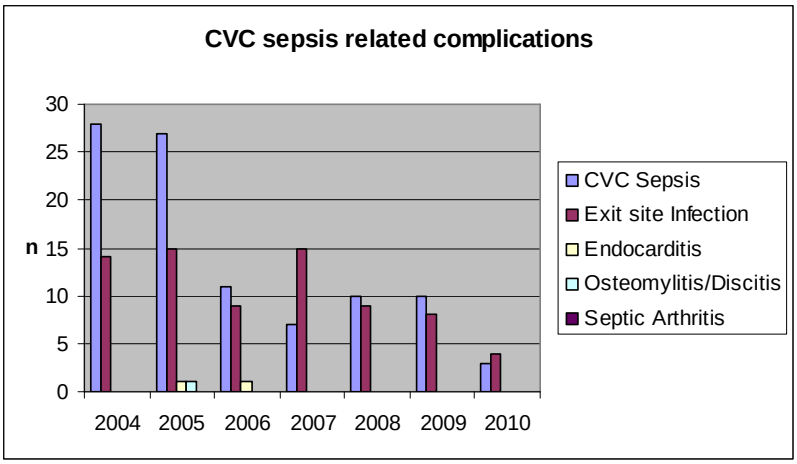


Comments:

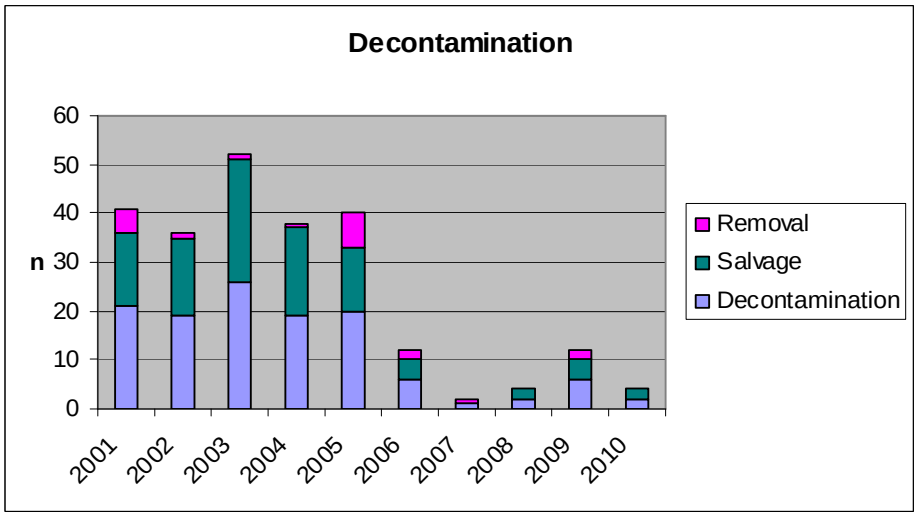
- There was an increased rate of catheter malfunctioning in 2010 (8%) compared to the previous audit in 2009 (5%). Review of the patients with malfunctioning catheters revealed more patients with left internal jugular (LIJ) catheter which is associated with difficult insertion than the right side insertion. These patients also had multiple previous catheters which could have contributed to poor flows in the CVC.

- The number of tunnelled CVC that bleed post insertion has decreased (5%) in 2010. From the review of the bleeding patients from the post insertion of tunnelled CVC in 2010 and liaising with the radiology department in 2008, less incidences of bleeding complication has been reported in 2010 compared to 2009 (8%).
- The insertion complications include a LIJ catheter inserted too far in the atrium and another patient had an extensive occlusive thrombus. Both catheters were removed and replaced.

Infection rates



	Catheter related bacteraemia (CRB) rate	Exit site infections (ESI) rate
2010	**3% (0.54 episodes/1000 catheter days)**	**4% 0.71 episodes/1000 catheter days)**
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:

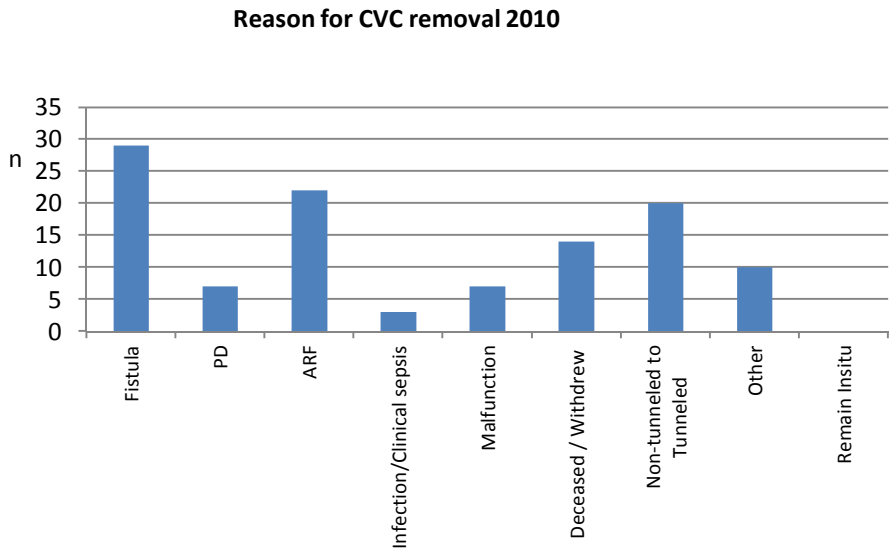
- The use of the gentamicin/heparin lock continues to reduce catheter related bacteraemia rates. There were no infections amongst femoral inserted non-tunnelled catheter in 2010.

- The 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 2010 St George met the KDOQI benchmarking for tunnelled catheter related infection at (3%).
- 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.
- Exit site infections continued to decline in 2010 (4% 0.71episodes/1000catheter days).
- The main causative organism in 2010 for CRB and ESI was MRSA. In 2010 two catheters required decontamination and both were salvaged. In 2010 "other" CRB causative organisms include Stenotrophomones maltophilia, Staph coag neg and Enterococcus.

Identified limitations and strengths:

- In 2010, the Nurse Initiated Antibiotic & Anticoagulant lock was approved and implemented as a clinical business rule. This has given the haemodialysis nurses a greater scope of practice and ensures the patient is receiving the appropriate lock.

Reason for removal



Comments:

- The main reasons for removal of CVC in 2010 are Acute Kidney Injury (AKI) patients recovering kidney function and fistula maturation. In 2010, a higher incidence of patients initially presented with AKI who then went on to develop ESKD requiring ongoing haemodialysis.
- 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, catheter accidentally pulled out by a patient and exposure of the catheter cuff.
- The average number of days non-tunnelled catheters were insitu in 2010 was 8, which was less than in 2009**.** The average number of days a tunnelled catheter was insitu in 2010 was 70 days compared to 107days in 2009.

Identified limitations and strengths:

- The ability of the Vascular Access Nurse to order a vascath removal on EMR has reduced the time a CVC is in-situ and positively impacted on the catheter infection rates.
- The lower number of patients (47%) who had a functioning fistula (AVF or AVG) at commencement (excluding late referrals) compared with ANZDATA results of 54% of patients (excluding late referrals) needs to be addressed. It remains a multifaceted issue.
- The KDOQI 2006 guideline recommends a fistula infection rate <1% and graft infection rate <10% during the use-life of the access (NKF-KDOQI 2006).
- The high blood stream infections (BSI) in AVG patients (13%) and thromboses of grafts need to be monitored. However, this is in a context of improvement since 2008.
- Excellent ongoing surveillance and detection of problem access has resulted in improved monitoring and an increase in interventions.
- The very successful intervention of catheter salvage and Nurse Initiated Antibiotic & Anticoagulant lock is a particular strength in the unit.

Peritoneal Dialysis

Written by: Elizabeth Josland

The peritoneal dialysis (PD) unit has continued to have a small decline in the number of prevalent and incident patients in 2010 with a gross loss of 6 patients. A total of 81 patients were treated on PD during the year (including hospital IPD) compared to 83 in 2009, 85 in 2008 and 74 in 2007. In December 2010 the proportion of patients receiving automated peritoneal dialysis (APD) was 96%, and the proportion of continuous ambulatory peritoneal dialysis (CAPD) was 4%. Our APD population is still over and above the proportion reported by ANZDATA of 59%. This has been a deliberate strategy to enhance the appeal of PD for our patients thereby increasing the number of home patients.

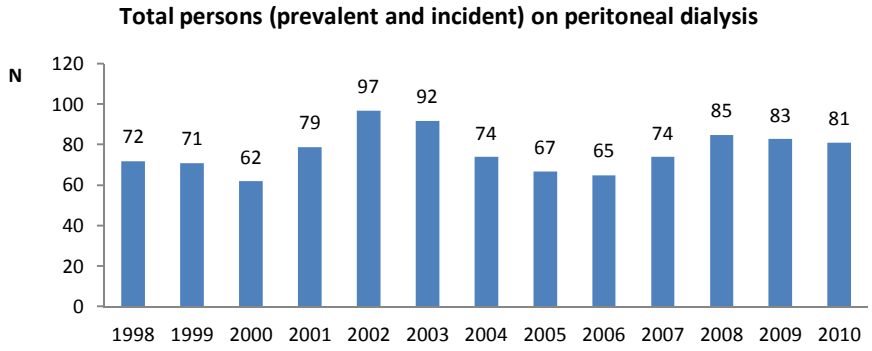


Figure 13: Total patients who received peritoneal dialysis at any stage during each year

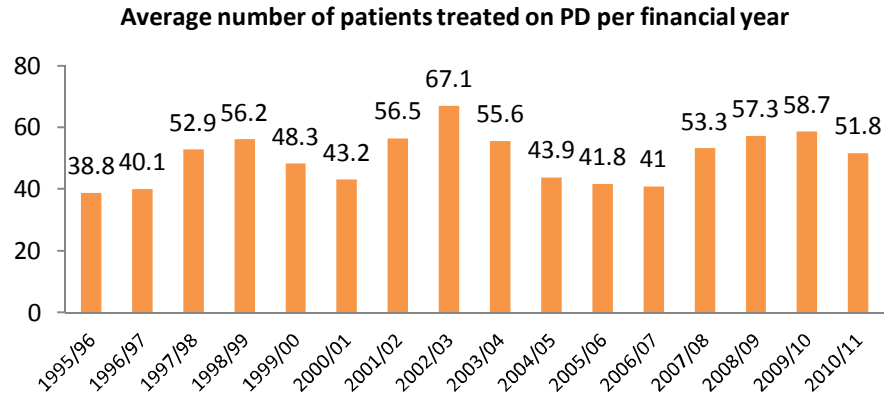


Figure 14: The average number of patients on peritoneal dialysis per financial year

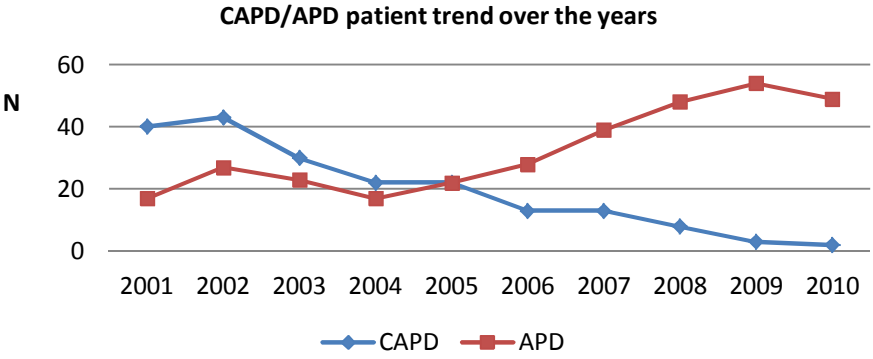


Figure 15: Number of patients on each modality at December 31st each year

The ANZDATA 33rd Annual Report 2010 (data to Dec 2009)

ANZDATA results show an increase in the prevalence of people using automated peritoneal dialysis (APD), up 2% Australia wide. The St George peritoneal dialysis unit continues to increase the numbers of patients on automated peritoneal dialysis, in December 2010 the APD population increased by 1% from 2009 while the CAPD population continues to decline; down by 1% from December 2009.

Table 7: Proportion of patients on each PD modality compared to ANZDATA

APD	*ANZDATA 59% (1293/2177)*	*St George 96%*
CAPD	*ANZDATA 41% (884/2177)*	*St George 4%*

PD Patient Flow

Balance carried forward: Peritoneal dialysis patients as at 01.01.2010 (n=57)			
In	New Patients	17	
	New patient transfer from Haemodialysis	6	
	Returns from HD	6	
	On hospital IPD	0	
	Return to PD 1 day per week	1	
	In Subtotal		30
Out	Transplants	2	
	Transfer to other units	2	
	Transfer to Home Haemodialysis	0	
	Temporary Transfers to Haemodialysis	8	
	Permanent Transfers to Haemodialysis	13	
	Return of renal function	2	
	Withdrawal from dialysis	5	
	Deaths on CAPD	4	
	Out Subtotal		36
	Net Loss	**-6**	
	PD patients Dec 2010		**51**

Change of modality and deaths

Table 8: Peritoneal Dialysis activity rates using ANZDATA for comparison

	St George 2009 (%)	St George 2010 (%)	ANZDATA 2010 (%)
Transplants	5	4	7
Change to haemodialysis	16	41	26
Deaths on Dialysis (PD)*	23	18	14

Note: The rates are calculated using the total number of patients on peritoneal dialysis at 31.12.2010 (n=51), the method used by ANZDATA to calculate their rates.

Patients changed to haemodialysis for a variety of reasons; failed PD (n=9), mechanical catheter failure (n=5), infective reasons (n=3), surgical (n=2), pain (n=1), other medical (n=1).

The percentage of deaths on peritoneal dialysis was 4% higher than the ANZDATA Australian rate. The St George withdrawal rate was 10% in 2010 and deaths on peritoneal dialysis was

8%; these cannot be compared to the ANZDATA 2010 report as these figures were not reported individually.
The percentage of transfers to haemodialysis increased by 25% from 2009 and is higher than the transfer rate reported by ANZDATA 2010. The increased change of modality relates to dialysis access issues and failed dialysis membrane requiring change of dialysis mode.

Unit Workload

In 2010 the PD unit provided 187 training days for PD patients with training time varying from 3 - 13 days (average 8 days). There were 11754 occasions of service; these include nurse outpatients, doctor outpatients, home visits, patient/staff education, phone contact and scrub assists on catheter insertions under local anaesthetic.

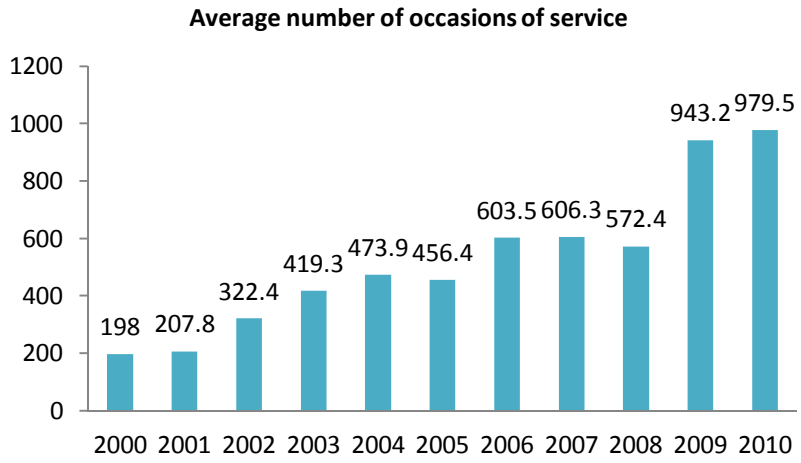


Figure 16: Occasions of service in the peritoneal dialysis unit

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.

Hospital Admissions

There were 155 hospital admissions for peritoneal dialysis patients over 2010 which can be broken down into the categories in the following table.

Table 9: Cause and number of separate hospital admissions

PD infection related	31	Other medical reasons	57
Vascular access	4	Transplant	2
PD Catheter theatre (insertion/removal)	48	PD fluid leaks	4
Hospital IPD	7	Respite care/social admission	5
Fluid overload	2	Failing dialysis	2
PD catheter problems	6		

PD catheter theatre, infections and 'other medical reasons' are major factors in PD patient hospitalizations. 'Other medical reasons' include myocardial infarctions, cerebral vascular incidents, urinary tract infections, haematological problems, psychiatric issues, gastroenterology issues, pneumonia, chemotherapy, mobility issues/falls, diabetic issues, pain management, neurological issues and amputations. These admissions highlight the complex medical issues each patient and carer face on a daily basis.

PD Adequacy, Biochemical and Haematological targets

Aim

1. To compare dialysis adequacy using haematological markers, biochemical markers and Kt/V with previous audits; October '10 (47), April '10 (53), October '09 (54), April '09 (56). 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.

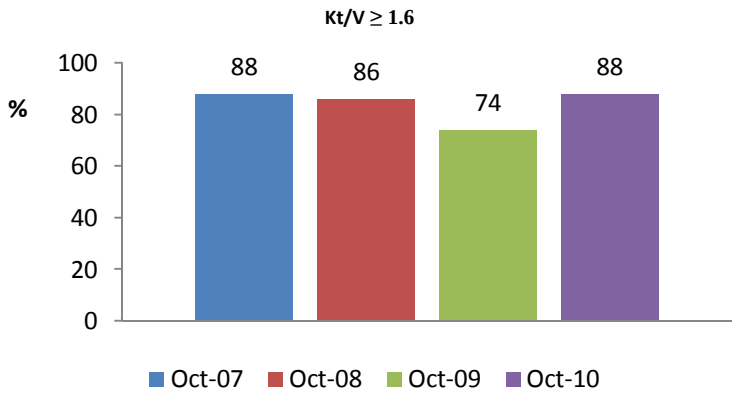
Background

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. 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.

Peritoneal Dialysis Adequacy



Statistics:

Oct 09 Mean 2.1, SD 0.7, min 0.9, max 3.59
Oct 10 Mean 2.3, SD 0.8, min 1.17, max 6.2

Figure 17: Percent of patients who achieved a Kt/V ≥ 1.6

Table 10: Percent of peritoneal dialysis patients falling within the target range

Parameter	Target	Apr 09	Oct 09	Apr 10	Oct 10	ANZDATA 10
Ca	2.25-2.58 mmol/L	49	46	53	53	-
Corr Ca	2.1-2.4 mol/L	46	34	30	28	-
PO4	0.8-1.6 mmol/L	55	52	49	39	47
$CaPO_4$	<4.0 mmol/L	63	55	55	43	63
Ferritin	200-800 ug/L	70	71	48	66	53
Fe Sats	20-50%	72	78	56	76	70
Mg*	0.74-1.03 mmol/L	57	60	51	71	-
Albumin*	33-48 g/L	41	20	28	45	-
Bicarbonate***	20-30 mmol/L	89	83	94	92	-
PTH	10-15 nmol/L	18	15	14	15	-
KT/V	≥ 1.6	-	74	-	88	-
CCL	>50L (L & LA) or >60L (H & HA)[1]		62		73	-

*p<0.05, ***p<0.001

Albumin and Bicarbonate

Albumin and bicarbonate both showed statistically significant improvements in 2010. There is no explanation for the significant variation in albumin results over the time period.

Serum Calcium and Phosphate results

- Calcium results show improvement in Oct 10 compared to April 10 and they continue to exceed ANZDATA results. The Oct 10 average calcium was 2.36 mmol/L compared to 2.26 mmol/L in April 10. There was no statistical significance.
- Phosphate results indicate that PD patients phosphate control continues to deteriorate with a higher percent >1.6mmol/L. The mean result in April 10 was 1.68 mmol/L and in October 10 it was 1.72 mmol/L. There was no statistical significance.

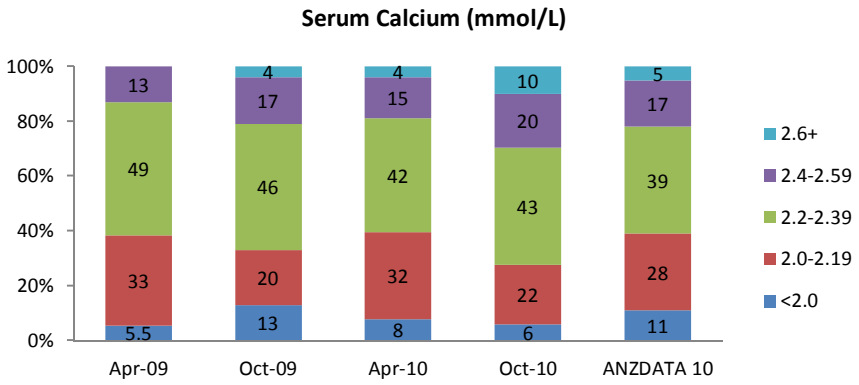


Figure 18: Serum Calcium compared to ANZDATA

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

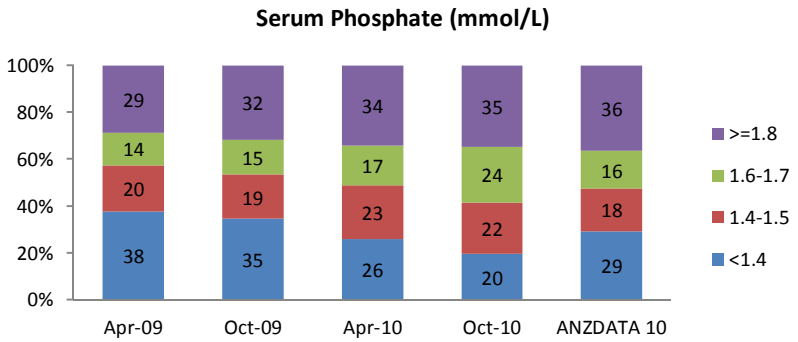


Figure 19: Serum Phosphate compared to ANZDATA

Calcium Phosphate Product

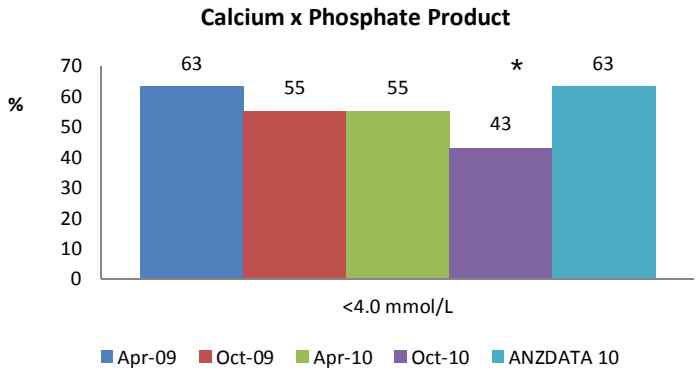


Figure 20: Calcium x Phosphate Product results compared to ANZDATA

Calcium Phosphate product is worse in October 2010 and worse than the ANZDATA results for Australia. This is reflective of the worsening phosphate control. The results are statistically significant using Kruskal Wallis χ^2=9.1, df=3, p<0.05.

PTH

- In October 2010, 15% of peritoneal dialysis patients had a PTH within the recommended limits set by CARI of 10-15 nmol/L, 15% had a level less than 10 while 21% were between 16-25 and 49% were >25. There was an increase in the percent of patients with higher PTH in 2010.
- The maximum recorded PTH in October ’10 was 200, the mean was 33.4 (median 24.6) nmol/L.

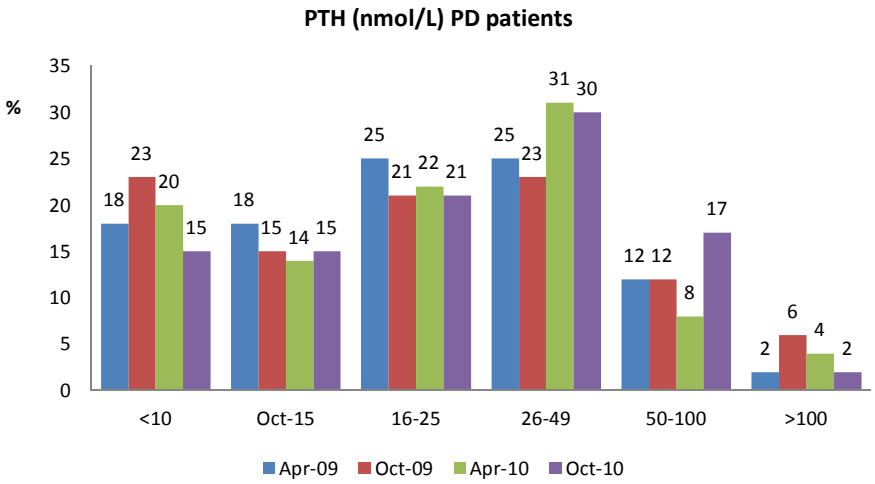


Figure 21: PTH results compared over different audit times

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 continues to be an ongoing project.
- There is no statistical significance in the improvement seen in Ferritin over 2009 and 2010, but a statistically significant improvement seen in Iron Saturation χ^2=14.2, df=6, p=0.03.

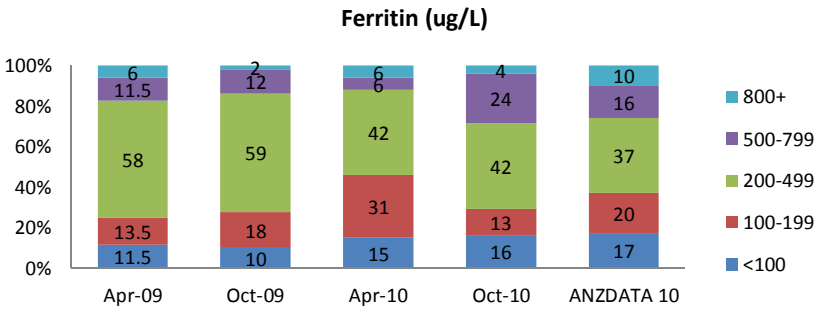


Figure 22: Peritoneal dialysis Ferritin results compared to ANZDATA

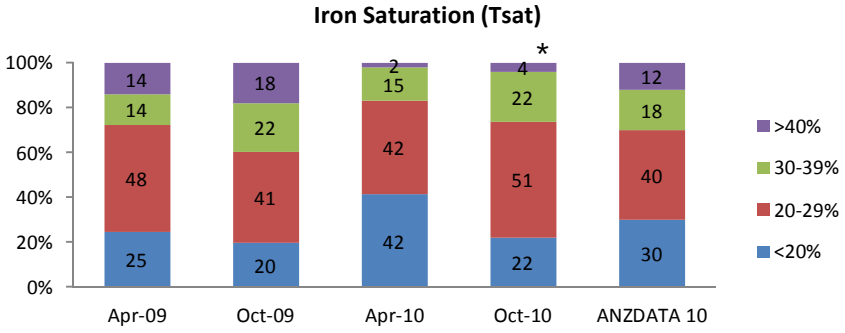


Figure 23: Peritoneal dialysis Iron Saturation compared to ANZDATA

Haemoglobin

Haemoglobin (Hb) has been examined using cardiovascular disease (CAD) as a determining factor.

- The October 2010 PD population showed an almost identical result to the previous year in the percent of patients with haemoglobins both <110 and >120. I pattern can be seen in the results over 2009 and 2010.

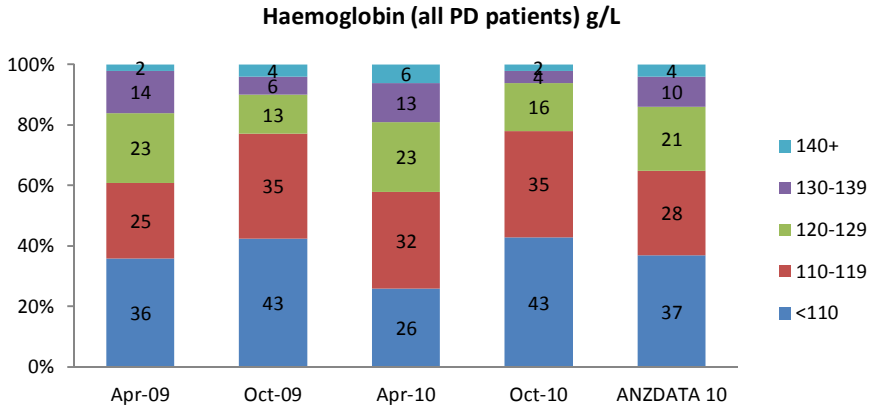


Figure 24: Peritoneal dialysis haemoglobin results compared to ANZDATA

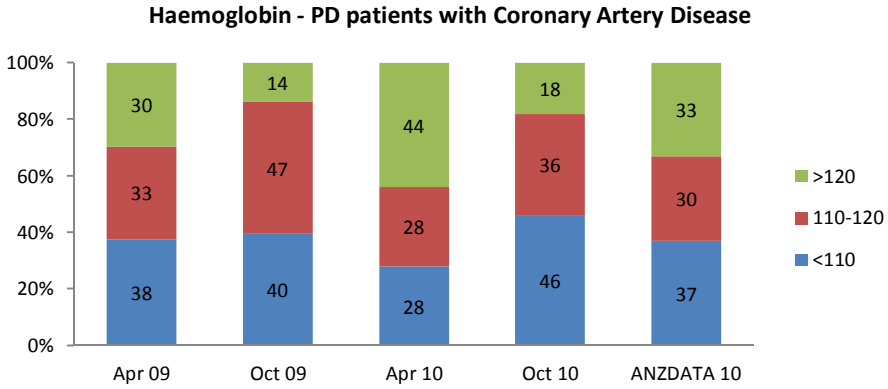


Figure 25: Haemoglobin results in peritoneal dialysis patients with coronary artery disease

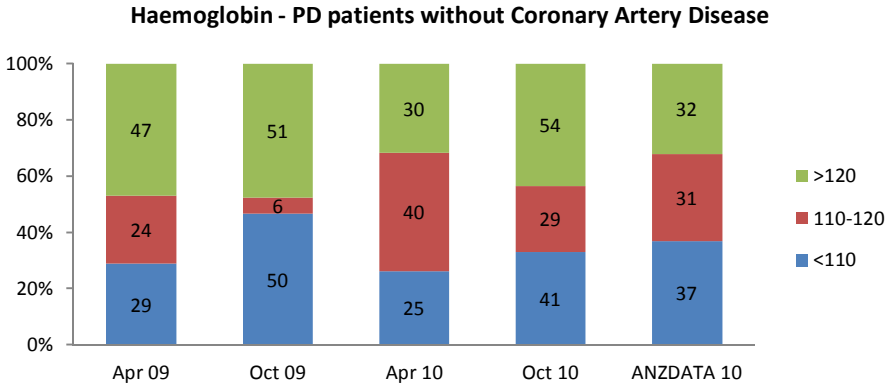


Figure 26: Haemoglobin results in peritoneal dialysis patients without coronary artery disease

- In October 2010, 33% of the patients were known or suspected of having coronary artery disease (CAD).
- Analysis of haemoglobins in CAD reveal increase in patients with haemoglobin <110g/L, an increase in patients within the recommended target of 110-120 g/L and a reduction in patients with a haemoglobin <120 g/L. Non CAD patients have a great deal of fluctuation over 2009/2010. April 10 showed 40% of patients within the

recommended range of 110-120 g/L which reduced in October 10 to 29%. Similar rates are seen for the >120 g/l in 2009 and Oct 10. Patients without CAD have higher haemoglobins than those reported in ANZDATA 2010 while those with CAD have lower haemoglobins compared to ANZDATA. 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 in PD patients more challenging.

- Monthly patient case management meetings with individual nephrologists and nursing staff were implemented in late 2009 and continue to be an ideal time to ensure PD patients haemoglobin, 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. 2010 showed an improvement in glucose control in the diabetics. Evidence in non-dialysis research suggest an HbA1c <7 is considered the benchmark. As indicated earlier the value of HbA1c monitoring in diabetes patients with ESKD has been brought into question.

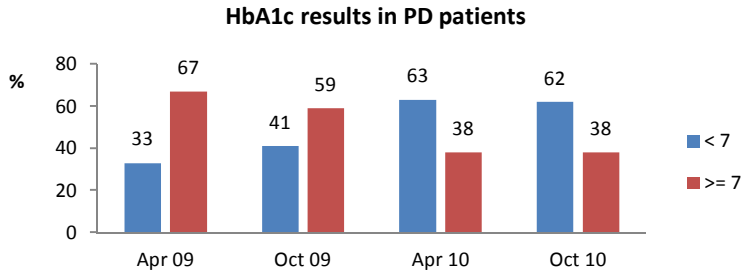


Figure 27: HbA1c results in peritoneal dialysis

Lipids

Lipid studies were collected for the 'high-risk' patients (having or suspected of having: diabetes, coronary artery disease, cerebrovascular disease, peripheral vascular disease), 54% of PD patients were classified as high-risk in October 2009. Lipid study results showed improvements in cholesterol, triglycerides, HDL and LDL over 2010, no statistical significance was found using Kruskal-Wallis Test.

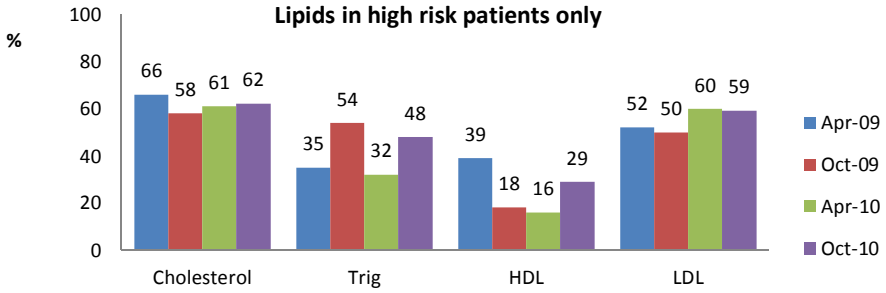


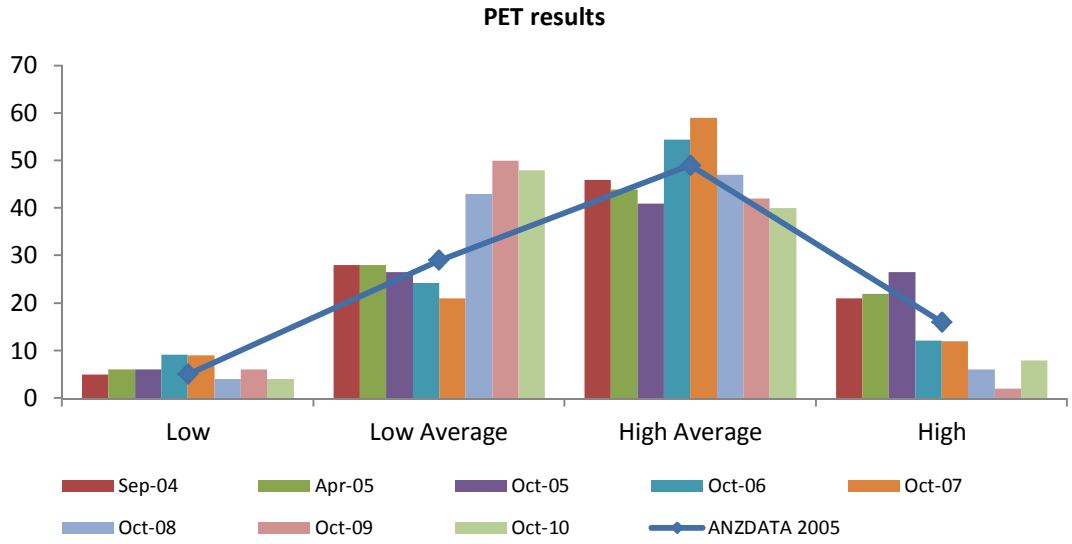
Figure 28: Lipid results in high risk peritoneal dialysis patients (any ANZDATA comorbidity excluding chronic lung)

PET (Peritoneal Equilibrium Test) Results

PET measures a patient's peritoneal membrane type or properties i.e. ability to transport molecules across the membrane. This 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 also 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 a current trend for patients to have low average (LA) and high average (HA) peritoneal membranes, less likely to have Low (L) or High (H) peritoneal membranes. Due to the majority of our patients using APD which usually uses short dialysate dwell times, patients machine 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. Once a patient cannot ultrafiltrate adequately or clear solutes adequately across their membrane and all peritoneal dialysis options are exhausted, the patient must change to haemodialysis.



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. Peritonitis Episode Forms from ANZDATA are used to collect peritonitis information (organism, treatment, admission) regarding every peritonitis event. This data is then analysed using a statistical program. Patient records are reviewed for exit site infections.
2. 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).
3. Recurrent peritonitis infections are included from 2008 onwards in this report, previously they were excluded as per the NSW Health method of calculating infection rates per 100 patient months (NSW Health, 2005).

Outcomes

- The rates of infections from 1998 to 2010 continue to show improvement.
- Causative organisms for peritonitis infections show higher fungal and particularly gram negative organisms but less Staph.

Table 11: Infection rates over time

	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
Total patients	72	71	62	79	97	92	74	67	65	74	85	83	81
Peritonitis episodes	118	81	69	45	51	62	42	34	40	30	33	33	16
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%	n=15 19%
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%	n=16 20%

Peritonitis Causative Organisms

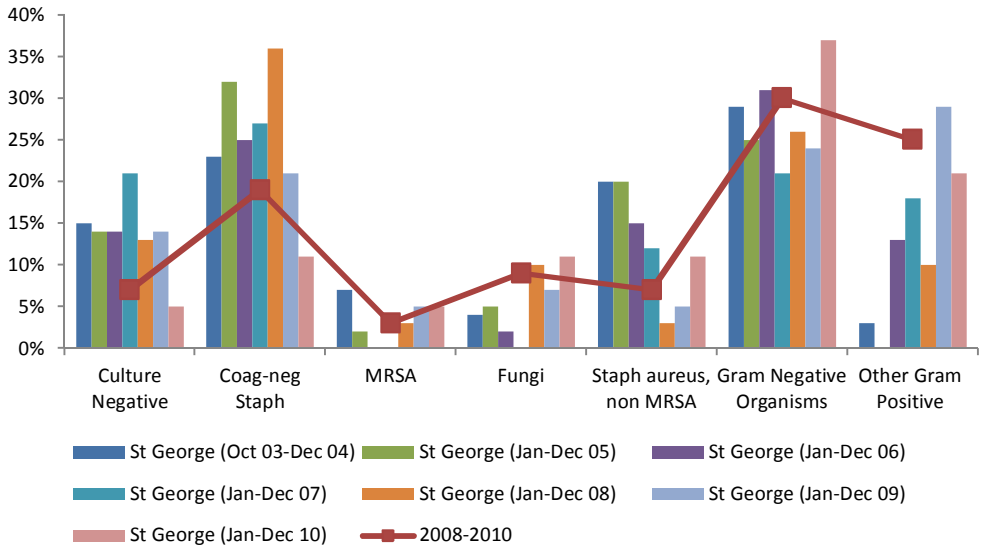


Figure 29: Peritonitis causative organisms

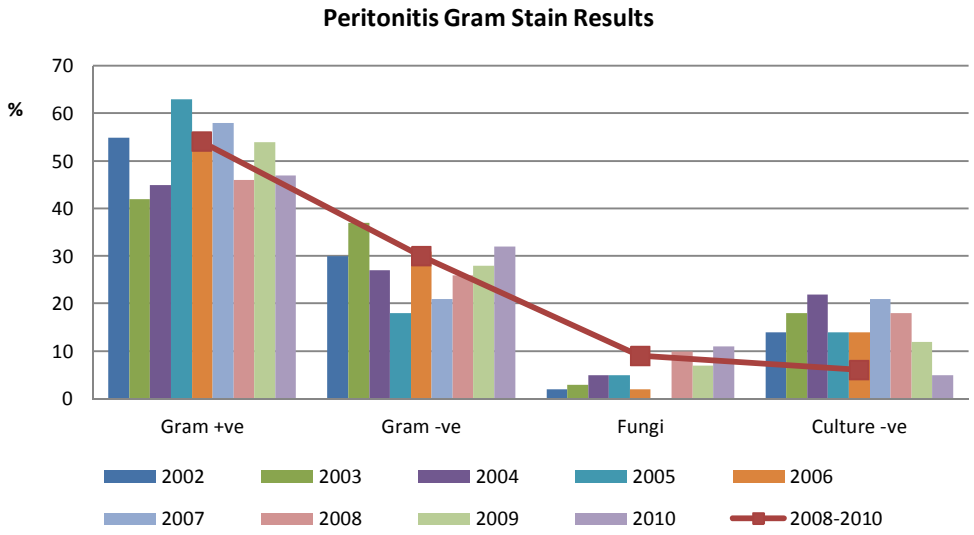


Figure 30: Peritonitis Gram Stain results

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***	**2010***
Interim Haemodialysis	9	9	10	6	0	6
Permanent Haemodialysis	11	13	13	18	15(5/33)	24 (4/17)
Catheter removed	20	22	20	24	15 (5/33)	41 (7/17)

**includes recurrent infections*

Peritonitis episodes and rates

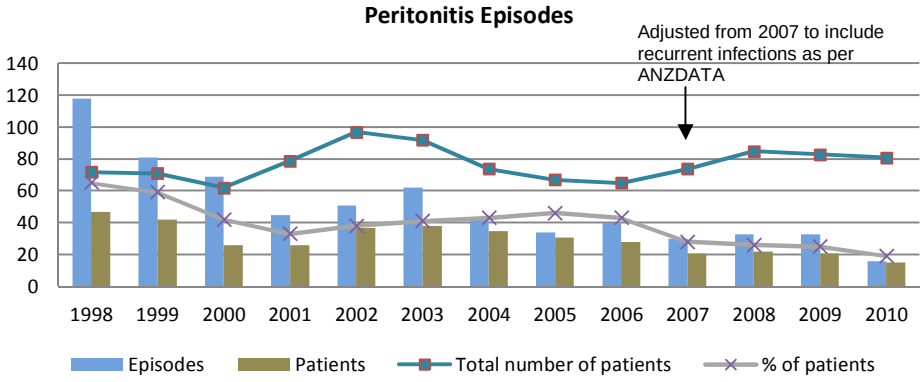


Figure 31: Peritonitis Episodes since 1998

- The number of episodes of peritonitis and the number of patients who had peritonitis over the years 1998 – 2010 has shown progressive improvement. There are considerably 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 increased again to 53%. This is related to the increase in number of patients who have been on peritoneal dialysis greater than 3 years.

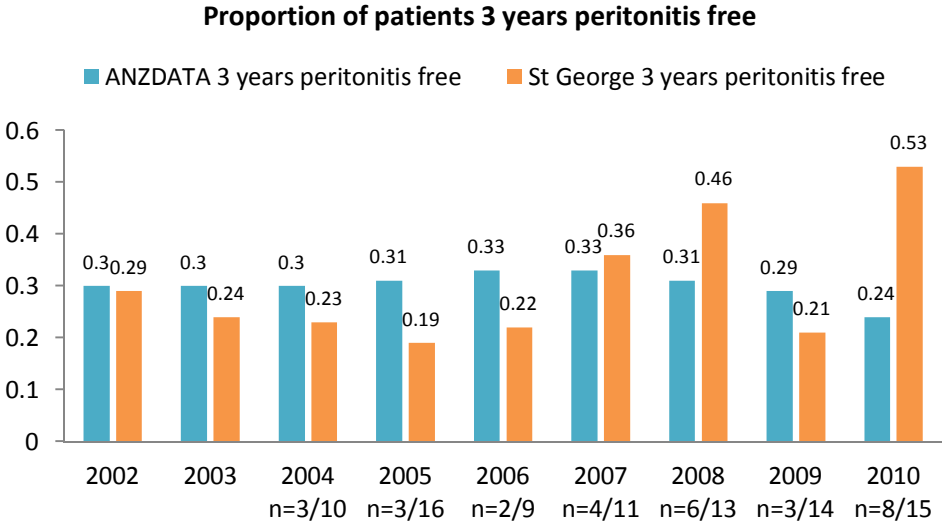


Figure 32: Proportion of patients' peritonitis free at 3 years compared to ANZDATA

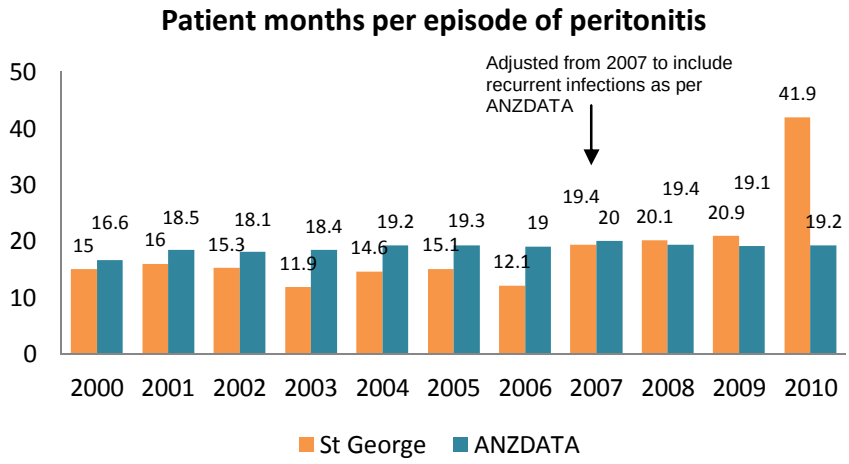


Figure 33: Peritonitis Rates

- Patient months per episode of peritonitis compared to ANZDATA Australian results show similar results to ANZDATA with an improvement in 2010 meaning there is a greater length of time to a peritonitis episode. The peritonitis rate over 3 years, 2008–2010 is 1/24.7 months. ANZDATA 2010 reports the APD rate at 1 per 21 months, St George APD rate over 2008-2010 is 1 per 29 patient months. ANZDATA peritonitis free survival is calculated from the date of first peritoneal dialysis 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 1/41.9 months. This betters the benchmark set by the Australian 2010 ANZDATA results.
- The percentage of patient's peritonitis free at 3 years has increased to 53%.
- The peritoneal dialysis unit staff employed a strong focus on home visits in early 2010 to identify and rectify any problems that may contribute to infections in conjunction with identifying gaps in education. These home visits were evaluated after 3 months and the results of these showed 28% of patients kept no dialysis records, no overstocking was observed, 97% had a suitable home environment, 100% had good basic dialysis knowledge and most patients agreed there was a need for home visits although 5% saw no benefit. It was felt that home visits to well patients could be viewed as intrusive.
- 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.
- There has been an implementation of a bi-annual patient newsletter (first issue was April 2010) in response to the patient satisfaction survey results where existing patients expressed the need for ongoing peritoneal dialysis education. Less than half of survey respondents were willing to attend information sessions.

Exit Site Infections (ESI)

The following graphs represent the exit site swab results from 2005 to 2010 and the numbers of patients / episodes of exit site infection. Exit site infections have reduced considerably since data collection began in 1998. There are considerably less repeat infections and a continual decline in the percent of patients who have infections was seen until 2010. The percent of patients who acquire an ESI reached a plateau in 2009 and slightly increased in 2010.

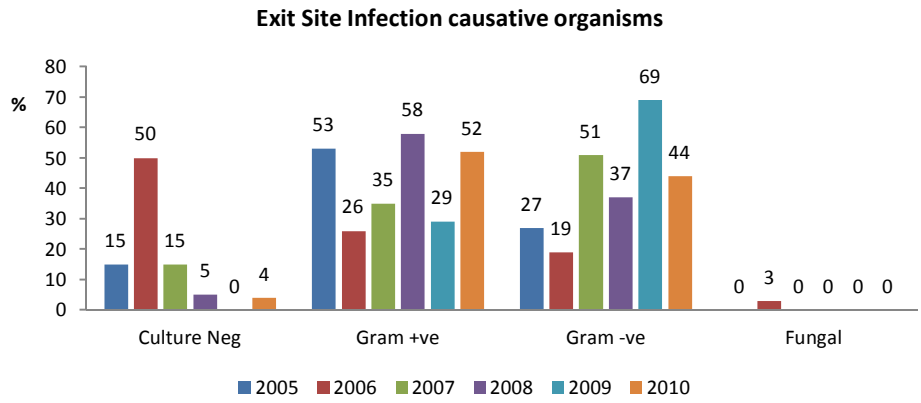


Figure 34: Exit site infection causative organisms

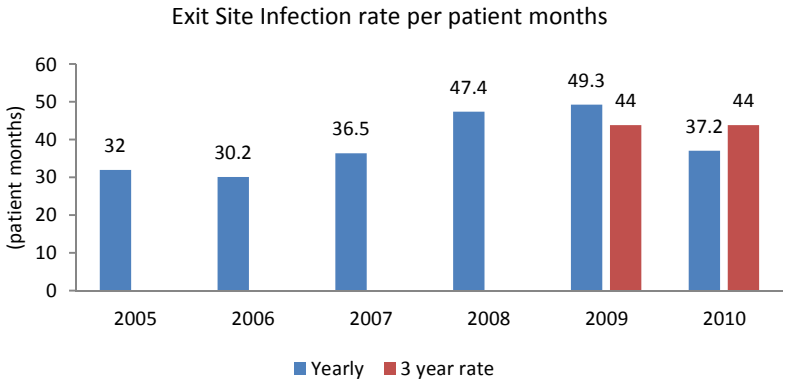


Figure 35: Exit site infection rates

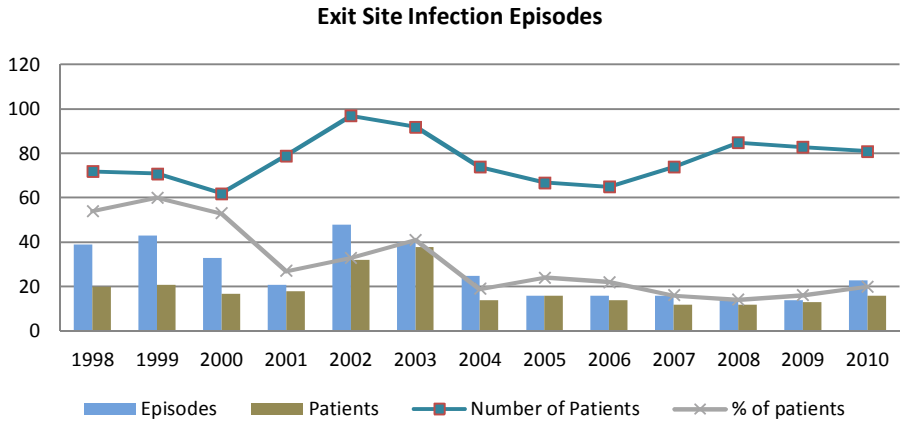


Figure 36: Episodes of exit site infection per year

Comments:

ANZDATA does not collect data on Exit Site Infections; therefore there is no Australian benchmark data with which to compare. However, deterioration in exit site infection rates occurred during 2010.

Technique failure

- Eighteen patients transferred to haemodialysis either temporarily or permanently during 2010, this is an increase from 2009, but similar to 2008. St George continues to have a lower percent of patients that change modality for social reasons than ANZDATA.
- ANZDATA 2010 reports the most common primary cause of technique failure (ceasing peritoneal dialysis) as 'total dialysis/technical failure' (39%) and 'infective' as the second most common cause (27%). Our primary cause of failure in 2010 is 'total dialysis/technical failure' (62%) originating from blocked catheters, inadequate solute clearance and dialysate leaks.

Table 12: Primary reason for technique failure on peritoneal dialysis compared to ANZDATA

Primary reason for technique failure	*St George 2008 n=21*	*St George 2009 n=9*	*St George 2010 n=21*	*ANZDATA 2010*
Infective	25%	44%	24%	27%
Total Dialysis/Technical Failure (inadequate dialysis, leaks, surgery, mechanical)	65%	44%	62%	39%
Social (patient choice, failed training)	10%	11%	14%	34%

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 in October 2010 showed some improvement while April 2010 had no improvement.
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. APD is not suitable for all patients, but it does offer patients more freedom during the day for normal activities and employment. The high rate of APD uptake has had a major influence on admission rates for infections. The fact that patients are unable to carry out APD any longer means they must remain admitted for antibiotic administration until infection has cleared. Alternatively they must be trained to administer their own antibiotics through a temporary change to CAPD. This fact has been identified as an issue and strategies to reduce these admissions are currently under discussion.
3. The percent of patients transferring to haemodialysis through technical failure (leaks, surgery and mechanical) increased in 2010. These transfers can be accounted for primarily through dialysate leaks, surgical and mechanical problems. This is similar to previous reports.
4. The rate of failing PD due to social reasons continues to be lower than the rate reported by ANZDATA. This may indicate that our patients are more suitable for the PD either financially or socially and are therefore more able to manage with their chronic disease. In the past, social failures included an inability to be trained and patients deciding they do not want to continue to proceed with PD during training.

5. Phosphate control remains a continuing issue for patients again in 2010 together with calcium phosphate product. This may not be unique to St George but is an international challenge for dialysis units. Continued education of the patients and staff was considered important. This was to ensure medications are taken correctly and that patients do not get confused with conflicting information. This education is covered by the units dietician, but it is considered important and encouraged that other staff convey the same information. Including educational material in the PD newsletter would be appropriate and targeting patients with poor results for diet and medication education would be another appropriate method of tackling this issue.
6. The increasing age of peritoneal dialysis patients may be adding to the complexity of training, and especially with an automated peritoneal dialysis machine. This, along with the need to educate patients from non-English speaking backgrounds is an ongoing challenge in the PD unit. Training is individualized to patients and carers needs. Education and re-training is provided on an ongoing basis where the need was identified during our home visits and patients' clinic visits.

Anaemia Coordinator

Written by Coralie Meek

Background

It is well documented that the development of anaemia is a common occurrence for patients suffering chronic kidney disease, particularly for those on haemodialysis. In addition to the more common causes, such as reduced erythropoietin production, iron deficiency and a reduced life span of red blood cells, haemodialysis patients will suffer from ongoing blood losses due to regular accessing of their fistula, blood left in blood lines and the need for repetitive blood testing. It is also common for both haemoglobin and iron stores to fluctuate in and out of range from one month to another for haemodialysis patients, due to their susceptibility to inflammation and infection, the sequestering of iron stores and the interference with a patient's response to an erythropoietin stimulating agent (ESA).

The role of Anaemia Co-ordinator for the St George Hospital Renal Department commenced in July 2009, 1 day per week, sponsored by Amgen. The role has involved overseeing the ward management of anaemia for the incentre and satellite haemodialysis population, setting up of a comprehensive anaemia-specific database covering 4 modalities, updating the department guidelines for anaemia and iron supplementation in line with the most up-to-date evidence available, and the revision of our nurse-driven iron protocols.

Ongoing education of staff members has also taken place with regard to anaemia management and the changes to guidelines. A comprehensive audit across incentre and satellite patients has yielded a 99% compliance rate for nurses with our latest guidelines, which has led to positive outcomes for patients. Feedback to the Renal Department takes place through weekly meetings with the Nephrologists regarding patient results.

The renal anaemia database has included an average of 250 patients across 4 modalities – Incentre, Satellite and Home Haemodialysis as well as Peritoneal Dialysis. The database consists of anaemia specific biochemical markers, such as haemoglobin, ferritin and transferrin saturation levels as well as ESA dosing regimes. Other related markers, such as calcium, phosphate, albumin, calcium/phosphate product and PTH, have also been included. An analysis of results for 2010 has been undertaken with an aim to show whether the introduction of an Anaemia Co-ordinator has made a difference to patient outcomes.

Data Collection and Analysis

The data collected was sourced with the assistance of the St George Hospital IT Support Group, Pharmacy, Admissions and Blood Bank, and then manually uploaded into an Excel database on a monthly basis. A total of 251 patients across 4 modalities (118 incentre, 37 satellite, 45 home and 51 peritoneal dialysis patients) were included. The data, from January to December 2010, was analyzed using the SPSS 17 program. The purpose of this data collection and analysis was to compare the

results against benchmarks from ANZDATA and previous biochemical results, as well as measure patient outcomes since the commencement of the Renal Anaemia Co-ordinator.

The targeted range for Hb for all patients in this population group was changed to 100 to 120 g/L by the Renal Department in December 2009, being seen as a more appropriate, affordable and safer range for chronic renal patients than the narrow range of 110 to 120 g/L (Goldsmith and Covic, 2010).

Outcomes

Percentage of patients in the new range 100 to 120 g/L across all modalities:

53% January to June 2010
58% July to December 2010
48% Amgen target of 10 to 12 g/dL as reported by USRDS (2009)

Percentage of patients with Ferritin in range: 200 – 800 ng/ml

77% October 2009 Annual Report
76% October 2010 Annual Report
59% ANZDATA

Percentage of patients with Tsats in range: 20 – 50%

60% October 2009 Annual Report
69% October 2010 Annual Report
56% ANZDATA

Percentage of patients across all modalities with normal Iron Studies:

63% 2009 Annual Report
89% 2010 Annual Report

There has been a significant statistical relationship noted between improved albumin levels and improved levels of haemoglobin.

Conclusion

The results above have shown that the St George Renal Department has been able to achieve excellent results within the targeted ranges for haemoglobin and iron-related biochemical markers, with an improvement from our 2009 Annual Report results and comparable to ANZDATA and international standards.

Although challenging in some ways, the role of Anaemia Co-ordinator has shown to be of great benefit, particularly to staff education, with the majority of staff members now having a much broader understanding of the many factors influencing the course of anaemia. It is pleasing to see that there are now a greater percentage of patients in the new preferred haemoglobin range of 10 to 12 g/dL, across all modalities, and having adequate and stable iron studies.

Acceptance onto Dialysis

Written by: Elizabeth Josland

17 new patients commenced peritoneal dialysis in 2010, while 35 new haemodialysis patients commenced. Patients are analysed according to their first mode of dialysis only and must have had dialysis >30 days on their first dialysis modality.

- In 2010 there was one late referral for peritoneal dialysis (6%) and 14 late referrals for haemodialysis (40%).
- Mean age at commencement of HD was 63 years and for PD it was 60.5 years in 2010. This was a younger age than 2009 for both groups compared to 2009.
- ANZDATA 2010 results show and increase in 46-64 year age group in haemodialysis and less people commencing haemodialysis aged >75 years.

Age Groups of new patients

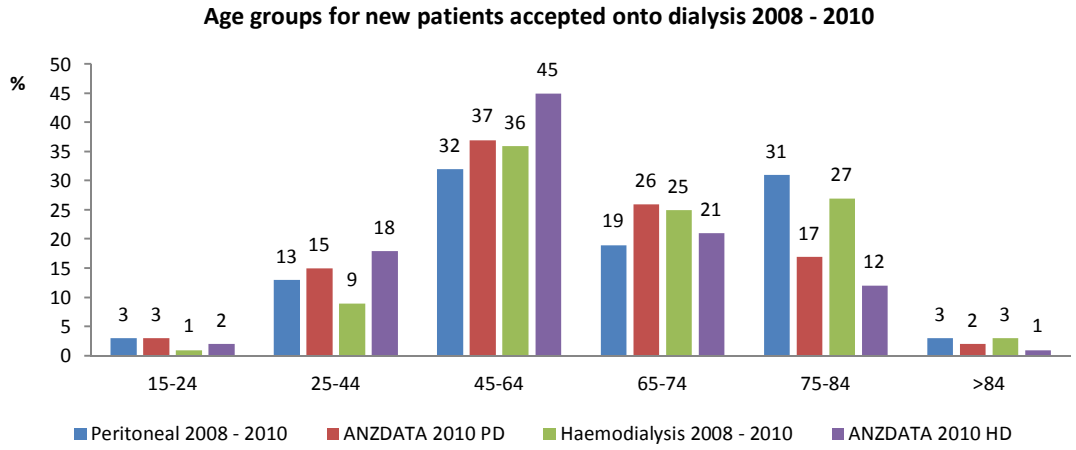


Figure 37: Age groups of new patients accepted onto haemodialysis and peritoneal dialysis

Glomerular Filtration Rate (eGFR)

An eGFR is obtained from the biochemistry blood serum results taken immediately prior to commencing dialysis.

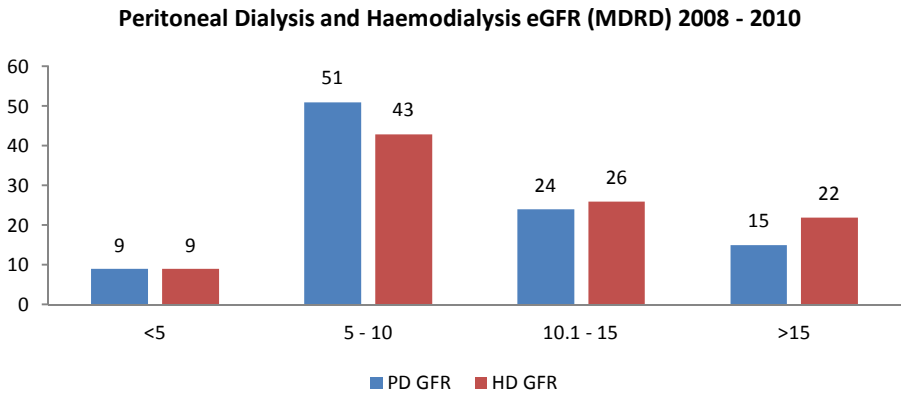


Figure 38: eGFR on commencement of dialysis

Baseline Characteristics of new dialysis patients

Table 13: Breakdown of baseline characteristics of new dialysis patients compared to ANZDATA

		St George Haemodialysis 08-10 (n=104*)	HD ANZDATA 2010	St George Peritoneal dialysis 08-10 (n=58*)	PD ANZDATA 2010
Age	(Average age in years)	64.5	60.7[†]	66.4	60.7[†]
Gender	Male	64%	61%[†]	55%	61%[†]
	Female	36%	39%[†]	45%	39%[†]
Late Referral	(< 3 months before first treatment)	36%	22%[†]	5%	22%[†]
Co-morbidities	Smoking (Current and former)	47%	54%	43%	53%
	Chronic Lung Disease (yes and suspected)	17%	17%	3%	14%
	Cerebrovascular Disease	5%	16%	9%	14%
	Coronary Artery Disease	34%	45%	29%	39%
	Peripheral Vascular Disease	17%	30%	8%	22%
	Diabetes	44%	49%	41%	42%

*Excludes patients who had previous mode of dialysis. [†] Total dialysis population (Hd + PD) ANZDATA 2010 (ANZDATA 2010) report

Body Mass Index (BMI)

Table 14: Baseline BMI of new dialysis patients

St George Hospital new patients*		PD 2008 - 2010	HD 2008 - 2010
Body Mass Index	<20	9	8
(kg/m)	20-24	26	21
	25-30	29	28
	>30	33	43

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.

The BMI of new dialysis patients is increasing. A BMI >30 is 4% higher than for the results from 2007-2009 for PD. The BMI >30 has increased by 5% in the HD group for the same time period.

Transplant

Written by Tania Burns

December 2010	
St George patients maintained on the transplant waiting list	50
Patients in work up for transplant suitability	45
Post –transplant St George patients	150

Transplants 2010	
St George patients who received a renal transplant	19
Deceased donors	16
Live donors	3
Pre-emptive transplant	4 (one from a deceased donor overseas)
Mean time on dialysis	76 months
Graft survival	
Functioning graft at December 2010	18 (95%)
Patient survival	100%
Rejection	16%
T-cell	1 (5%)
Antibody mediated	2 (11%)
Infection	
BK viraemia	2 (11%)
BK nephropathy	1 (5%)
CMV viraemia	3 (16%)
CMV disease	1 (5%)

The ANZDATA transplant report (2004-2009) for St George Hospital as caring hospital show overall demographics and primary diagnoses similar to, or slightly below, national benchmarks:

Cumulative death or graft loss

12.7 vs. 6.2%

Fewer deceased donor transplants with creatinine < 120 at 1 year

25 vs. 39.7%

Better live donor transplants with creatinine < 120 at 1 year

46.7 vs. 41.8%

Fewer pre-emptive transplants

3.1 vs. 11.5% of transplants

Fewer live donor transplants

26.6 vs. 43.1%

Graft survival showed that 10 out of 64 grafts had failed (15.6% compared to 11% Australia). Causes of graft failure:

- Acute rejection = 2
- Chronic Allograft Nephropathy = 3
- Vascular/technical = 2

- Recurrent disease in graft = 0;
- Death with functioning graft = 3

Patient survival records the total number of deaths as 5 out of 64. (7.8% compared to 4.9% Australia). Causes of death:

- Cardiac = 3
- Infection = 1
- Vascular = 1

The small numbers of St George patients has meant that adverse events are magnified so we obtained these data from ANZDATA for a 10 yr period. This confirmed good overall patient and graft survival rates for our Unit.

ANZDATA : St George as caring hospital		
	St George	**Australia**
ANZDATA 2000 – 2009 St George as caring hospital		
Graft survival to 1 year	92 %	93%
Graft survival to 5 years	82 %	83%
Patient survival to 1 year	97%	97%
Patient survival to 5 years	90%	92%
ANZDATA 1997 – 2004 St George as transplanting hospital		
Graft survival to 1 year	93%	92%
Graft survival to 5 years	81%	81%
Patient survival to 1 year	98%	97%
Patient survival to 5 years	88%	90%

Predialysis Clinic

Written by: Elizabeth Josland

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 way the clinic is conducted.

Overview

We currently have 103 patients on our pre-dialysis clinic list; each of these has an active plan for dialysis.

The pre-dialysis clinic has been operating since April 2002. The clinic is held on 4 west dialysis unit on Tuesday mornings. It was coordinated by Shelley Tranter and Elizabeth Josland (Renal CNC's) in 2010, and attended by Maria Chan (dietician), Anastasia Anastasiou (Renal Social Worker) and the renal pharmacist. All new patients are provided with dialysis options education, a social work and nutritional assessment, and pharmacy education. A comprehensive letter and assessment of each patient is then sent to the nephrologist. Patients return to the clinic for a follow up at 4-6 weeks and then yearly or as required. Since the clinics inception 344 patients have attended. Their progress and outcomes were then tracked through the clinic.

Clinic activity

The pre-dialysis clinic continued to be busy in 2010 with 67 new attendees and 67 follow up appointments compared to 2009 where there were 75 new attendees and 51 follow up appointments. Clinic letters continue to be stored electronically for easy access by renal staff should the patient present to the emergency department and potentially require urgent dialysis so that their choice of dialysis treatment modality is then known. This is an attempt to prevent those patients who indicated that they wish to start peritoneal dialysis do not switch to haemodialysis and therefore to a non home based dialysis therapy.

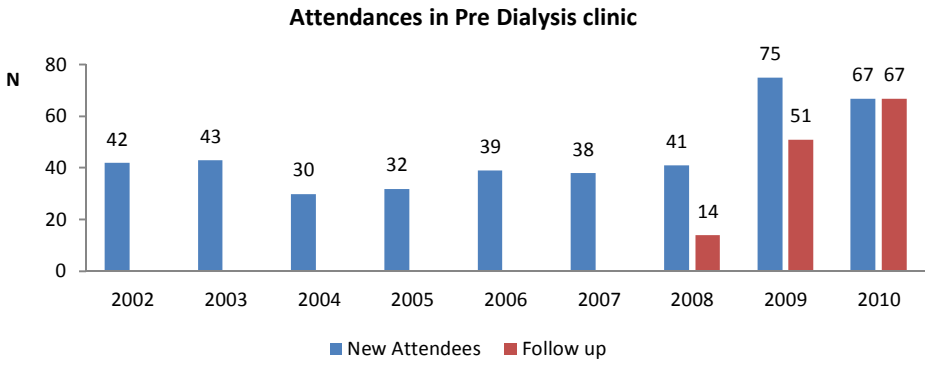


Figure 39: Yearly new attendees and follow up since inception in 2002

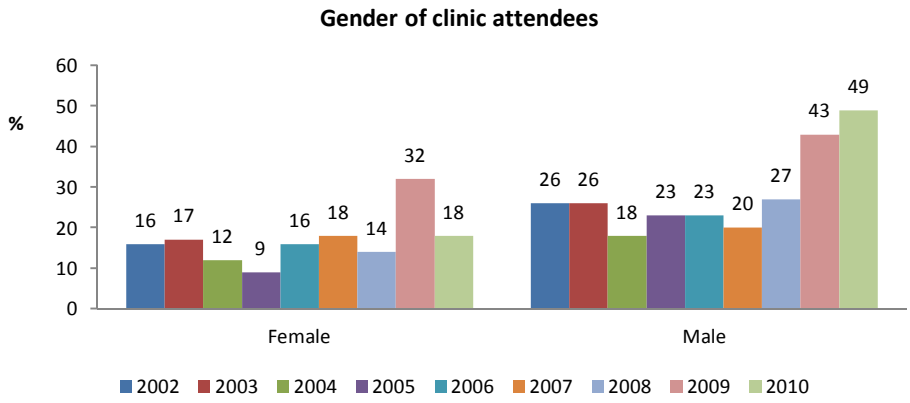


Figure 40: Gender of pre dialysis education clients

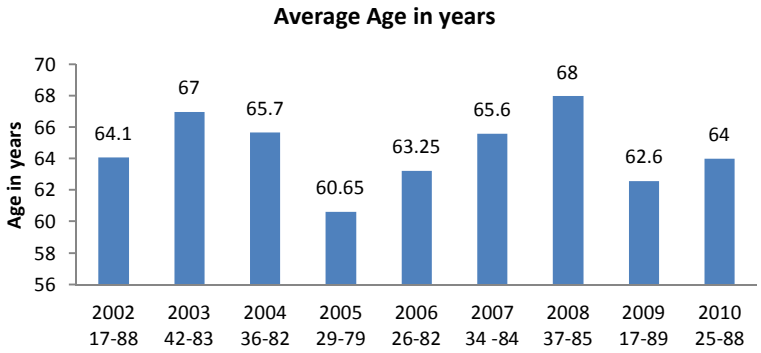


Figure 41: Average age of predialysis education clients

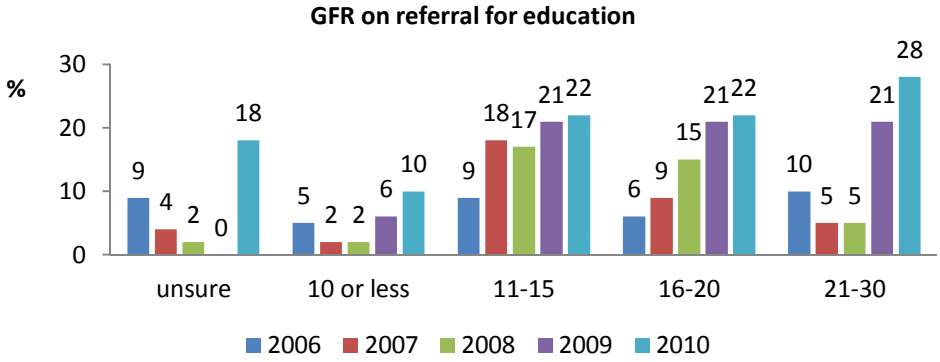


Figure 42: eGFR for new patients on referral for pre dialysis education

The guideline for referral to the Pre dialysis Clinic is

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

The benchmark for referral is 50% eGFR> 20, 70% eGFR> 15-20. This is currently not accurately measured due to missing data on referral (18% unknown eGFR). Once a patient is referred to the Pre-dialysis Clinic the following processes occur:

- Patients are tracked on a database which is updated as new information e.g. doctors letters or blood results are available.
- The clinic database is stored on RISC doc allowing access by all renal staff.
- Patients are flagged at a serum creatinine of >400 and/or eGFR <15.

- The Vascular Access Nurses are alerted to check for or initiate a vascular referral in patients on the haemodialysis pathway.
- The PD staff are alerted when patients requesting a PD pathway require a comprehensive pre PD assessment.

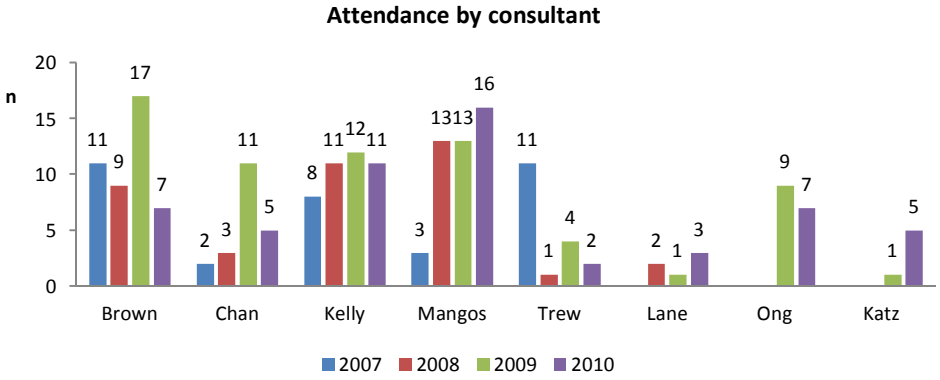


Figure 43: Attendance at predialysis clinic by consultant

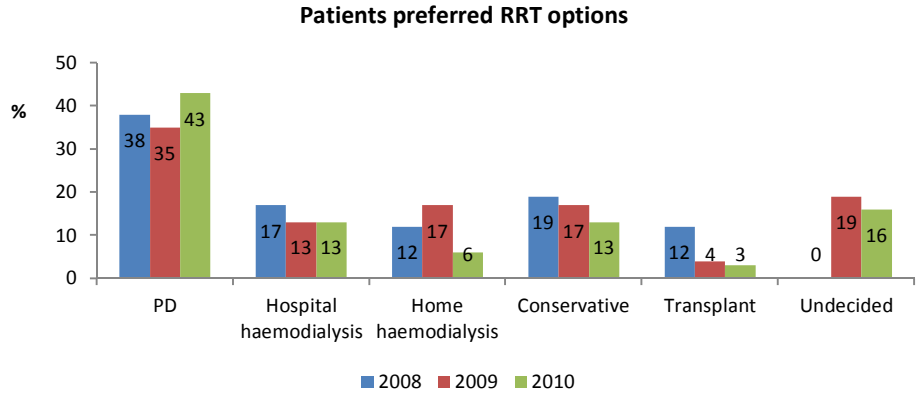


Figure 44: Percent of patients who opt for specific RRT therapies as a result of pre dialysis education

Of the 34 ESRF patients who commenced haemodialysis in 2010, 17 had attended the clinic pre dialysis. Fouteen out of 17 new peritoneal dialysis patients attended the clinic pre dialysis clinic for education and assessment. This reflects an ongoing problem with late referrals to the renal unit.

Patient Satisfaction

Patients scored the Pre-dialysis service with an overall satisfaction rating of 21 out of maximum score of 24. This included evaluation for timely appointment, helpful staff, waiting time, comprehensive assessment, left with a good understanding and a personal rate of satisfaction. Waiting time scored the worst and most likely refers to 'waiting time to get an appointment' in clinic and not 'waiting in the waiting room' to be seen.

Patients who commenced their treatment of choice at commencement of RRT

Following is a list of the percent of patients who chose a mode of RRT and commenced on their first treatment of choice. Peritoneal dialysis 83%, home haemodialysis 65%, hospital haemodialysis 86% and transplant 37%. The current benchmark is set at 70% for all modalities. This is often not reached in home haemodialysis due to change in health and

personal circumstances over time and in transplantation due to complexities in the work up for the transplant process which. Both home haemodialysis and renal transplantation require early and comprehensive planning before being able to enter this modality.

Plans for 2011

1. Benchmarking with other major pre-dialysis services (NSW) is due to commence and also the measurement of the following benchmarks:
    - At the commencement of RRT 80% of patients will have had a review in the Pre-dialysis 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
        i. 50% eGFR> 20
        ii. 70% eGFR> 15-20

Renal Supportive Care Clinic

Written by: Elizabeth Josland

Aim

The aim of this report is to provide data to the department highlighting clinic attendances and outcomes.

Overview

The renal department has been working closely over 2009 and 2010 with Dr Frank Brennan and Dr Jan Maree Davis from the Palliative Care Service to integrate a palliative care chronic disease model of care to benefit our end stage renal disease patients. Dr Jan Maree Davis, Dr Frank Brennan, Elizabeth Josland, Shelley Tranter, Anastasia Anastasiou and Maria Chan, Gemma Collett, Celine Foote and Mark Brown comprise the renal palliative care group and they meet monthly to discuss and implement renal supportive 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 hosted a very successful Renal Palliative Care Symposium on August 13th 2010 which was attended by 190 medical, nursing and allied health professionals from Australia and New Zealand. As a result of this success, the second **Renal Supportive Care Symposium** will be held on 19th August 2011. Doctors, nurses and allied health again will be invited for the event which will include workshops and presentations.

The renal department website now has a dedicated palliative care section on the renal website which includes details of current research, guidelines, patient information, education and presentations.

The **Renal Supportive Palliative Care Clinic** commenced in March 2009, it has recently increased from bi weekly clinics to weekly clinics in December 2010. It is staffed by Dr Frank Brennan, a renal registrar and the renal supportive care clinical nurse consultant. The clinic also receives support from the renal social worker and dietician.

There are four main categories of patients who are referred to the clinic; these are detailed in the following table:

Table 15: Reasons for initial supportive care clinic attendance

Attendance reasons up to Dec 31, 2010		n	%
1	Not for dialysis (conservative management) or need assistance to make decision whether to have dialysis or not	50	57
2	On dialysis but also have another terminal condition	8	9
3	On dialysis or pre dialysis with difficult to control symptoms	23	26
4	Patients considering withdrawing from dialysis	6	7

Clinic Attendances and Outcomes

There were 110 visits to the clinic from March 09 to Dec 09, and 218 visits in 2010. The age of patients range from 47-94 years with the average age being 77 years. Males account for

59% of patients to the clinic. Symptoms reported on the first visit when comparing dialysis patients attending for symptom management and conservative patients show a high symptom burden in the dialysis population. This may be due to some dialysis patients having a dual diagnosis of a second major life limiting disease such as cancer.

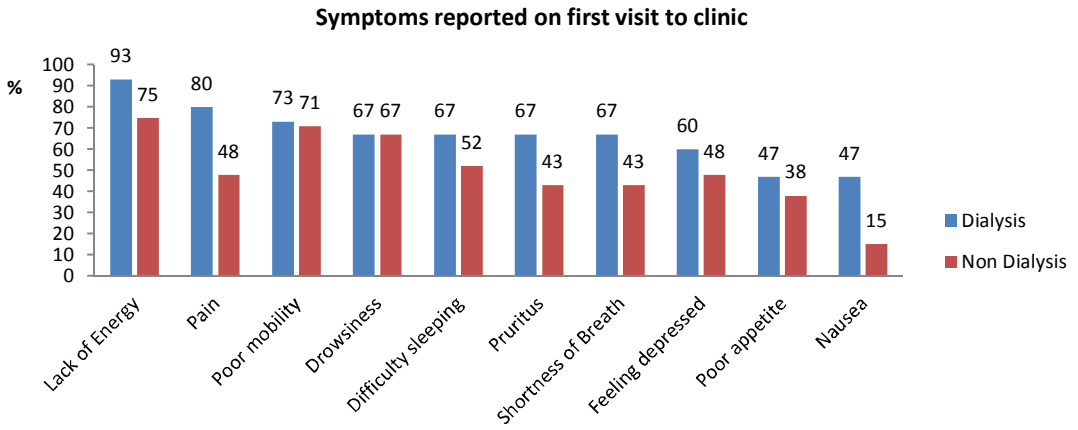


Figure 45: Symptoms reported on the first visit to the supportive care clinic

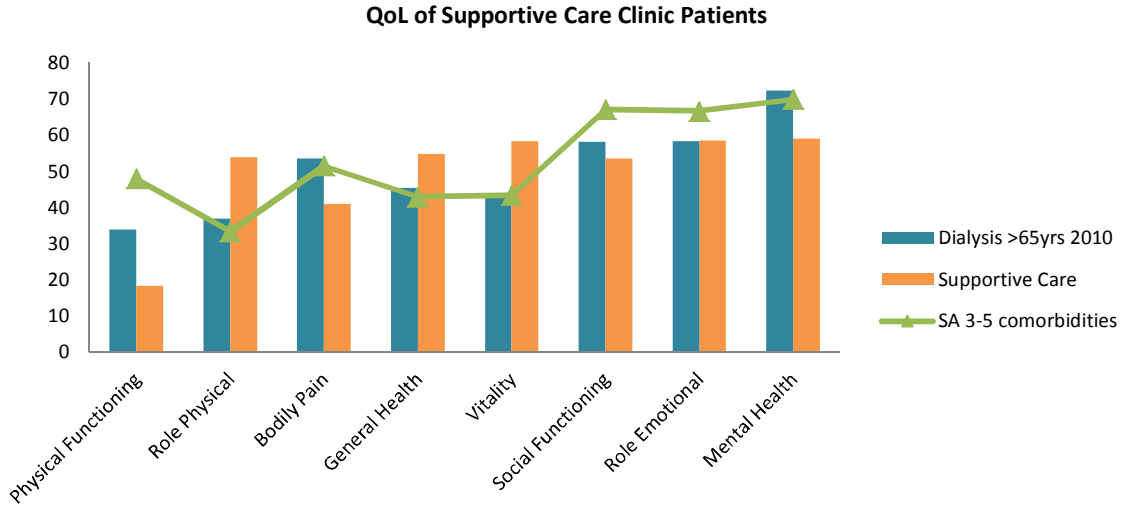


Figure 46: Quality of life using the SF36 survey compared to dialysis patients aged >65yrs and the South Australian general population with 3-5 comorbidities

The figure above compares the Supportive Care Clinic patients to the South Australian population with three to five out of six specified health conditions (diagnosed arthritis, osteoporosis, diabetes, current asthma, chronic bronchitis or emphysema, and mini-stroke (TIA) or stroke). The QoL of 31 conservatively managed clinic patients who returned surveys reveal worse physical functioning (PF), bodily pain (BP) and mental health (MH), but good scores for role physical (RF) meaning they can still manage basic household duties; good general health (GH) indicating the patients don't perceive their health as being poor, or they have had a shift in expectation and feel there health is as good as they can expect for their age and disease burden; vitality (VT) scores well in the supportive care group, indicating patients don't perceive their energy level as being poor; social function (SF) rates slightly lower than dialysis patients and role emotional (RE) scores are equal to dialysis.

Quality of Life 2010

Written by Elizabeth Josland

Background

Research has shown that the quality of life (QoL) experienced by the dialysis population to be well below the QoL experienced by the general Australian population. Six audits conducted by our unit in 2001, 2003, 2004, 2006, 2008 and 2010 also showed similar results.

Aim

The aim of this study is to determine the QoL of Renal Replacement Therapy (RRT) patients and to determine if there is a relationship between QoL, specific biochemical markers (albumin and haemoglobin), dialysis adequacy (Kt/V, a measure of urea clearance), age, and diabetic status.

Method

- Home haemodialysis, peritoneal dialysis (PD) and transplant patients were sent a SF 36 questionnaire via the mail with a reply paid envelope attached. Hospital and satellite haemodialysis (HD) patients were handed their questionnaires in person. A total of 297 surveys were distributed with 181 returned. The return rate was 61%, this is the slightly less than the 2008 survey (64%).
- Patients excluded from the survey were non-English speaking or suffering from dementia or a psychological condition.
- All returned surveys were entered into the Quality Metric Health Outcomes Scoring software and PASW 18 for statistical analysis.
- Data was also collected on patient's age, sex, diabetic status, haemoglobin, albumin and Kt/V from data already available from routine audits.
- SF-36 scores were compared with dialysis mode, diabetic status, albumin results below 30g/L and haemoglobin <100g/L using the appropriate parametric or non-parametric unrelated two sample statistical tests; correlation and regression was also carried out to determine if there were any significant linear relationships.

SF 36 Questionnaire

The SF-36 is a 36-item universal tool for the measurement of health status, it measures the following eight dimensions of health (Ware et al, 2000).

Parameters	Description
Physical Functioning (PF)	Limitations in physical activities because of health problems
Role Physical (RP)	Limitations in usual role activities because of physical health problems
Bodily Pain (BP)	Bodily pain
General Health (GH)	General health perception
Vitality (VT)	Vitality (energy level and fatigue)
Social Functioning (SF)	Limitations in social activities due to physical or emotional problems
Role Emotional (RE)	Limitations in usual role activities because of emotional problems
Mental Health (MH)	Mental health (psychological distress and well-being)

Benchmark Data

Data was compared to the results of the previous surveys.
Data was also compared to the South Australian normative data from the 2004 Population research and outcome studies unit in South Australia and the Australian normative data from ABS.

Ethics

Ethics approval was granted by South Eastern Sydney and Illawarra Area Health Service Human Research Ethics Committee - Southern Section (HREC) for the project named 'Quality of life measurement in patients with end stage renal disease' and was incorporated as part of normal quality practice in the unit with HREC approval once the study was closed.

How did we record, store & analyse the data

- All returned surveys were entered into the QualityMetric Health Outcomes Scoring software and a statistical program (PASW 18) for analysis.
- Data was also collected on patient's age, sex, diabetic status, Hb, albumin and Kt/V from routine audits and entered into an Excel database for analysis in PASW.
- SF-36 scores were compared with gender, dialysis mode and diabetic status using the appropriate parametric or non-parametric unrelated two sample statistical tests using PASW 18.
- Regression analysis determined if there was any significant relationship between SF-36 scores and Haemoglobin, albumin, Kt/V and age.

Patient Characteristics

Table 16: Patient Characteristics of people who returned SF36 surveys

	2001	2003	2004	2006	2008	2010
Age	59.9 ± 14	65 ± 13	63 ± 13.6	62.9 ± 13.45	63.5 ± 13.58	68.4 ± 12.9**
Male	58%	64%	61%	61.2%	70.5%	68%
Diabetes	26%	24%	32%	26%	31%	30%
Haemoglobin	116 ± 14.2	115 ± 17.2	120.5 ± 15.9	118.7 ± 18.69	117.1 ± 15.00	114.7 ± 14.3
Albumin	32 ± 14.2	32 ± 4.5	32.31 ± 4.51	33 ± 4.5	34.2 ± 4.11	34.0 ± 4.0
Kt/V CAPD	1.79 ± 0.26	2.1 ± 0.4	2.03 ± 0.54	2.1 ± 0.45	2.16 ± 0.66	2.2 ± 0.67
Kt/V HD	1.41 ± 0.27	1.66 ± 0.41	1.75 ± 0.43	1.63 ± 0.39	1.51 ± 0.33	1.6 ± 0.27

Table 17: Comparison of our SF36 findings (excluding transplant) to Australian normative data

Parameter	2004	2006	2008	2010	SA Pop Norms 2002*
Physical Functioning*	52.96 ± 30.4	54.78 ± 29.72	54.54 ± 26.62	42 ± 30	84.7 ± 22.03
Role/Physical	39.6 ± 42.5	38.45 ± 42.78	41.75 ± 42.34	41.9 ± 33.1	76.8 ± 37.14
Bodily Pain	64.3 ± 28.82	60.84 ± 27.91	62.58 ± 26.44	56.1 ± 31	75.9 ± 25.27
General Health	45.3 ± 24.5	43.22 ± 24.17	43.58 ± 24.43	44 ± 25	72.4 ± 21.66
Vitality	47.42 ± 24.7	46.17 ± 23.50	47.06 ± 23.53	44.6 ± 23.8	63.3 ± 21.78
Social Functioning	59.44 ± 31.14	62.00 ± 30.14	64.83 ± 27.23	58.2 ± 31.5	87.1 ± 22.56
Role/Emotional	63.9 ± 42.6	60.23 ± 43.27	62.98 ± 42.34	61.1 ± 33.6	86.8 ± 30.21
Mental Health	71.85 ± 21.1	72.09 ± 18.80	70.15 ± 19.55	67.6 ± 22.4	80.0 ± 17.40

** (2004) Population Research and Outcome Studies Unit, Department of Human Services, SA available at website: http://www.health.sa.gov.au/pros/portals/0/quality-life-sf36-04.pdf*
** p<0.05 in PF with 2006 and 2008 compared to 2010*

The dialysis patients in the St George renal unit in 2004, 2006, 2008 and 2010 continue to have a poorer self-assessed QoL than the average Australian in all of the eight measured parameters. Physical functioning is significantly worse in 2010, but it should be noted that this group of patients is significantly older than previous surveys. These results indicate the difficulty in improving the QoL of dialysis patients.

Results

Modality

The SF36 scores show a significant difference between the modalities in the parameters of role physical (RP) and physical functioning (PF) ($p<0.05$). This is consistent with the 2008 results showing home haemodialysis offers a better overall QoL compared to hospital haemodialysis. Newly added this year was the transplant population which shows overall better QoL, but is close to the peritoneal dialysis general health (GH) score. Satellite has been included in these results for the second year. The Sutherland satellite unit opened in March 2008. The following table represents results between modalities not stratified for age.

Table 18: SF36 results comparing modes of RRT

Parameters 2008	Hospital (n=43)	Satellite (n=25)	Home (n=22)	Peritoneal dialysis (n=22)	Transplant (n=71)	Test Statistic[a]	df	p-value
PF	28.71 (25.8)	40.5 (27.9)	62.2 (27.0)	49.5 (28.5)	73.7 (29.1)	X^2=55.8	4	0.000
RP	35.7 (34.3)	38.0 (32.3)	56.0 (33.3)	42.6 (29.2)	72.6 (27.1)	X^2=39.3	4	0.000
BP	51.9 (29.4)	51.9 (30.5)	65.0 (34.2)	59.7 (31.2)	68.5 (26.3)	X^2=10.8	4	0.029
GH	38.4 (25.2)	43.3 (22.0)	45.0 (29.6)	54.8 (20.5)	58.9 (22.7)	X^2=20.9	4	0.000
VT	36.6 (24.9)	50.0 (20.4)	46.0 (25.4)	52.8 (19.8)	60.0 (22.9)	F=6.96	4	0.000
SF	52.7 (34.1)	53.5 (29.5)	65.3 (29.6)	66.7 (29.1)	80.0 (24.8)	X^2=25.2	4	0.000
RE	55.0 (37.0)	66.5 (30.8)	68.9 (35.0)	58.7 (27.2)	80.8 (26.9)	X^2=18.3	4	0.001
MH	70.1 (20.3)	63.5 (24.2)	63.8 (26.3)	71.8 (20.0)	75.0 (16.4)	X^2=5.6	4	0.228
Age	71.6 (11.2)	70.6 (13.2)	58.9 (8.9)	69.3 (15.1)	53.8 (12.7)	F=19.2	4	0.000
Albumin	33.5 (4.4)	35 (3.0)	35.4 (5.0)	32.6 (2.9)	38 (3.7)	X^2=45.6	4	0.000
Haemoglobin	113.4 (13.3)	115.3 (10)	121.4 (23.9)	111.9 (9.8)	134.6 (19.5)	X^2=44.5	4	0.000
Kt/V[b]	1.6 (0.3)	1.6 (0.2)	-	2.2 (0.7)	-	F=14.6	2	0.000

Data reported as mean and (standard deviation)

[a] H=Kruskal-Wallis Test, F= ANOVA (Kt/V = 2 sample t test using hospital and capd data only)

[b] Kt/V expected to differ due to differing benchmarks between the modalities (haemodialysis aim is >1.4 while capd is >1.6)

Diabetics

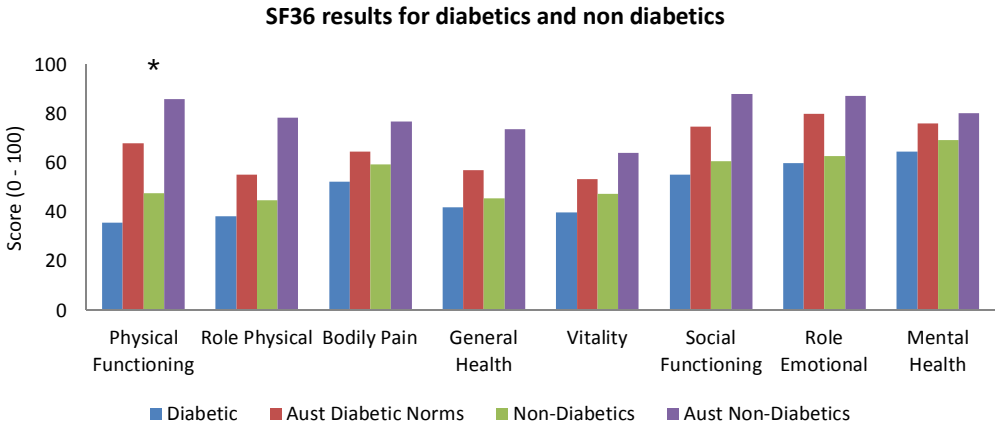


Figure 47: Comparing diabetics and non-diabetics (excluding transplant)

** p<0.05*

There are significant differences in physical functioning (PF) scores between diabetics and non-diabetics. This is an indication of the impact of the dual diagnosis of diabetes and renal disease on the quality of life to dialysis patients and the significant overall physical impact on their ability to perform physical tasks.

Age Groups

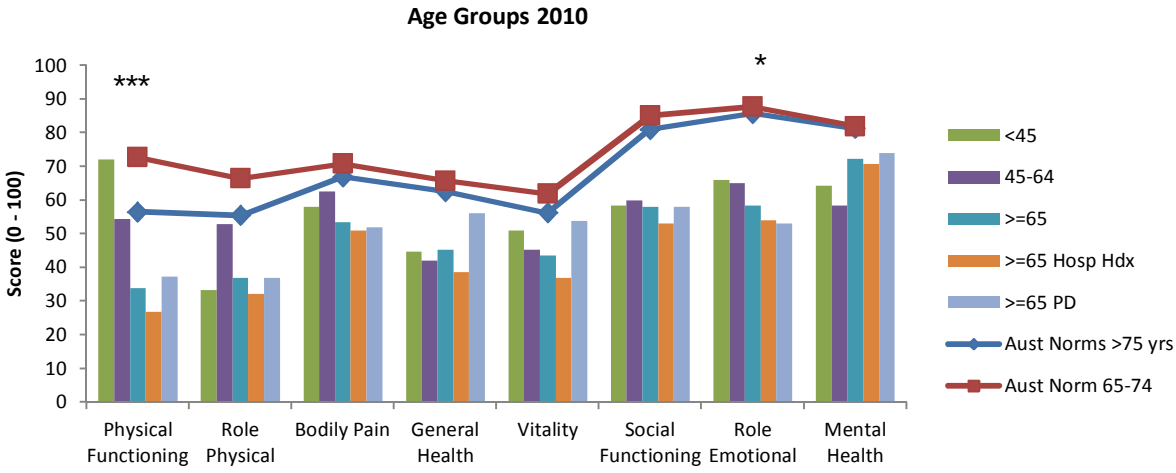


Figure 48: Comparing age groups

** p<0.05 *** p<0.001*

Age groups are compared excluding transplant patients as they are a very different demographic group. Significance found in PF and MH (age group comparison only, all modalities of RTT). The physical results are not unexpected due to the expected deterioration with age.
The age groups graph has some modality scores added to visualize how age and dialysis impact on QoL. Once >65 years of age and on hospital haemodialysis, physical QoL is extremely poor, but the mental health scores still almost equal the Australian norm.

Transplant

Table 19: Transplant patient characteristics and SF36 scores in 2010

Transplant Patient Characteristics 2010		SF 36 Variables	Mean Score ± SD	SA Pop Norms 2002*
Age	53.8 ± 12.7	Physical Functioning	73.7 ± 29	84.7 ± 22.03
Male	63%	Role/Physical	72.6 ± 27.1	76.8 ± 37.14
Diabetes	15%	Bodily Pain	68.5 ± 26.3	75.9 ± 25.27
Haemoglobin	134.6 ± 19.5	General Health	58.9 ± 22.7	72.4 ± 21.66
Haemoglobin <100g/L	5%	Vitality	60.0 ± 22.9	63.3 ± 21.78
Albumin	38 ± 3.7	Social Functioning	80.0 ± 24.8	87.1 ± 22.56
Albumin <30g/L	5%	Role/Emotional	80.8 ± 26.9	86.8 ± 30.21
		Mental Health	75.0 ± 16.4	80.0 ± 17.40

* (2004) Population Research and Outcome Studies Unit, Department of Human Services, SA available at website: http://www.health.sa.gov.au/pros/portals/0/quality-life-sf36-04.pdf

Renal transplantation is not a cure for kidney failure but an alternate form of RRT. Not every patient is eligible for a transplant as there are strict medical criteria that patients must meet. As such these patients are analysed separately to dialysis patients. There are less diabetics that the dialysis population, but these patients have a significantly worse physical functioning (PF) score (n=11) compared to the transplant non-diabetics. Overall, the transplant QoL scores are very close to the Australian norm population.

Actions

Recommendations to improve QOL in dialysis patients include early referral, anaemia management, calcium/phosphate management, adequate dialysis, nutritional support and

exercise. The St George renal unit currently employs these recommendations with the exception of exercise where there is no in-house programme at present, but there are plans for this to occur should funding ever become available.

The results of the SF-36 survey has shown a difference in the self-reported QoL of patients between the dialysis modalities. Home haemodialysis shows a significant difference in physical quality of life scores compared to peritoneal dialysis and hospital haemodialysis. This has implications for the renal unit with regards to promoting the home haemodialysis option to eligible clients especially between the ages of 45-64.

Renal Biopsies

Written by Dr Partha Shanmugasundaram

Table 20: Renal biopsy data for the year 2010

	Jan-Dec 2010 (all)	Jan-Dec 2010 (transplant only)
Number of biopsies	85	29 (34%)
Inpatients	34	10
OP	51	19
Done by radiology	12 (3 Tx) 2 had MH	3
Total complications	10 (11.8%)	4 (13.8%)
Macroscopic haematuria	4 (4.7%)	2(6.8%)
Symptomatic perinephric haematoma	4 (4.7%)	1 (3.4%)
Pain	3 (3.5%)	2 (6.8%)
Transfusion	0	0
Embolization	0	0

Table 21: Comparison of complication rates from the previous year

	2002	2003	2004	2005	2006	2007	2008	2009	2010
Total Number	14	22	21	27	77	58	67	106	85
Complication rate	0%	10%	19%	19%	6%	9%	9%	9.4%	11.8%

Table 22: 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%)	2010 N=85 (11.8%)
Gross Haematuria, %(n)	0	1(1)	0	1.5(1)	1(1)	4.7(4)
Haematoma, %(n)	4(1)	1(1)	2(1)	0	5.6(6)	4.7 (4)
Perinephric bleed – angioembolization, %(n)	0	0	0	0	1.9(2)	0
Pain post procedure, %(n)	0	3(2)	2(1)	0	5.6(6)	3.5(3)
Required blood transfusion	0	1(1)	0	0	2.8(3)	0

Comments:

The complication rate was relatively more compared to the previous year although not statistically different (p=0.64). The complications were all minor, resolving with bed rest and observation. No patient required blood transfusion or embolization for any complication related directly to the biopsy procedure. The rate of complications between the transplant and non-transplant biopsies was not significantly different (p=0.73, Fischer's exact test). The frequencies from the cumulative data over the previous 8 years and comparing two periods (2002 to 2005 and 2006 to 2010) are given in the table below. Overall complication rates were statistically similar between the two periods (p=0.41, Fischer's exact test).

Table 23: Cumulative Renal Biopsy data for the year periods 2002-2005 and 2006-2010

	2002-2005	2006-2010
Number of biopsies	84	394
Total complications	10 (11.9%)	35 (8.8%)
Macroscopic haematuria	6 (7.1%)	14 (3.6%)
Symptomatic perinephric haematoma	3 (3.5%)	14 (3.6%)
Pain	1 (1.2%)	10 (2.5%)
Transfusion	1 (1.2%)	4 (1%)

References

ANZDATA (2008). Anzdata Registry Report.
ANZDATA (2009). Anzdata Registry Report.
ANZDATA (2010). Anzdata Registry Report.
Association for the Advancement of Medical Instrumentation (AAMI) (2006). Water treatment equipment for hemodialysis applications. Arlington, Association for the Advancement of Medical Instrumentation. ANSI/AAMI RD62:2006.
Australian Bureau of Statistics (ABS), (1995) National Health Survey, available online at: www.abs.gov.au
CARI (2006). "The CARI Guidelines." Nephrology 11(s1): s1-s261.
Dal Grande, E. (2004) Quality of Life in South Australia as measured by the SF-36: Population Norms for 2002, Trends from 1994 to 2002 and Impact of Chronic Diseases and Health Risk Factors on Quality of Life, online at http://www.dhs.sa.gov.au/pehs/PROS.html
Diabetes Australia. (2009). "National Evidence Based Guidelines for the management of Type 2 diabetes." Retrieved February 18, 2010, from http://www.diabetesaustralia.com.au/PageFiles/763/BGC%20guideline%20FINAL%20-%20Sept%202009.pdf.
Inaba, M. Okuno, S. et al (2007). Glycated Albumin is a better Glycemic Indicator than Glycated Hemoglobin values in Hemodialysis Patients with Diabetes: Effect of Anemia and Erythropoietin Injection. J Am Soc Nephrology 18:896-903.
National Heart Foundation of Australia and the Cardiac Society of Australia and New Zealand. (2005). "Position Statement on Lipid Management - 2005." Retrieved Feb 22, 2010, from http://www.heartfoundation.org.au/SiteCollectionDocuments/Lipids%20HLC%20Pos%20Statement.pdf.
NKF-KDOQI. (2006). "KDOQI Clinical Practice Guideline and Clinical Practice Recommendations for Vascular Access." Retrieved May 15, 2008, from http://www.kidney.org/professionals/KDOQI/guideline_upHD_PD_VA/index.htm.
NKF-KDOQI. (2007). "KDOQI Clinical Practice Guideline and Clinical Practice Recommendations for Anemia in Chronic Kidney Disease." Retrieved May 15, 2008, from http://www.kidney.org/professionals/kdoqi/guidelines_anemiaUP/index.htm.
NSW Health (2005) Infection Control Program Quality Monitoring Indicators. Version 2 Users'Manual. Retrieved July 12, 2011 from: http://www.health.nsw.gov.au/pubs/2005/pdf/infection_ctrl_manual.pdf
NSW Health. (2007). "NSW Renal Dialysis Service Plan to 2011." Retrieved March 9, 2010, from http://www.health.nsw.gov.au/resources/gmct/renal/pdf/nswrenalplan_jan2007_final.pdf.
Peacock, T. Shihabi, Z et al. (2008). Comparison of glycated albumin and hemoglobin A1c levels in diabetic subjects on hemodialysis. Kidney Int 73(9): 1062-1068.
Pisoni, R., Arrington, C., Albert, J., Ethier, J., Kimata, N., Krishnan, M., Rayner, H., Saito, A., Sands, J., Saran, R., Gillespie, B., Wolfe, R. and Port, F. (2009). "Vascular Access Use and Mortality in Countries Participating in DOPPS: An instrumental Variable Analysis." American Journal of Kidney Diseases 3: 475-491.
Ware, J. (1993) SF-36 Health Survey. Manual and Interpretation Guide. QualityMetric, Inc. Lincoln, Rhode Island