Department of Renal Medicine
St George & Sutherland Hospitals

2015

Annual Report and Quality Indicators

Health
South Eastern Sydney Local Health District

Introduction

The following pages highlight the key findings from our report. In brief, we are meeting most of our targets and exceeding several, including our very low peritoneal dialysis and haemodialysis infection rates.

We have demonstrated good patient survival for all dialysis and transplant patients, and have been able to control or improve symptoms well for patients on a non-dialysis pathway.

Preparation for dialysis through our pre-dialysis education program is increasingly successful and the vascular access program has achieved primary access at a higher rate than the national average.

These data are discussed regularly within our department to ensure we maintain the highest standards of care.

I welcome any feedback.

Prof. Mark Brown

Director, Renal Medicine. St. George Hospital.

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1. Executive Summary

ANZDATA Activity Overview

- Dialysis and transplant patient numbers at St George Hospital have increased steadily between 1990-2014 (Figure 1, page 7)
- Dialysis and functioning transplant patients at St George hospital have increased significantly since 1990 (Figures 2 and 3, page 7).
- 46% of dialysis patients at St George Hospital are on Hospital haemodialysis (HD) compared to the Australian average of 23%, due to the lack of a satellite dialysis unit. The proportions of St George patients on home dialysis is higher than the Australian average (36% compared to 29%). (Figure 4, page 8)

New Patients

- After attending the Pre-dialysis clinic, over half the patients (55%) who had been referred to the pre-dialysis clinic opt to have a home therapy, more commonly PD. There was a reduction in patients opting for the conservative pathway. This most probably reflects the referral of patients directly to Renal Supportive Care rather than to the Predialysis Clinic. (Figure 7, page 9)
- New patients starting dialysis at St George are older and perhaps with more IHD than national average (Table 2, ,Page 13)
- Benchmarks for Pre-dialysis
  1. 65% of patients (excluding late referrals) have a timely referral to the Pre-dialysis Program (Benchmark: 100% ≥eGFR 15).
  2. 94% of patients who are known to the unit and have attended Pre-dialysis Clinic commenced their planned dialysis choice (Benchmark: 70%).
  3. 94% of patients at the commencement of RRT had a review in the pre-dialysis assessment and education program between 3 -12 months (Benchmark: 80%)
  4. 32% of patients have vaccinated immunity – plan to contact GPs to determine whether failed vaccination or not vaccinated (Benchmark: 60% of patients starting RRT are HBsAb positive)

Haemodialysis

- At Sutherland Hospital 7289 HD treatments were completed in 2015; up from 6440 in 2014. On average, 48 patients dialysed each month.
- At St George Hospital, 20,339 treatments were completed in 2015, compared with 19,052 in 2014. On average 125 patients were dialysed each month
- Eight chairs opened on night shift at St George Hospital reaching 12 by the end of 2015
- Patient survival was at least as good as if not slightly better than the national average with one year survival of 91% and 5 year survival 52% (Figure 12, page 17)
- Below National average: Phosphate control 49 vs 61%
- Similar or better than national average: Ferritin 77 vs 60%; Fe sats. 63 vs 56%; CaPo4 product both 58%; URR 91 vs 93%
- Average for April and Oct for iPTH was 55%. (Figure 19, page 24)

- The calcium phosphate product remained similar to previous target levels and were at or continued to be slightly better on average when compared with national ANZDATA targets (Figure 22, page 26)

Vascular Access

- Stable AVF rates at entry – better than national average (Figure 25, page 28)
- 19 (63%) patients had a mature access at their first haemodialysis (excluding late referrals) compared to 50% in the ANZDATA report.
- Average time from initial referral to access creation was 41 days. The aim is to have access created within 30 days of initial referral.
- Average time to first cannulation in 2015 was 6.5 months
- 58 % started with a AVF (46%) or AVG (12%) vs 40% National ANZDATA (Figure 26, page 30)
- 90% of St George patients were using a fistula/graft for haemodialysis, compared to the ANZDATA benchmark of 84% and KDOQI benchmark of 40% (Figure 27, page 31)
- 3% of St George patients were using a permanent catheter which is less than the KDOQI benchmark of < 10%(Figure 27, page 31)
- Thrombosis rate for St George Hospital does not meet benchmark: AVF = 1.7 episodes/pt-year (aim <0.25). AVG/SVG = 0.8 episodes/pt-year (aim <0.5) (Table 10, page 32)
- For 2015, 1 catheter-related and nil exit-site infections for a total of 85 catheters in situ (Table 9, page 31)
- Excellent long-term AVF & AVG patency (Figure 28, page 33). Cumulative proportion surviving at end of the below intervals:
  - AVF at 5 years (85%), at 10 years (75%)
  - AVG at 1 year (62%), 2 years 54%, 3 years (54%)
  - Flexine at 1-3 years (80%)

Peritoneal Dialysis

- A total of 75 patients were on PD in 2015 (including hospital IPD) compared to 85 in 2014. (Figure 31, page 36)
- 49% of patients achieved the target for serum corrected calcium in October 2015 (an improvement from previous year). The ANZDATA benchmark is for uncorrected calcium only (Table 13, page 37)
- 86% of PD patients with Hb <100 were receiving erythropoiesis stimulating agents (ESA). 40% of the patients with high Hb (>120) were also receiving ESA. 28% of patients who had Hb below 100 g/L had iron studies below the target range (Figure 35, page 39)
- 50% of peritoneal dialysis patients had diabetes in October 2015. All diabetics were screened for HbA1C - 73% had results below 7, an improvement from previous year. (Figure 35, page 39)
- 2015 exit site infection rate improved to 1/166.3 months compared to 1/85.2 months in 2014 (Figure 46, page 46)
- St George hospital has fewer deaths and transfers to haemodialysis and more transplants than the national average (Table 21, page 48)
- Improvement was seen over the audit periods for peritoneal dialysis adequacy using solute clearance measurements of: Kt/V (median 2.10 (CI 2.05, 2.4, min 1.08, max 4.21); Creatinine clearance (mean creatinine clearance was 72 L/week/1. 73 m^2 (SD 25.7, min 28.31, max 124.32).

73% of APD patients had creatinine clearance of ≥ 45 L/week/1.73m^2 in 2015, this is the ISPD target for patients on APD (Table 14, page 41)

- The 5-year patient survival rates for those on PD for more than a year were significantly better than the national rates for both Australia and New Zealand (Figure 41, page 42)
- At St George Hospital, the primary cause of technique failure in 2015 was similar to ANZDATA (2014) with "total dialysis/technical failure" being the main cause at 89%. These were due to abdominal surgeries, pleuro-peritoneal leak, fractured catheter and membrane failure resulting in inadequate solute clearance/fluid ultrafiltration. (Table 17, page 44)
- 2015 peritonitis rate results continue to surpass the national benchmark. The St George peritonitis rate over a 3 year period from 2013–2015 improved to 1/88 months (Figure 43, page 45)
- 85% (46/54) of patients on peritoneal dialysis in 2015 were peritonitis-free (Figure 44, page 45)

Transplants

- Overall outcomes slightly better for LD than DD transplants (Figure 54, page 53)
- More recipients with IHD (30 vs 24%) than nationally but other co-morbidities similar (Diabetes similar (18 vs 14%))
- Most cases of biopsy proven acute rejection in the first 12 months after transplant are 'borderline rejection' in the early post-transplant period (Figure 52, page 52)
- Transplant QOL similar to general population (Figure 63, page 68)

Renal Supportive Care

- Renal Supportive Care (RSC) clinic occasions of service reduced in 2015 (related to clinic closures due to increased demand to provide education and set up the state-wide RSC service during 2015), but dialysis and inpatient consultations have increased rapidly.(Table 27, page 57)
- Of the 51 current RSC clinic patients who were not for dialysis, 39 were competent and 5 were lost to follow-up. 49% (19) of competent patients had an Advance Care Plan completed
- 61% of patients had a reduction in total symptom score by the 3rd clinic visit. Pain, Lack of Energy, Poor Mobility, Itch and Difficulty Sleeping were the most prevalent symptoms. The proportion of patients reporting each of these symptoms as severe or overwhelming decreased by the third visit (Figure 57, page 59)
- The total return rate of the QOL survey was 60% (254/420); this is an improvement on 2014 (56%).
- Home haemodialysis and transplantation had an advantage in self-reported QOL, but Satellite haemodialysis results in bodily pain, social functioning and role emotional are better than hospital haemodialysis and peritoneal dialysis (Figure 59, page 65).

Obstetric Medicine

- In 2015 there were 2475 pregnancies at St George Public Hospital, 191 (8%) of these were complicated by hypertension in pregnancy and 150 of these were seen by the Renal Obstetric Medicine group.

- There was a further fall in the number of women presenting with hypertensive disorders of pregnancy to our unit (Figure 64, page 69).
- Both maternal and fetal outcomes continued to be favourable with less than 30% of women with PE developing severe hypertension and there were no cases of eclampsia in the year (Figure 65, page 70).

Chronic Kidney Disease

- The majority of patients (43%) were referred for decline in renal function (Figure 66, page 71)
- The iConnect program found that there was no difference in the rate of decline in eGFR over 12 months in 23 high risk CKD patients.

Renal Biopsy

- Our benchmarks (Am J Kidney Dis 60(1):62-73. 2012) are:
  - Macroscopic hematuria 3.5% - not met
  - Blood transfusion 1%- not met
  - Angio-embolisation 0.6%- met
- Each case of bleeding reviewed – new DDAVP plan + formal credentialing of trainees

Nutrition Services

- Nutrition management protocols for the SESLHD have been updated in accordance to the best practice guidelines
- Average number of patients under the care of dietitian/day: 5.7±2.3 (range 0-14), accounting for 45.4±15.9% of renal admissions
- Mean eGFR of referrals to dietitian was 16.5±3.7ml/min. Referrals were too late to benefit from the full effect of nutrition intervention before dialysis is needed
- Of the 39.8% (n=43) malnourished patients identified in the April audit, 58% of these have improved or stabilised by the October audit (Table 43, page 79)
- SGA scores in both the April and October audits indicated improvement and stabilisation in the majority of patients ~80% (Table 45, page 80)

Overall Summary

- Increase in activity, particularly haemodialysis
- Need for more Home HD
- Good patient outcomes for ESKD
- Very good results for peritonitis and all vascular access measures
- Transplant graft survival improving
- Overall very good quality results

2. ANZDATA Activity Overview

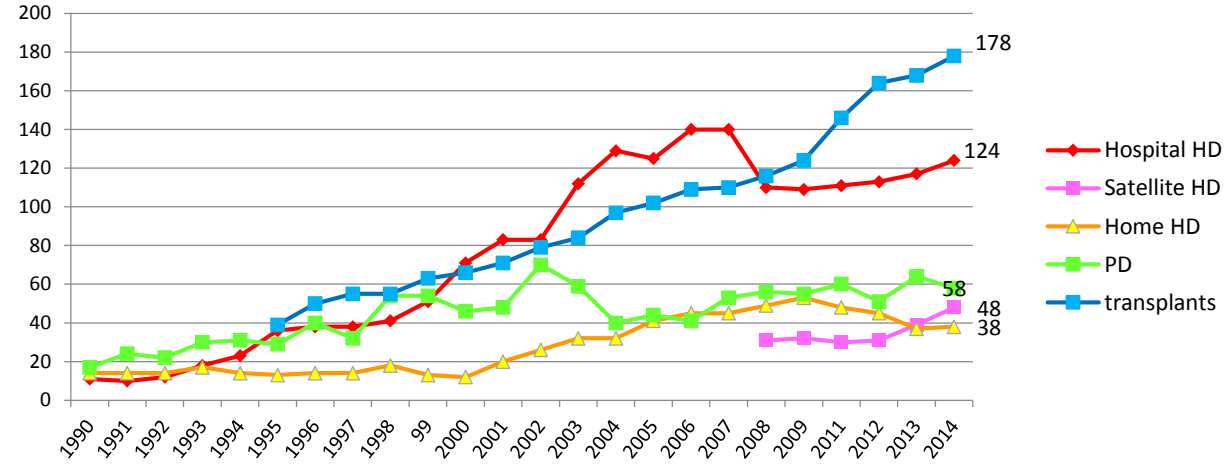


Figure 1. Dialysis & transplant patients St George hospital 1990-2014 (ANZDATA 31/12/14)
NB. Hospital HD includes potential satellite patients until 2008

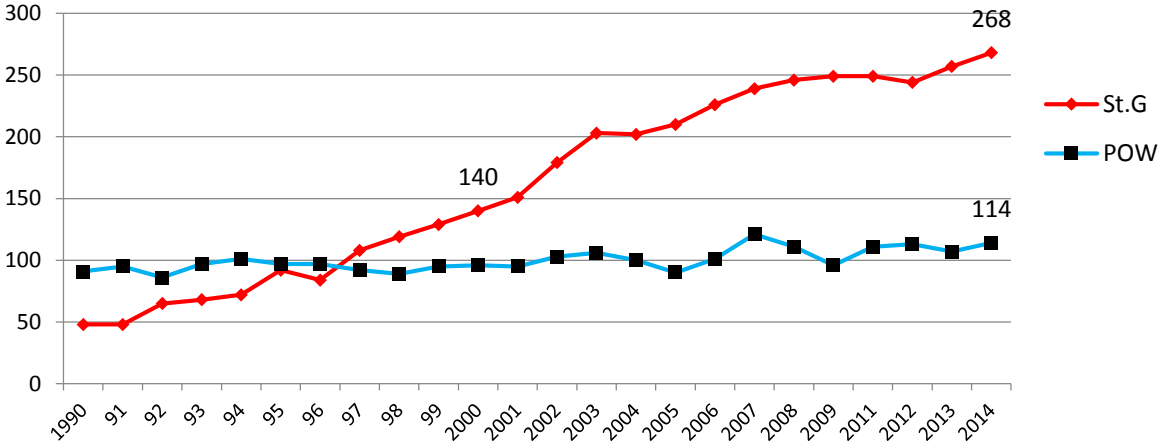


Figure 2. Dialysis patients South East Sydney LHD (ANZDATA 31/12/14)

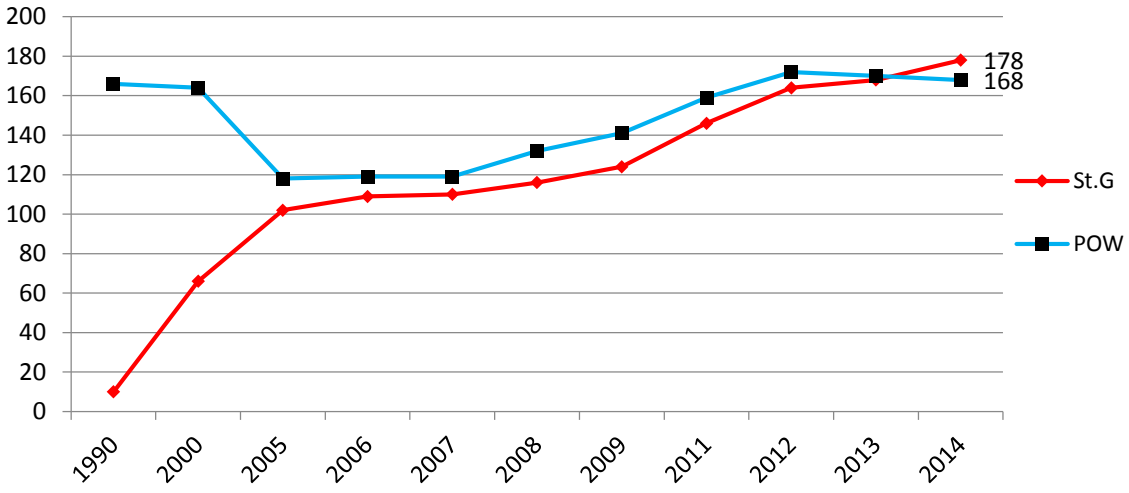


Figure 3. Functioning Transplants South East Sydney LHD (ANZDATA 31/12/14)

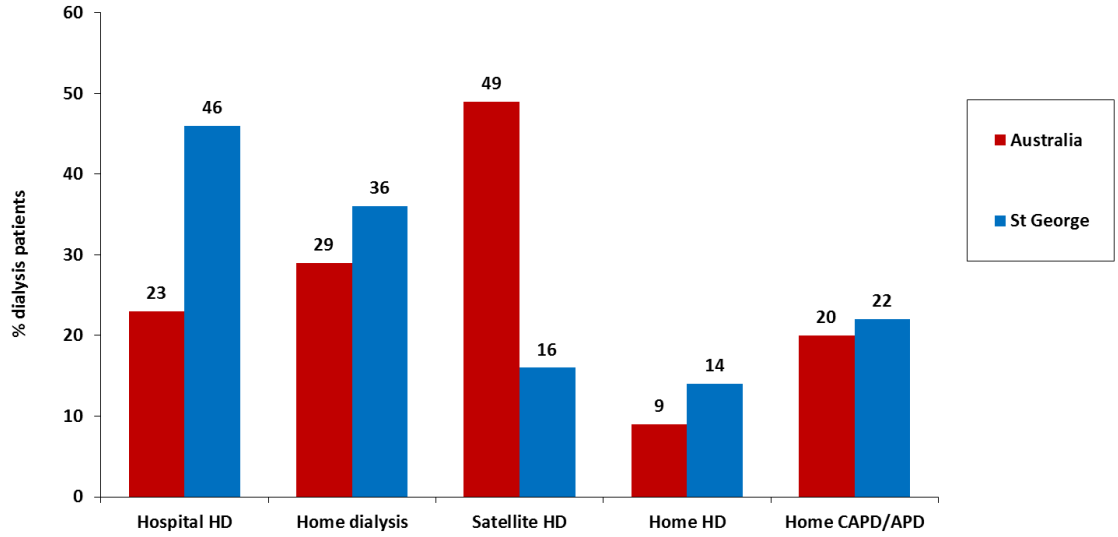


Figure 4. Mode of dialysis Australia & St George 2014 (ANZDATA 31/12/14)

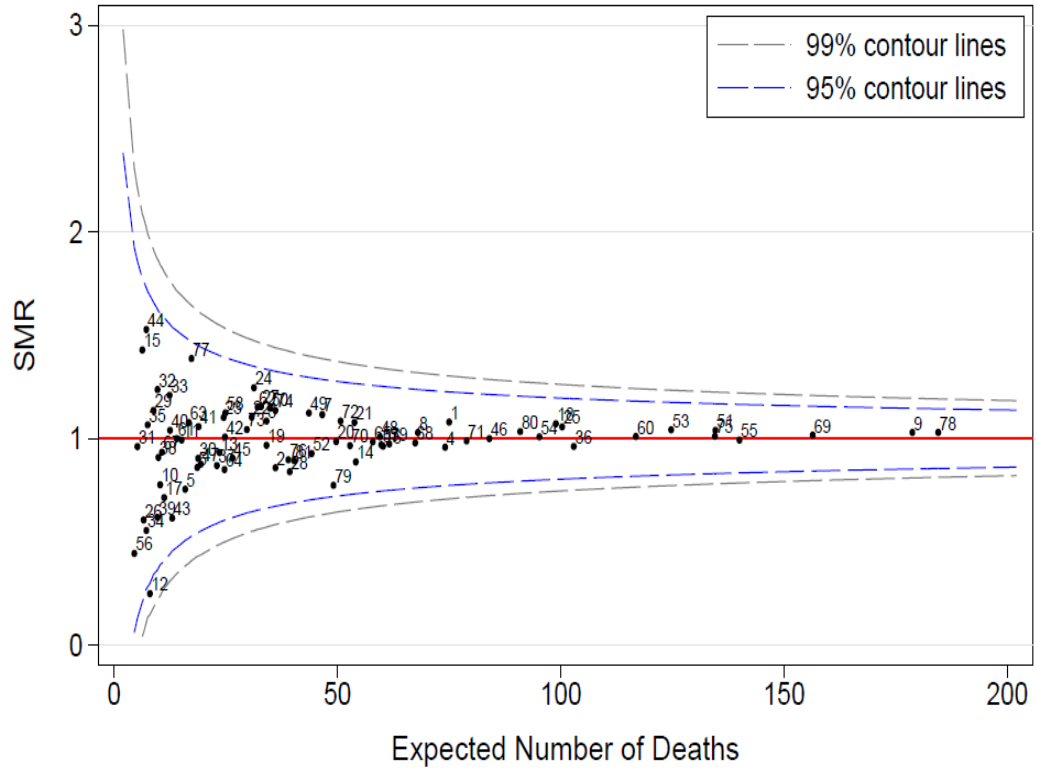


Figure 5. Acceptable SMR for all dialysis patients - All Units : ANZDATA 2009-14

3. Predialysis Program

Shelley Tranter

Activity summary

The Renal Department guideline for referral to the multidisciplinary Predialysis Clinic is eGFR ≤ 15 or dialysis predicted in the following year. Generally, nephrologists will have considered these patients as suitable for dialysis. As of 31 December 2015, there were 121 patients on the Predialysis Program with an active plan for renal replacement therapy. This was a 15% reduction from the previous year.

Since April 2002 there have been 820 people who have attended the clinic. 61 new patients attended clinic in 2015 compared to 64 new attendees in 2014. There were 86 follow up appointments compared to 63 follow up appointments in 2014 (Figure 6). The reduced attendances over the past 2 years can be explained by the drop in referral eGFR.

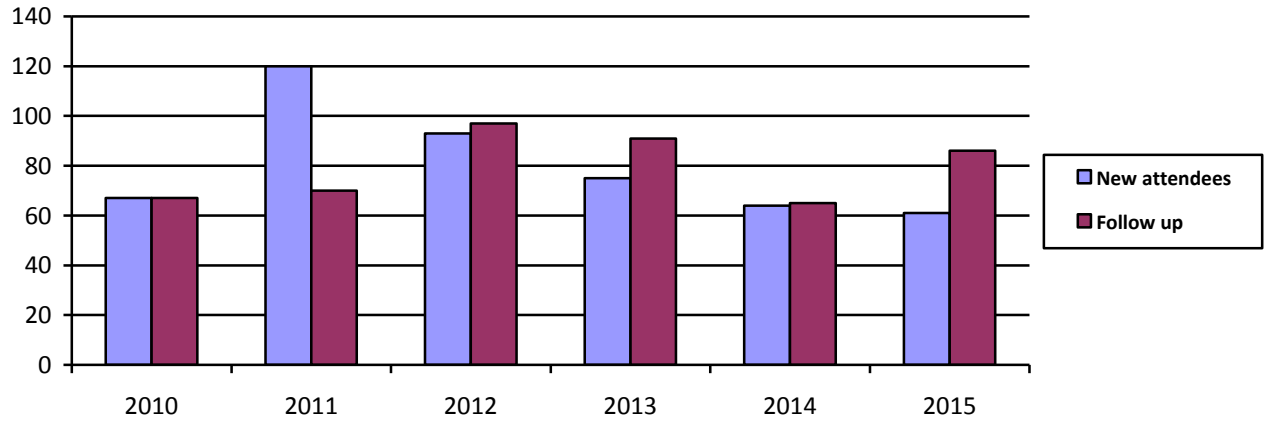


Figure 6. New attendees and follow up numbers for 2010-15

The age range of new patients seen in 2015 was 20 – 87 years. The average age was 66.9 years. Following the visit to the clinic, patients are asked to choose a tentative treatment option. The figure below indicates the choice of patients 2013 -2015 (Figure 7). In 2015 there was a reduction in patients opting for the conservative pathway. This most probably reflects the referral of patients directly to Renal Supportive Care rather than to the Predialysis Clinic.

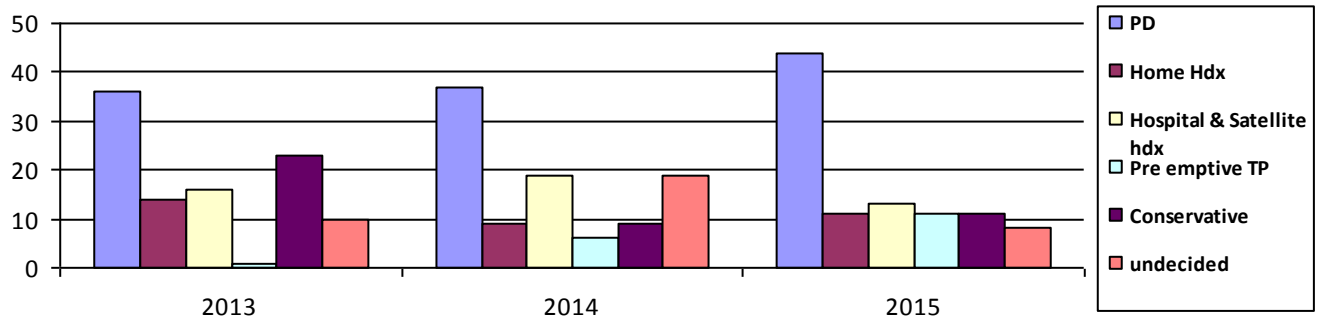


Figure 7. Percent of patients who opt for specific RRT therapies as a result of pre-dialysis education 2013-15

It is apparent from these data that over half the patients (55%) who had been referred to the pre-dialysis clinic opt to have a home therapy, more commonly PD.

KPIs

The four benchmarks for predialysis have been established on historical Renal Department data.

1. Timely referral to Predialysis Program - 100% ≥eGFR 15.
2. 70% of patients who are known to the unit and have attended Predialysis Clinic commence planned dialysis choice.
3. 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.
4. 60% of patients starting RRT are HBsAb positive

1. **Timely referral to Predialysis Program - 100% ≥ eGFR 15.**
   In 2015, 65% of patients were referred with an eGFR ≥ 15 (excludes patients who were late referral to nephrologist). This is reduction from the 80% result for 2014.
2. **70% of patients who are known to the unit and have attended Predialysis Clinic commence planned dialysis choice.**
   For patients commencing dialysis in 2015 94% started the planned dialysis choice.
   100% of patients who chose PD commenced PD. One patient commenced haemodialysis while awaiting a paired kidney exchange. One patient commenced home haemodialysis training but later transferred to St George satellite.
3. **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.**
   94% of new dialysis patients (excluding late referrals) had pre-dialysis education or review within 12 months before dialysis commencement. This result is consistent with the previous year's result.
4. **60% starting RRT had vaccinated immunity**
   This benchmark means 60% of patients starting dialysis had 'vaccinated immunity' defined as 'anti-HBs ≥10 International units/L'. Those with natural immunity were excluded in this analysis. Only 32% of patients commenced with vaccinated immunity. This is a slight improvement on 30% for 2014. An audit of hepatitis B vaccination for new patients was conducted in 2015 to identify areas for improvement. These improvements will commence in 2016. The plan is to contact GPs to see when vaccinations have occurred and whether there has been poor response in which case re-vaccination is required.

Summary

The Pre-dialysis program works extremely well, capturing the vast majority of patients who commence dialysis, providing good education and allowing the department to plan its dialysis resources accordingly. It is a great achievement that over 90% of patients had received this education prior to starting dialysis and that 94% started their planned dialysis modality.
In 2016 we will focus on:

- whether any changes to Hepatitis B vaccination protocols is required;
- ensuring more timely referral of all patients;
- reviewing individual patients who are older and have more co-morbidities as to their real suitability for dialysis;
- providing better written patient information to allow informed consent to dialysis.

4. Acceptance onto dialysis

Shelley Tranter

Out of 47 new patients who started dialysis in 2015, 15 patients commenced peritoneal dialysis and 32 started haemodialysis. Patients are analysed according to their first mode of dialysis only.

- There were 8 (17%) late referrals which is below the National average (20%). Two late referrals received PD as first modality.
- Mean age at commencement in 2015 was 64 years for PD and 71 years for haemodialysis. The age of patients starting haemodialysis was older than in previous years and is older than the National average age of 60 (ANZDATA).

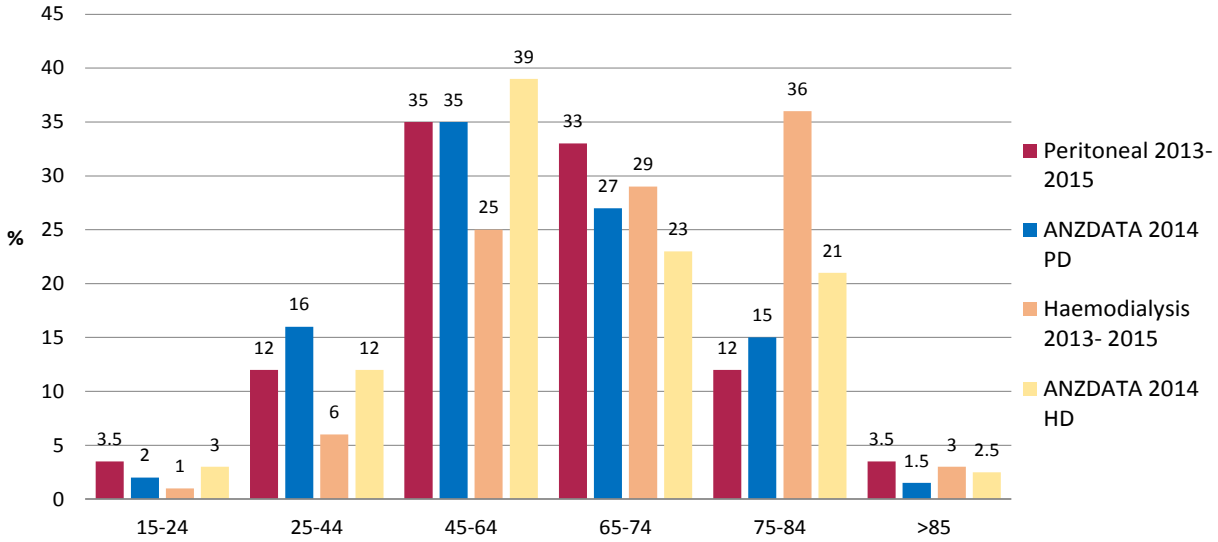


Figure 8. Age Groups of New Patients 2013-2015 compared to ANZDATA 2014

The major finding for acceptance to haemodialysis is that we continue to start more patients than nationally in the 75-84 age group.

Glomerular filtration rate (GFR)

An eGFR is obtained from the serum biochemistry results taken immediately prior to commencing dialysis. The data are consistent with general recommendations, with the vast majority commencing at an eGFR below 10ml/min.

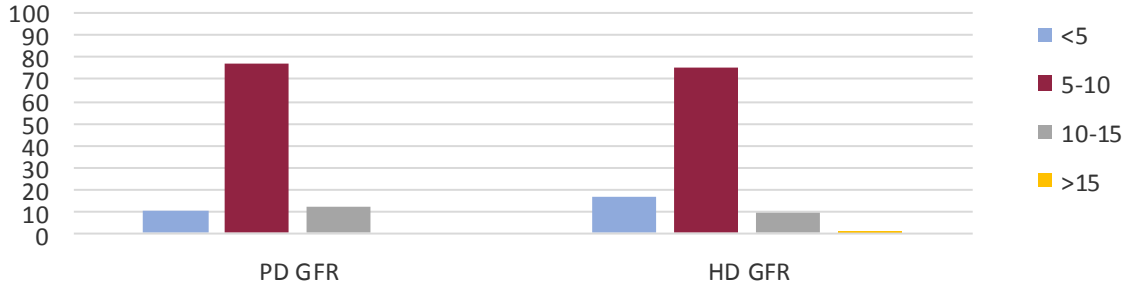


Figure 9. PD and Haemodialysis eGFR at commencement 2013-2015

Baseline characteristics of new patients

Body mass index

Body Mass Index (kg/m)	PD 2013-2015 (%) N=57	HD 2013-2015 (%) N=100
<20	7	4
20-24	31	22
25-30	31	32
>30	26	24
>35	4	17

Table 1. BMI for St George Hospital new patients

*According to ANZDATA (2004), BMI <20 indicates underweight, 20-25 normal, 26-30 overweight, >30 is obese and >35 morbidly obese. *Excludes patients who had haemodialysis prior to peritoneal dialysis.*

		St George HD 2013-15 (n=100*)	ANZDATA HD 2014 (n=1757)	St George PD 2013-15 (n=57*)	ANZDATA PD 2014 (n=752)
Age	Average age in years	67	60*	66	60*
Gender	Male	61%	64%	73%	64%
	Female	39%	36%	27%	36%
Late Referral	<3mths before 1st treatment	23%	21%	7%	10%
Co-morbidities	Smoking (Current and former)	42%	48%	42%	48%
	Chronic Lung Disease (yes and suspected)	19%	16%	19%	10%
	Cerebrovascular Disease	11%	13%	16%	11%
	Coronary Artery Disease	42%	36%	42%	28%
	Peripheral Vascular Disease	20%	20%	21%	17%
	Diabetes	49%	52%	52%	43%

*Excludes patients who had previous mode of dialysis. † Total dialysis population (Hd + PD) ANZDATA 2014

Table 2. Baseline characteristics of new patients

Action

We can conclude from these data that we are accepting patients for haemodialysis who are older than accepted nationally and possibly with more coronary artery disease. All cases are discussed bi-monthly at the pre-dialysis meeting with nephrologists to ensure suitability for dialysis.

5. Haemodialysis

Tracey Blow, Yasko Takatori, Ivor Katz, Saiyini Pirabhahar and Louise Jordan

Activity

St George Hospital operates a 34 chair haemodialysis service providing high level care haemodialysis and home haemodialysis training. On average 125 patients were dialysed each month and a total of 20,339 treatments were completed in 2015, compared with 19,052 in 2014. Whilst activity increased during 2015 with the introduction of an 8 station night shift in April, patient numbers dropped slightly to 123 at the end of December.

The Satellite haemodialysis service at The Sutherland Hospital operates twelve chairs for low care patients. In 2015, 7289 treatments were performed; up from 6440 in 2014 and on average, 48 patients dialysed each month.

The Home haemodialysis Unit was quiet in 2015 with eight patients commencing training but only five completing training. Respite dialysis continued to be a well utilised service with over 170 sessions performed and one third of patients were trained and transferred to an updated dialysis machine in the home.

Our new Nocturnal Dialysis program patient numbers remained consistent in 2015 with twelve patients dialysing 8-10 hours a night with the remaining home patients dialysing on average patients 20.5hrs per week.

Activity for haemodialysis

Activity increased across the two sites in 2015 with a total of 27,628 sessions performed (in-centre and satellite treatments). The graph below shows growth patterns from 2002 with an 8% increase in 2015.This includes haemodialysis for acute and chronic kidney disease.

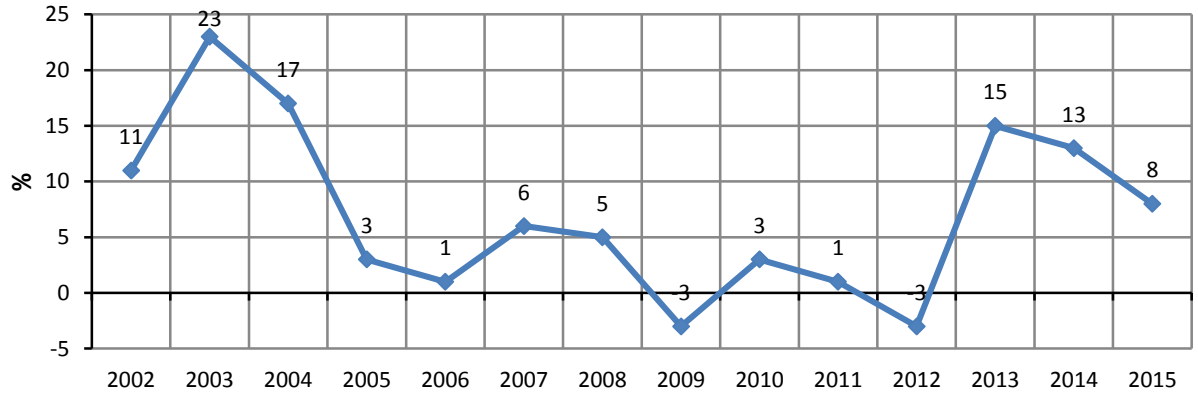


Figure 10. Growth Rates in Haemodialysis at St George and Sutherland Dialysis Units

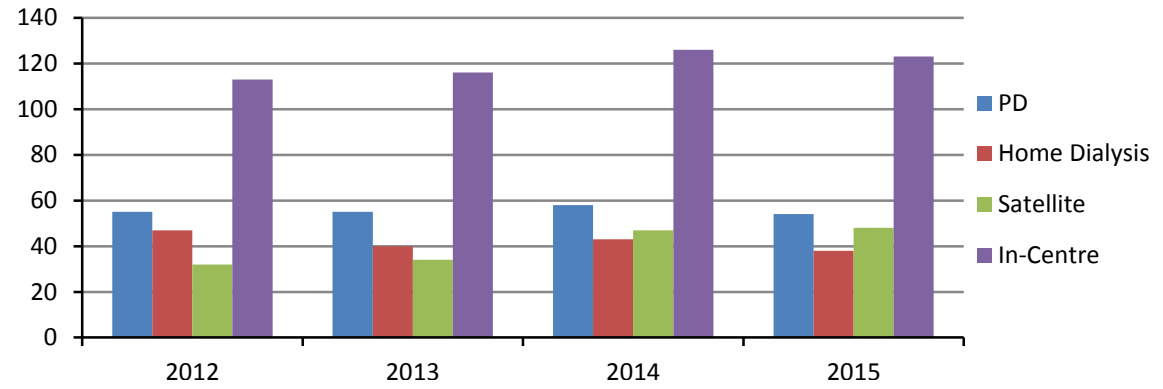


Figure 11. Distributions of dialysis modalities for 2011 through to 2015

Patient Flow

	2011	2012	2013	2014	2015
In-centre haemodialysis patients at beginning of year	**111**	**110**	**118**	**116**	**126**
IN					
1. New Patients	26	22	36	36	27
2. Transfers from other units	1	2	1	1	4
3. Transfers from PD	2	7	10	14	7
4. Failed transplants	11	4	4	2	3
5. Transfers from Home Hdx/Satellite	2	0	7	1	7
6. Acute Kidney Injury*			19	29	26
Subtotal	***42***	***35***	***77***	***83***	***74***
OUT					
7. Transplants	5	7	4	3	8
8. Transfers to other units/overseas	2	2	2	2	2
9. Transfers to Home Hdx	4	2	4	3	3
10. Transfers to PD	2	3	4	5	4
11. Transfers to Satellite	8	6	15	10	12
12. Regain Function	0	0	15	26	15
13. Deaths (medical)	19	8	19	11	11
14. Deaths (withdrawal)	5	7	16	12	14
Subtotal	***45***	***35***	***79***	***72***	***69***
NET GAIN/ LOSS	**-3**	**-**	**-2**	**10**	**5**
In-centre haemodialysis patients at end of year	**108**	**110**	**116**	**126**	**131**

*Includes patients with acute kidney injury with existing chronic kidney disease

Table 3. Patient Flow at St George Hospital from and to haemodialysis for 2015

	2011	2012	2013	2014	2015
Satellite haemodialysis patients at beginning of year	**34**	**33**	**34**	**39**	**47**
IN					
1. New Patients	1	1	1	1	2
2. Transfers from other units	1	1	0	1	1
3. Transfer from PD	0	0	0	1	0
4. Transfer from Incentre	8	14	8	10	12
Subtotal	***10***	***16***	***9***	***13***	***15***
OUT					
5. Transplants	3	1	1	0	2
6. Transfers to Home Hdx	1	0	1	2	1
7. Transfers to PD	0	0	2	0	0
8. Transfers to Incentre	0	1	3	0	5
9. Transfer to other units	0	0	0	1	1
10. Deaths (medical)	2	5	4	2	5
11. Deaths (withdrawal)	2	2	1	0	0
12. Regain Function	0	0	0	0	0
Subtotal	***8***	***9***	***12***	***5***	***14***
NET GAIN/ LOSS	**2**	**7**	**-3**	**8**	**1**
Satellite haemodialysis patients at end of year	**36**	**40**	**31**	**47**	**48**

Table 4. Patient Flow at The Sutherland Hospital from and to haemodialysis for 2015

	2011	2012	2013	2014	2015
Home haemodialysis patients at beginning of year	**51**	**48**	**47**	**40**	**43**
IN					
1. New Patients	3	4	3	4	2
2. Transfer from PD	0	0	0	1	2
3. Transfers from other units	1	1	0	0	0
4. Transfer from Satellite	1	0	0	2	1
5. Failed transplants	0	0	0	0	0
6. Transfer from Incentre Hdx	5	3	4	3	0
Subtotal	***10***	***8***	***7***	***10***	***5***
OUT					
Transplants	7	7	10	4	7
Transfers to other units	0	1	1	0	1
Transfers to Incentre Hdx	0	0	2	1	2
Transfers to Satellite	1	0	0	1	0
Deaths	4	1	3	1	0
Subtotal	***12***	***9***	***16***	***7***	***10***
NET GAIN/ LOSS	**-2**	**-1**	**-9**	**3**	**-5**
Home haemodialysis patients at end of year	**49**	**47**	**38**	**43**	**38**

Table 5. Flow to and from Home Haemodialysis from 2011 to 2015

Summary:

- Activity increased throughout 2015 with an overall growth of 8% across the sites.
- On the 31st December 2015, 48 (18%) St George and Sutherland patients were dialysing at the Satellite unit.
- 38% of patients were dialysing on a home therapy (PD and HD) compared to **27% nationally** and 48% of patients were dialysing in the hospital based facility.
- Respite dialysis for home patients remained a valuable service in 2015 and 15% of patients were retrained on new machine technology.
- Both haemodialysis services reached capacity at the end of 2015 and a new haemodialysis program was developed to cope with this demand. Eight chairs opened on night shift at St George Hospital reaching 12 at the end of 2015. A new stand-alone satellite haemodialysis unit for the St George area is being planned to manage future service demands and remains a short term priority.

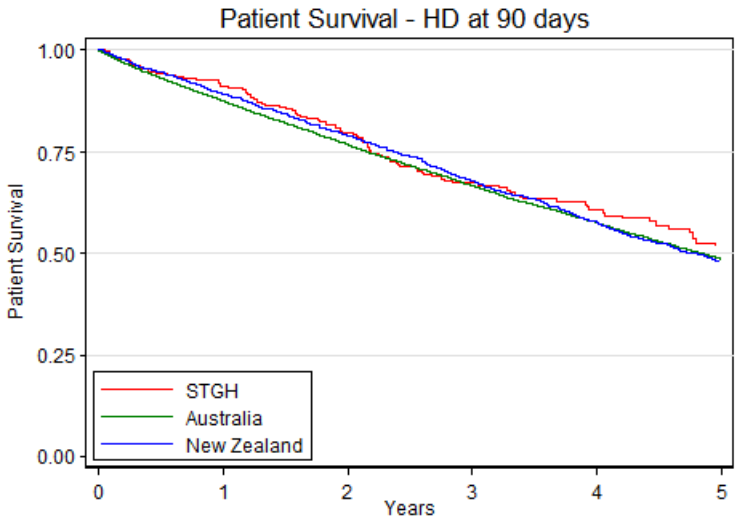


Figure 12. Patient survival – HD at 90 days

Data are for 301 patients dialysed from 2003 to Dec 31st 2012.
Patient survival was at least as good as if not slightly better than the national average with one year survival of 91% and 5 year survival 52%. This is an excellent outcome for our cohort which is also slightly older than the national average.

1 year	233	91.1 (87.1 - 93.9)	10455	87.5 (86.9 - 88.0)
5 years	57	51.7 (43.9 - 58.9)	2315	48.7 (47.5 - 49.8)

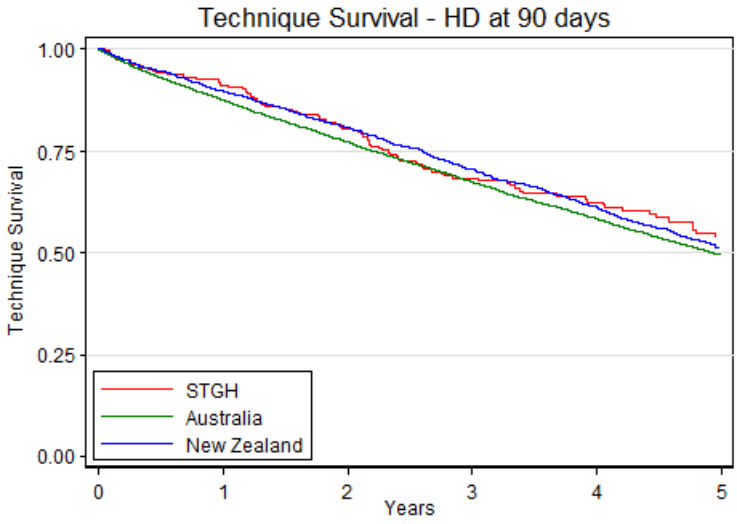


Figure 13. Technique survival – HD at 90 days

Dialysis technique survival also continued to remain slightly better than the national average, being 91% at one year and 54% at 5 years.

1 year	224	91.2 (87.2 – 94.0)	9729	87.5 (86.9 - 88.0)
5 years	55	53.8 (45.8 – 61.1)	2131	49.4 (48.2 – 50.6)

Haemodialysis Clinical, Biochemical and Dialysis Adequacy Evaluation

As part of the dialysis unit's ongoing evaluation to ensure adequate dialysis was achieved for the patients, it remains standard practice to carry out routine monthly blood testing. Such protocols remain standardised throughout Australia and many are reported in the ANZDATA annual reports. It is our aim to achieve specific biochemical and haematological targets which have been established by ANZDATA and national consensus. To achieve these a specific 'dialysis dose' is prescribed and specialist renal medications are prescribed for each individual patient. The goal being to achieve biochemical and haematological targets and an acceptable 'uraemic toxin' clearance. Clearance and dialysis adequacy are measured using specific tools such as a Kt/v and uraemia reduction ratio (URR) formula equations.

Achieving the correct dialysis dose, assessing patient's diet and general well-being are measured using these standardised tests together with biochemical and haematological targets. Some of the targets are achieved through choosing the most appropriate dialyser, dialysis time and dialysis machine settings and others are achieved through diet and lifestyle factors and others through multiple medical therapies. An example of this is the use of iron infusions and an erythropoietin stimulating agent (ESA) in order to achieve a target haemoglobin level.
Achieving these desired targets for patients on dialysis is termed 'dialysis adequacy'. Many targets are used and achieving these targets or KPIs serves as a measure of how our dialysis unit delivers an acceptable standard of healthcare for patients with end stage kidney failure (ESKD).

An audit of our results are carried out in April and October each year for the chronic in-centre and satellite haemodialysis patients
Where applicable our results are evaluated against the national KPIs e.g. ANZDATA
In other instances data are evaluated against the existing national and international guidelines e.g. CARI guidelines, KDOQI

Dialysis Duration (Hours on dialysis)

There is increasing evidence that time on dialysis is a key factor to improve outcomes.

Duration (hours)	St George Hospital	Sutherland Hospital
< 4	0	1
4	54	22
4.5	29	12
5	27	10
5.5	2	1
6-8	8	

Table 6. Dialysis duration per individual dialysis session at St George and Sutherland Hospitals

28% of in centre or satellite haemodialysis achieve the KPI of >15 hours on dialysis per week. This is slightly below the ANZDATA national average of 34% and lower than 2014 where the sites reached 34%.

Home Haemodialysis

Duration (hours)	Home haemo	Frequency of dialysis
12 -13 hrs week	2	3 x week = 12
15-17 hrs week	9	Alternate days = 18
18-20 hrs week	6	4 x week = 3
21-22 hrs week	8	5 x week = 1
24-28 hrs week	6	
30-32 hrs week	3	
40 hrs week	1	

Table 7. Home haemodialysis dose (hours and frequency on dialysis)

Thirty one patients (86%) are dialysing >17hours week
Eleven patients (30%) are performing overnight dialysis
Twenty four patients (66%) are dialysing on alternate days or more
Twenty patients (55%) are using an ESA.

Dialysis Adequacy assess by Kt/v and URR

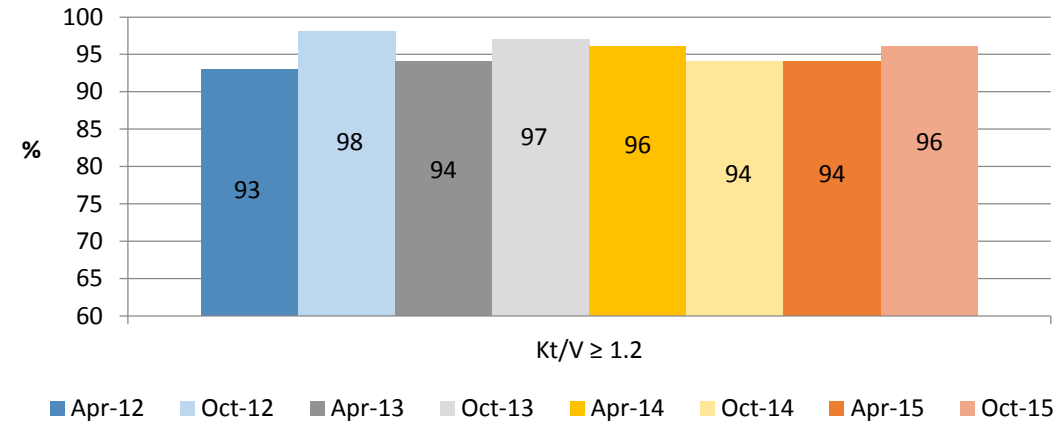


Figure 14. Dialysis Adequacy assessed by Kt/v from 2012 to 2015

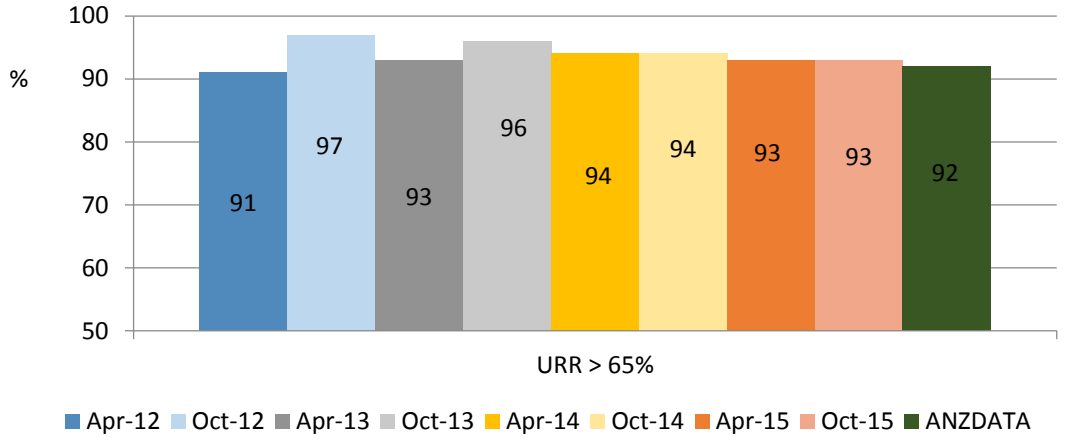


Figure 15. Urea Reduction Ratio (URR) >65% in patients on Haemodialysis by Year

The St George and Sutherland dialysis units continue to achieve targets at or better than national or international standards. This is in keeping with our overall patient outcomes which are slightly better than the national averages. Our data demonstrates that The St George and Sutherland rates for clearance using both Kt/v and Urea Reduction Ratio (URR) remain similar if not slightly better compared to national data from ANZDATA, which were 96% and 92% respectively.

Parameter	Target	Apr-13	Oct-13	Apr-14	Oct-14	Apr-15	Oct-15	ANZDATA 2014
Ca	2.25-2.58 mmol/L	60	57	70	60	62	62	
Corr Ca	2.1-2.4 mol/L	49	40	33	41	31	40	**39**
PO4	0.8-1.6 mmol/L	62	61	63	54	58	49	**61**
$CaPO_4$	<4.0 mmol/L	71	67	71	62	61	58	**58**
Ferritin	200-800 ug/L	76	69	69	71	71	77	**60***
Fe Sats	20-40%	72	68	72	66	70	63	**56**
Albumin	33-48 g/L	59	56	59	60	58	71	**-**
PCR	<1.0	64	55	55	51	61	50	**-**
KT/V	≥ 1.2	94	97	96	94	94	95	**-**
URR	>65%	93	96	94	94	93	91	**93**

*ANZDATA target for ferritin 200-500µg/L** Australia only and >4-5hrs

Table 8. Blood biochemical targets and percentage of patients achieving target levels at St George Haemodialysis.

Of note is that our serum phosphate targets have been dropping over the past 3 years and currently we are below the national targets achieved in ANZDATA. This is something that we will need to tackle in the coming years.

Haemoglobin Targets

The current haemoglobin (Hb) target range is now set at 100 to 120 g/dL. Haemoglobin, iron stores and ESA dosing for patients with CKD are maintained at optimal levels to provide for an improved quality of life and a decrease in adverse symptoms. The range 100-120g/dL is that range at which patients are safe with regard to morbidity and mortality. Hb levels >130 are associated with increased morbidity and mortality. Levels below 100g/dL are associated with worsening symptoms and reduced QOL.

	Mean	SD	Min	Max	ANZDATA 2014 Median
Apr-15	115	13	66	156	105.5-122
Oct-15	114	16	12	167	

ANZDATA presents their Hb as a median range due to their data being non-parametric as it is collated from all units around the country. In Australia, median haemoglobin for each centre ranged from 105.5 to 122 g/L for haemodialysis patients.

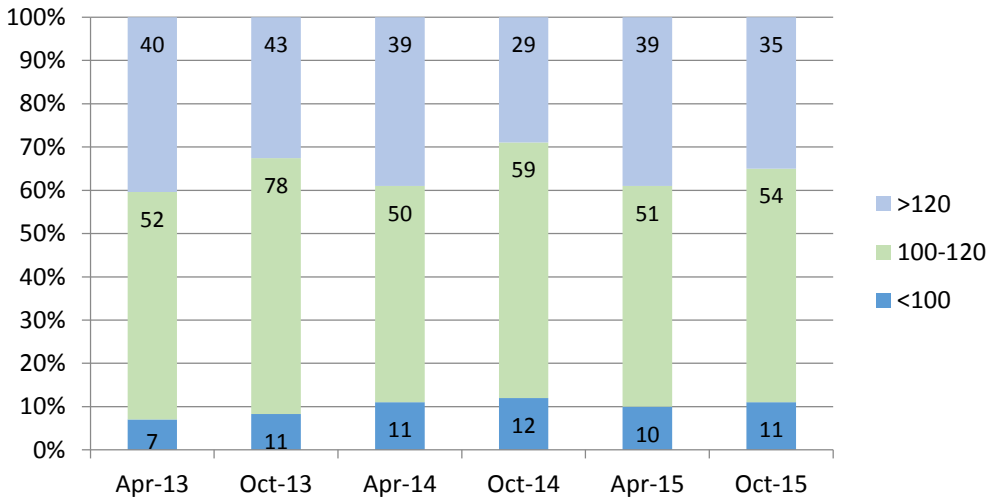


Figure 16. Serum Haemoglobin levels categorised by target level

Overall we continue to keep the majority of our patients within the target range. Importantly very few are at levels below 100mg/dL at which patients may become symptomatic or where quality of life may be impacted upon. The Australian CARI 2011 guideline target for Hb is 100-115g/L. Use of an ESA is suggested when levels drop <95g/L. Levels become potentially dangerous and associated with morbidity and mortality when Hb >130. Keeping the range 100-120 allows for a buffer to ensure levels are clinically safe.

The proportion of patients in Australia with a haemoglobin of 110-129 g/L in each centre ranged from 32% to 78% for haemodialysis patients. For St George and Sutherland the proportion with an Hb 100-120 was 55%. The ANZDATA 2014 reports that dialysis patients with an Hb 110-130 (a higher range) were 46%. This probably indicates that we have a higher proportion within the acceptable target range, although we are targeting different ranges. Importantly our data reveals us to be within the national target range or maybe slightly better.

Anaemia Management Erythropoietin Use and Serum Iron Studies and

The management of anaemia for patients with end stage kidney disease (ESKD) continues to remain largely the responsibility of the primary dialysis nurse in our unit with the nephrologist determining ESA dose and being responsible for the prescription. In particular we have nurse led initiation and management of intravenous iron for patients on haemodialysis. The program was commenced over 10 years ago and has resulted in excellent success. We continue to achieve targets above the national ANZDATA targets.

More recently we have noted that the fluctuation in target Hb has been high. In order to reduce this effects, as it may be associated with clinical implications, we have changed our dosing ESA practice.

A total of 170 patients were audited for use of erythropoietin use. Seventy nine percent (79%; n = 135) of patients were receiving an erythropoietin stimulating agent (ESA) at the time of the second audit in October 2015. Five percent (5% n = 8 were having their ESA withheld as their Hb was above

target i.e. >120mg/dL. Thirteen percent (13%; n = 16) were not on an ESA and no data was available for a further 6% (n = 11).

ANZDATA revealed 85% of Australian patients to be on an ESA in the 2013 survey. If we include those patients in whom we are withholding it, our target of 79% is slightly lower. Importantly our Hb mean remains similar.

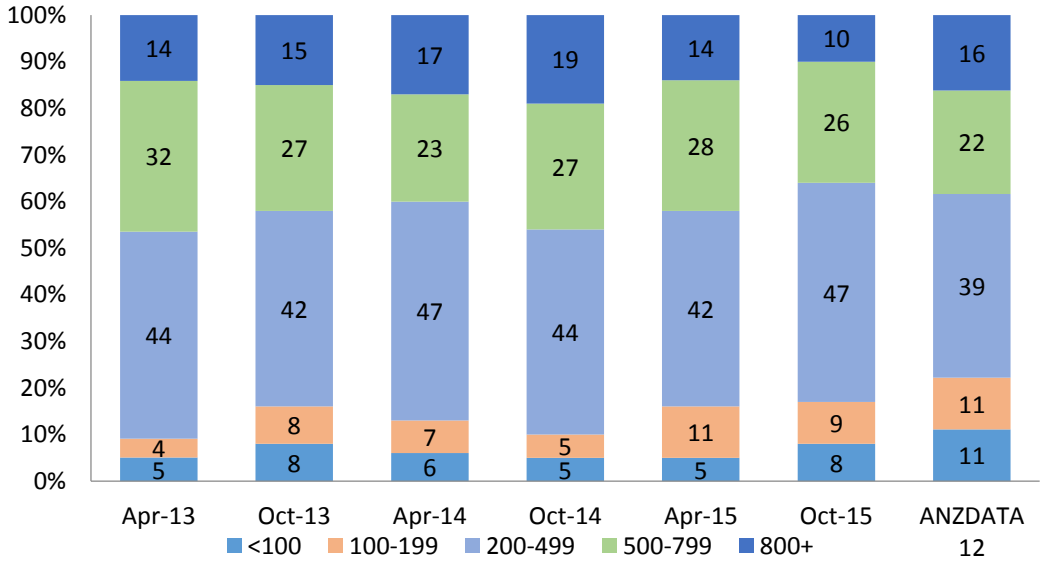


Figure 17. Serum Ferritin levels by target level

The mean serum ferritin for Oct 2015 was 438 with SD 252.

In Australia and New Zealand ANZDATA 2013 demonstrates the proportions of haemodialysis patients with ferritin <200 mcg/Land those with ferritin ≥ 500 mcg/L have been relatively stable. Those with serum ferritin 200-500mcg/L at St George and Sutherland were 46% which was slightly higher when compared with 35% from the ANZDATA 2013 report.
Target levels for serum ferritin are from 200-400% with safe levels being levels being that <800%. Nineteen percent of our patients had a serum ferritin >800% vs. 16% from ANZDATA.

In Australia distributions of transferrin saturation have been unchanged for the past three years. Target levels for transferrin saturation are between 20-40% are targeted to ensure optimal iron stores. This in turn ensures erythropoietin stimulating therapy (ESA) works. ANZDATA 2013 serum transferrin saturation levels between this range were in 56% of the dialysis population. At St George and Sutherland hospital we had 59%.

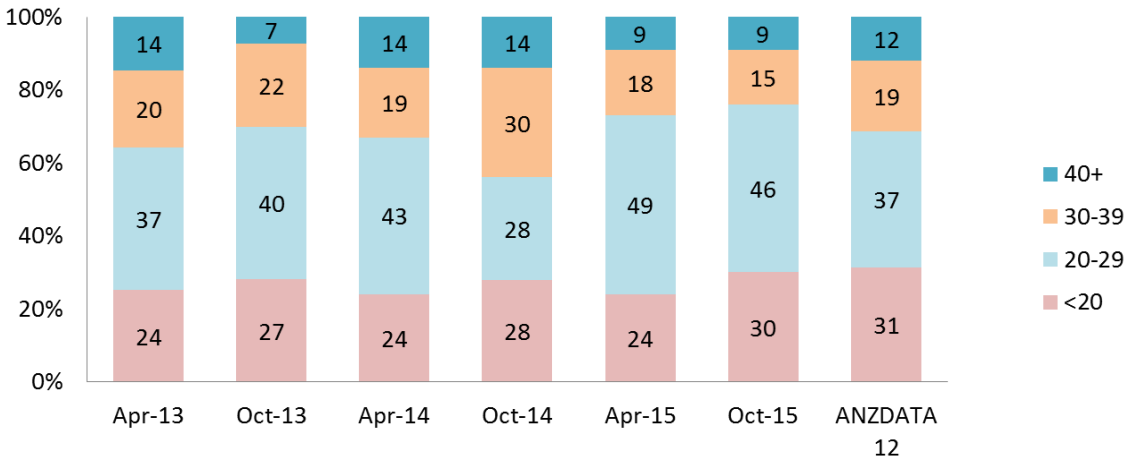


Figure 18. Serum Iron Saturation by target Level

Apr 2015: Median 25, IQR 10 (20, 30) and Oct 2015: Median 24, IQR 11 (18, 29)
The St George and Sutherland haemodialysis results continue to achieve levels at or slightly better than the national ANZDATA averages for dialysis patients.

Renal Bone and Mineral Disorder (MBD) Metabolism Management

Importantly only a very small number of our patients have iPTH levels at those associated with increased morbidity and mortality i.e. levels >7x normal or >52-95pmol/L or < 3.5 pmol/L. It was noted that a large number (55%) continue to have iPTH levels <20pmol/L but only 11/131 or 8.3% were <3.5. Parathyroid hormone levels are not reported in ANZDATA.

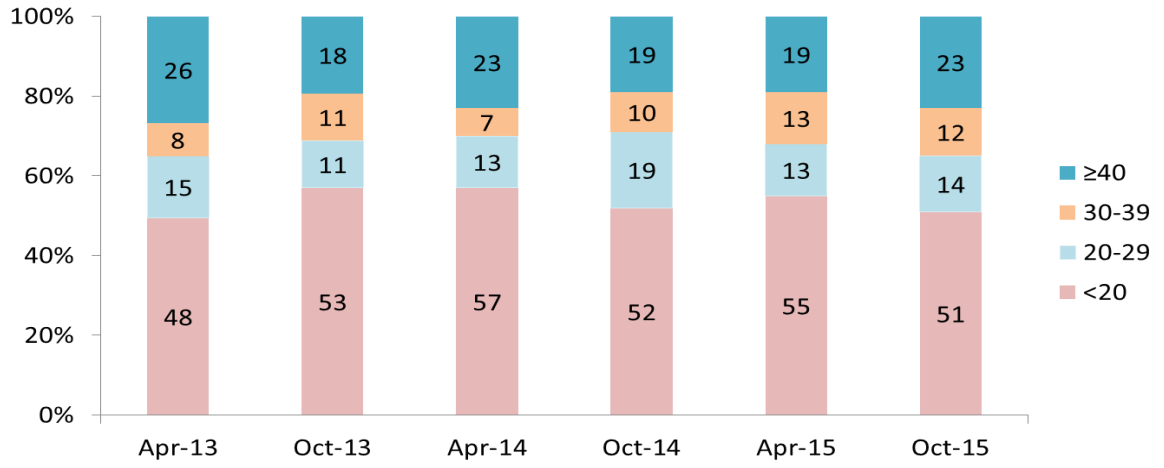


Figure 19. Serum PTH for Haemodialysis patients from 2012 to 2014
Average for April and Oct for iPTH was 55%.

Interestingly there is a large variation in serum calcium levels through the year. The target levels were lower for October differ slightly compared with April. Compared with ANZDA levels when averaging out our biannual levels we have a much larger number of patients within the target calcium level 2.2-2.5mmol/L compared with ANZDATA i.e. 71% versus 60%. We have a slightly higher

number >2.6mmol/L. We also have fewer patients at the lower level i.e. serum Ca<2.2mmol/L. We have an aggressive focus to achieve lower serum calcium or calcium phosphate products and achieve this by have a high number of patients completing >4 hours of dialysis each dialysis session.

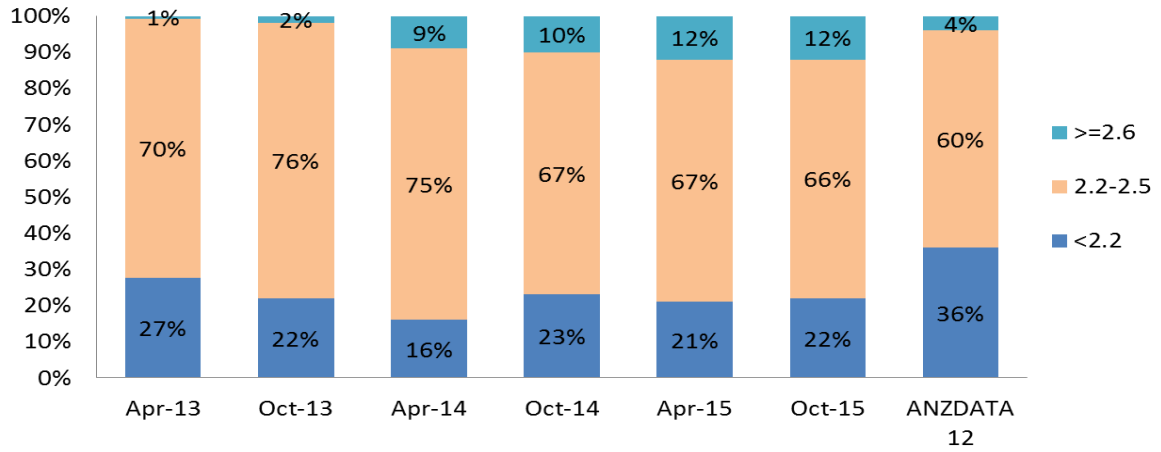


Figure 20. Serum Calcium target levels (2.25-2.58 mmol/L) 2013 to 2015 versus ANZDATA

Apr 2015: Mean 2.32, SD 0.16; Oct 2015: Mean 2.31, SD 0.16

Target serum phosphate levels remain very similar when compared to ANZDATA. We have a similar number of patients within the target range 1.4-1.7mmol/L and a similar number 34% vs. 32% with levels >1.8mmol/L. Higher levels make patients at higher risk for morbidity and mortality.

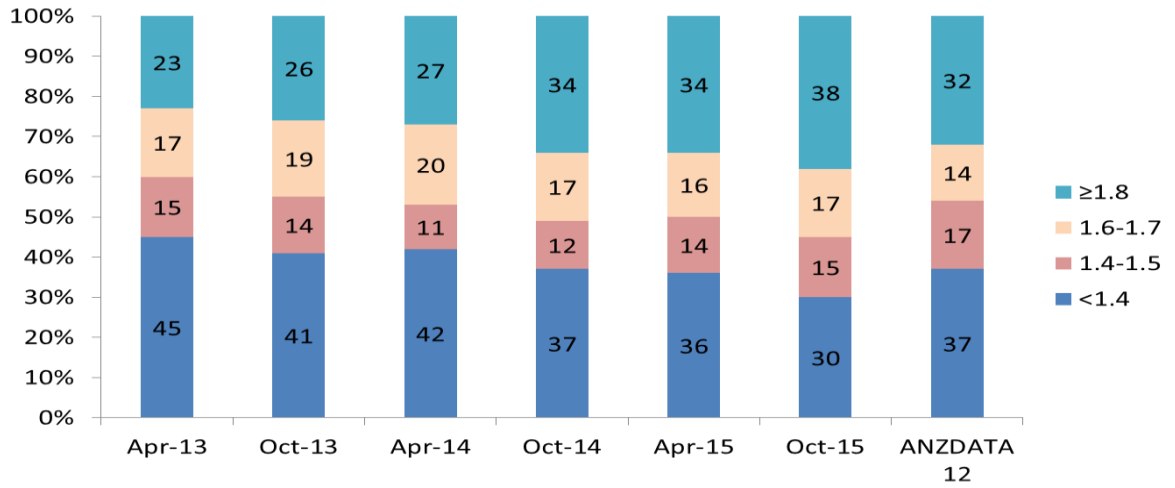


Figure 21. Serum Phosphate target levels from 2012 to 2014 versus ANZDATA

Apr 2015: Mean 1.59, SD 0.53; Oct 2015: Mean 1.62, SD 0.46

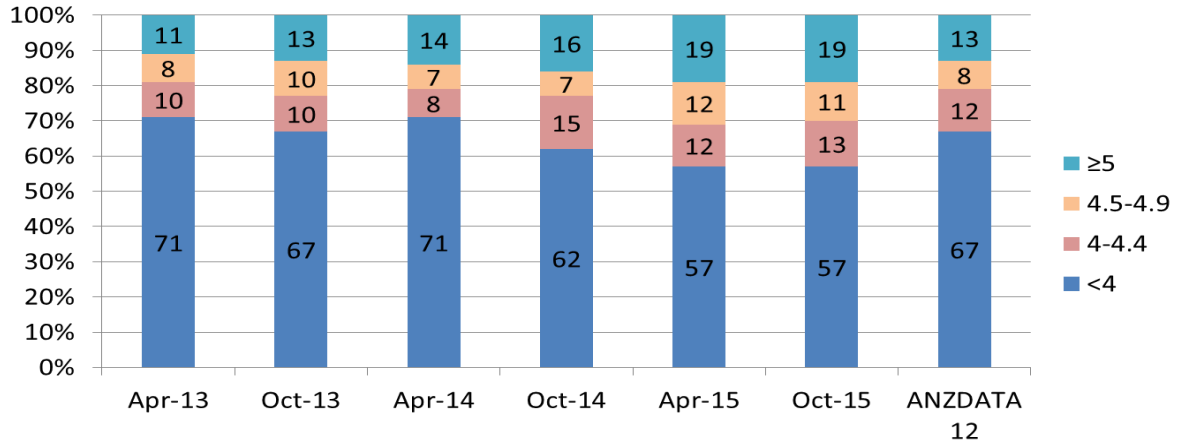


Figure 22. Calcium Phosphate Product by year and compared to ANZDATA

The calcium phosphate product remained similar to previous target levels and were at or continued to be slightly better on average when compared with national ANZDATA targets

It is important to recognise, and is acknowledged in the Australian CARI guidelines, that ideal targets for bone mineral metabolism parameters are unlikely to be met with conventional dialysis methods and available phosphate binders in the majority of patients.

The research evidence remains unclear as to whether using high doses of phosphate binders, using the newer phosphate binders and/or whether performing longer dialysis to improve the bone mineral metabolism status of patients will translate into improvement in the mortality of patients with chronic kidney disease. However, what we do know is that we see the lowest phosphate levels in patients on home dialysis and home dialysis patients in Australia have an outcome much better than in-centre haemodialysis and close to or in some cases equal to those who have undergone renal transplantation.

Blood Lipid Targets

The most recent KDIGO guidelines have suggested that in adults with dialysis-dependent CKD or ESKD that statins or statin/ezetimibe combination should not be initiated. A few systematic reviews pooling data from all available randomized trials suggest that despite the exceedingly high cardiovascular risk in dialysis patients, it is uncertain whether statin regimens lead to clinical benefit in this population. However, clinicians might reasonably choose statin treatment if they are interested in a relatively small, uncertain reduction in cardiovascular events. Other factors that might influence a patient's decision to receive statin could include recent MI or greater life expectancy (both favouring treatment), and more severe comorbidity or higher current pill burden (both favouring non-treatment).

In light of these new recommendations we present our findings of lipid levels for our dialysis patients. Data are collected only on patients who started dialysis on a lipid reduction medications or with, or suspected of being high risk or having, coronary artery disease, peripheral vascular disease, cerebrovascular disease or diabetes. In our group of dialysis patients target levels for lipid levels have remained relatively stable and there are no statistically significant changes over this time period in any of the lipid results.

ANZDATA does not collect lipid levels.

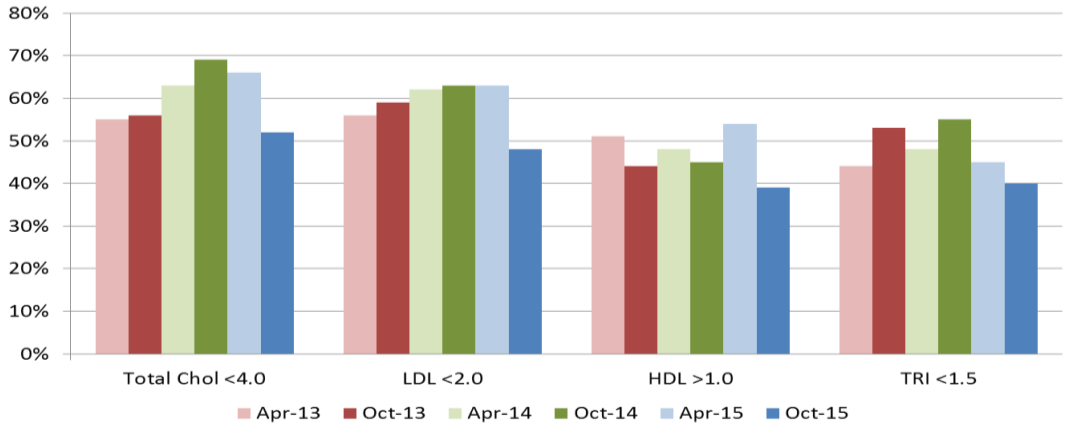


Figure 23. Lipid levels for high risk Haemodialysis patients

Diabetes Control measured by HbA1c

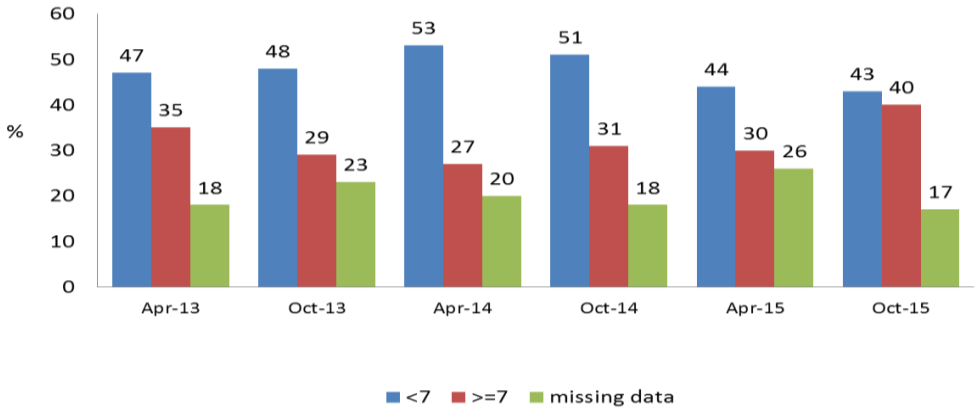


Figure 24. HbA1c results for Diabetes patients on Haemodialysis

Data on glucose control was collected on all haemodialysis patients with diabetes (n=92/164) in the October 2015 audit. There is no statistically significant change compared to the previous audits. Twenty nine percent had control which could be considered inadequate as HbA1c was >7%. However, the role of HbA1c to assess control of diabetes on dialysis remains controversial. Based on an HbA1c level <7% around half of the patients with diabetes are having adequate control.
There is concern that HbA1c levels are influenced by serum Hb, which can be very variable in dialysis patients. There are no validation studies looking at the newer measurement where HbA1c is measured in mmol/mol. Conventional glucose control monitoring methods may not be as meaningful in diabetes patients with end-stage renal disease, researchers found. Patients on dialysis will normally show a lower HbA1c than they actually have. Another test, the glycated albumin or GA assay, appears to be far more effective in this setting. We do not routinely do this test.

ANZDATA does not record HbA1c levels on dialysis patients.

6. Vascular Access

Yanella Martinez-Smith and Coralie Meek

Background and Performance Indicators

- The preferred haemodialysis access is a native AV fistula (KDOQI 2006 & CARI 2012)
- The Vascular Access Nurse (VAN) aims to monitor all fistulas from creation until the commencement of dialysis to ensure maturity; monitor fistula maintenance after dialysis has commenced; and ensure a low level of fistula and vascath infection is maintained.

Data Benchmark

- Data is benchmarked against ANZDATA 2014 report, KDOQI 2006 and CARI 2012 guidelines.
- The key performance measures for vascular access are:
  1. > 38% patients commencing haemodialysis with a functioning access (ANZDATA 2014)
  2. > 78% of prevalent patients dialysing through a native fistula (ANZDATA 2014)
  3. < 10% of prevalent patients dialysing through a permanent catheter (KDOQI 2006)
  4. < 1% fistula infection rate during the useful life of the access (AVF) (KDOQI 2006)
  5. < 10% fistula infection rate during the useful life of the access (AVG) (KDOQI 2006)
  6. > 3.0 years AVF patency and 2.0 years AVG patency (KDOQI 2006)
  7. < 0.25 episodes/pt-year at risk for fistula thrombosis (KDOQI 2006)
  8. < 0.5 episodes/pt-year at risk for graft thrombosis (KDOQI 2006)
  9. < 1.5 episodes/1000 catheter days tunnelled catheter infection rate (KDOQI 2006)

Vascular Access at Commencement of Haemodialysis

The national average was 46% for patients having a functioning fistula at first dialysis (ANZDATA 2014).

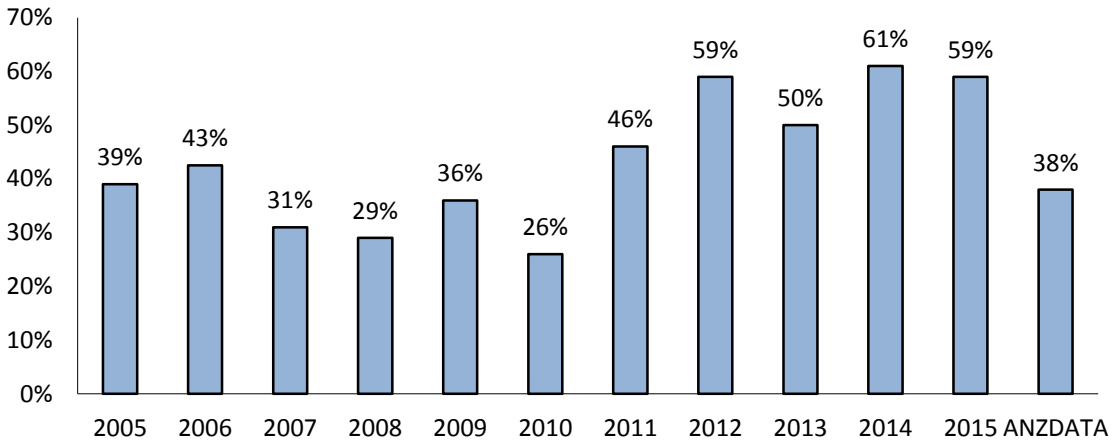
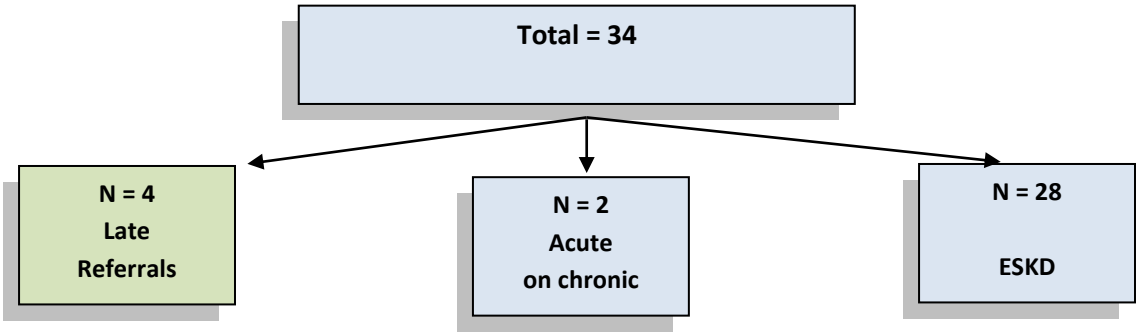


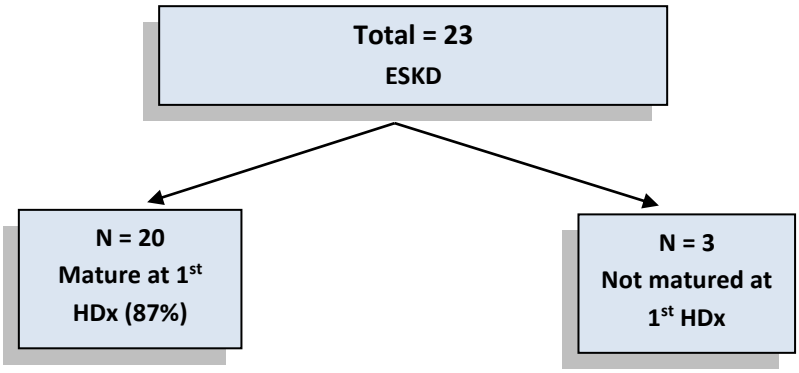
Figure 25. Functioning fistula at entry

- 59% of patients at St George had a functioning access at first dialysis

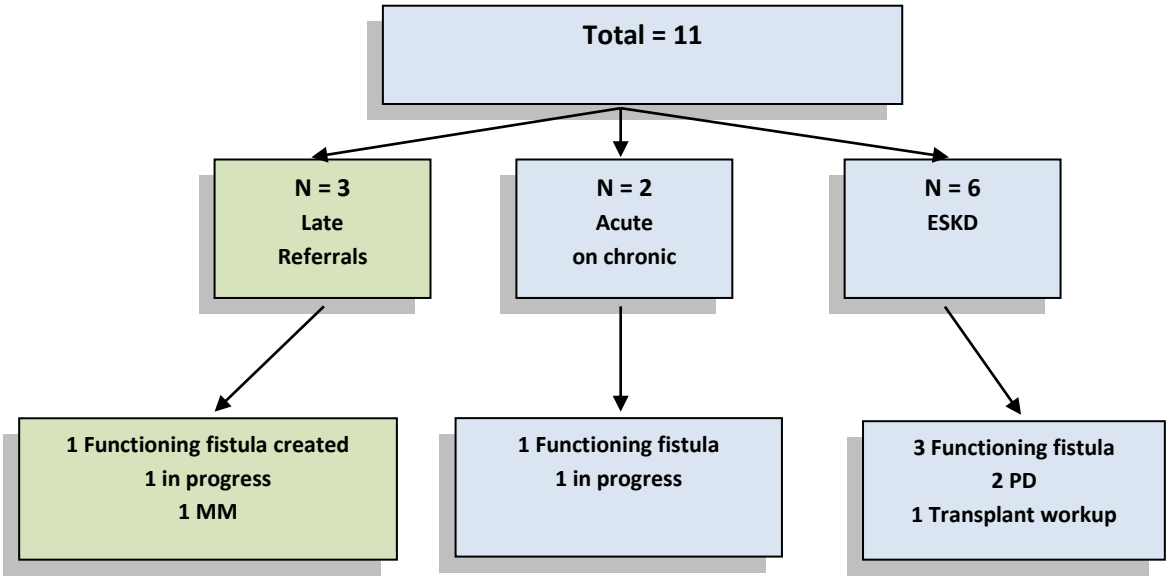
Patients new to haemodialysis in 2015:



Access created before initial haemodialysis:



No access created before initial haemodialysis:



Comments:

- 19 (63%) patients had a mature access at their first haemodialysis (excluding late referrals) compared to 50% in the ANZDATA report (that also excludes late referrals).

Identified strengths and weaknesses:

- The late referral rate at St George was 12% as compared to the ANZDATA Report (2014) at 21%
- Average time from initial referral to access creation was 41 days
- The aim is to have access created within 30 days of initial referral
- Average time to first cannulation in 2015 was 6.5 months

Vascular Access at 1st HDx

ANZDATA (2014) benchmark: 38% commenced with a native fistula (AVF) and 2% with a graft (AVG) equating to 40%.

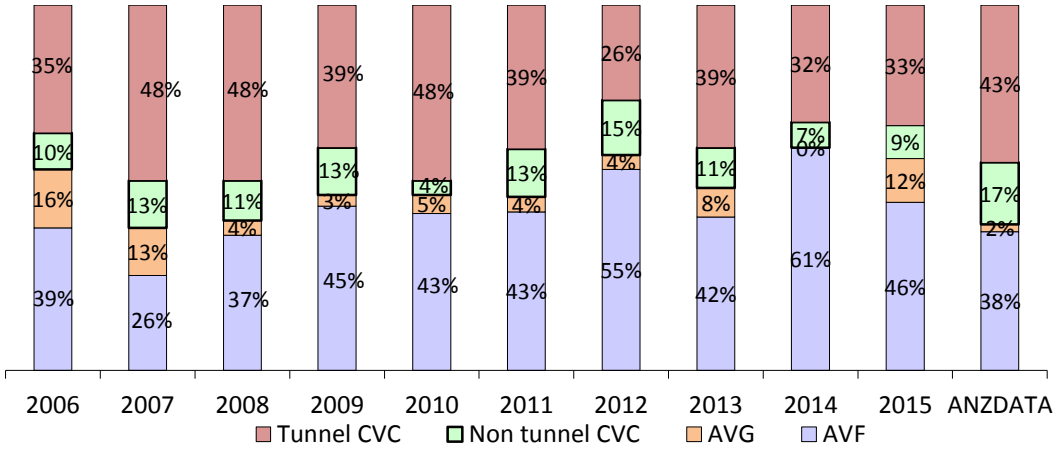


Figure 26. Vascular access at first HDx

Comments

- In comparison, St George Hospital Renal Department achieved 46% with a native fistula compared to the ANZDATA benchmark of 38%.

Access type

- KDOQI (2006) recommends fistula use in 40% of prevalent patients
- ANZDATA set a benchmark of 38% for fistula use (ANZDATA 2014)
- KDOQI (2006) suggest < 10% of patients have a permanent catheter
- ANZDATA set a benchmark of 43% for tunnelled catheter use (ANZDATA 2014)

Prevalent Data (n = 211)

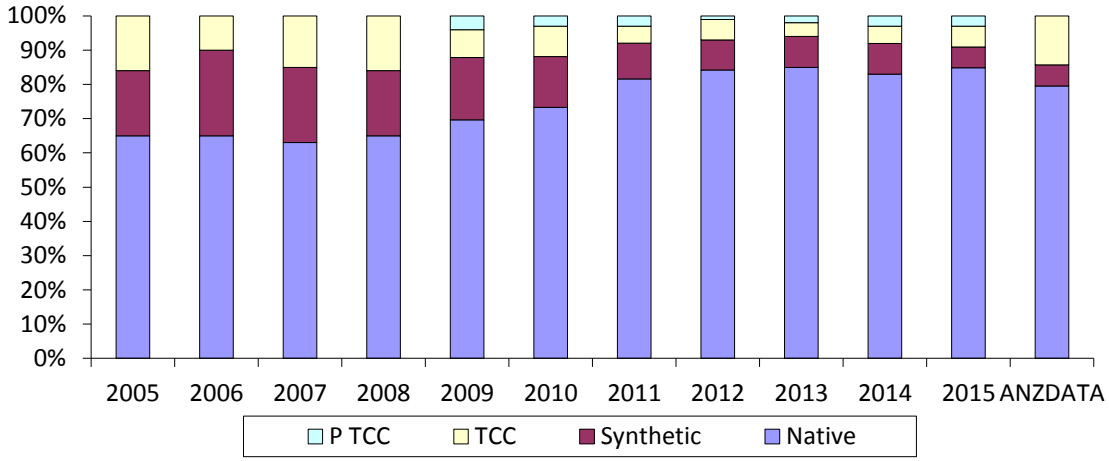


Figure 27. Prevalent access

Comments

- 90% of St George patients were using a fistula/graft for haemodialysis, compared to the ANZDATA benchmark of 84% and KDOQI benchmark of 40%
- 3% of St George patients were using a permanent catheter which is less than the KDOQI benchmark of < 10%
- A total of 6% for tunnelled catheter use which is less than the ANZDATA benchmark

Access Infection Rates

KDQOI (2006) recommends infection rate for fistula < 1% and graft < 10% during the useful life of the access.

	Blood stream infection (BSI) range AVF/SVG	Blood stream infection (BSI) range AVG
2015	**2 BSI (0-0.15 BSI/100 pt months)**	**0 BSI (0 BSI/100 pt months)**
2014	0 BSI (0 BSI/100 pt months)	0 BSI (0 BSI/100 pt months)
2013	1 BSI (0-0.15 BSI/100 pt months)	2 BSI (0-2.3 BSI/100 pt months)
2012	1 BSI (0-0.07 BSI/100 pt months)	1 BSI (0-0.59/100 pt months)
2011	2 BSI (0-0.53 BSI/100 pt months)	4 BSI (0-4.5 BSI/100 pt months)
2010	2 BSI (0-1.16 BSI/100 pt months)	4 BSI (0-11.76 BSI/100 pt months)
2009	4 BSI (0-0.76 BSI/100 pt months)	3 BSI (0-1.15 BSI/100 pt months)
2008	1 BSI (0-1.3 BSI/100 pt months)	3 BSI (0-0.8 BSI/100 pt months)
2007	3 BSI (0-1.32 BSI/100 pt months)	10 BSI (0-4.97 BSI/100 pt months)

Table 9. Access Infection Rates

Comments

- St George Hospital and Sutherland Dialysis Unit patients' infection rate for fistulas was 1% and 0% for grafts. This data does not include home haemodialysis patients

Thrombosis events

The KDOQI (2006) guidelines:

- fistula thrombosis rate of < 0.25 episodes/pt-year at risk
- graft thrombosis rate of < 0.5 episodes/pt-year at risk

Thrombosis events			
	AVF	AVG	Ave/month
2015	20 (17pt)	16 (5pt)	2.5
2014	14 (13pt)	13 (8pt)	2.3
2013	8 (8pt)	12 (7pt)	1.7
2012	9 (9pt)	11 (9pt)	1.7
2011	6 (4pt)	16 (10pt)	1.8
2010	8	21	2.4
2009	10	24	2.8
2008	14	25	3.3

Table 10. Thrombosis events

Comments

- Thrombosis rate for St George Hospital is above target:
  - AVF = 1.7 episodes/pt-year
  - AVG/SVG = 0.8 episodes/pt-year
- Average 2.5 thrombosis per month across all fistula types
- 5 patients accounted for 13 thrombosis episodes in their access
- 5 patients require regular intervention on their fistulas
- 2 patients had immature fistulas
- 4 patients had a thrombosis episode during/post an acute illness or post-surgery

Access survival

KDOQI (2006) recommends AVF patency > 3.0 years and AVG patency > 2.0 years (by life-table analysis)

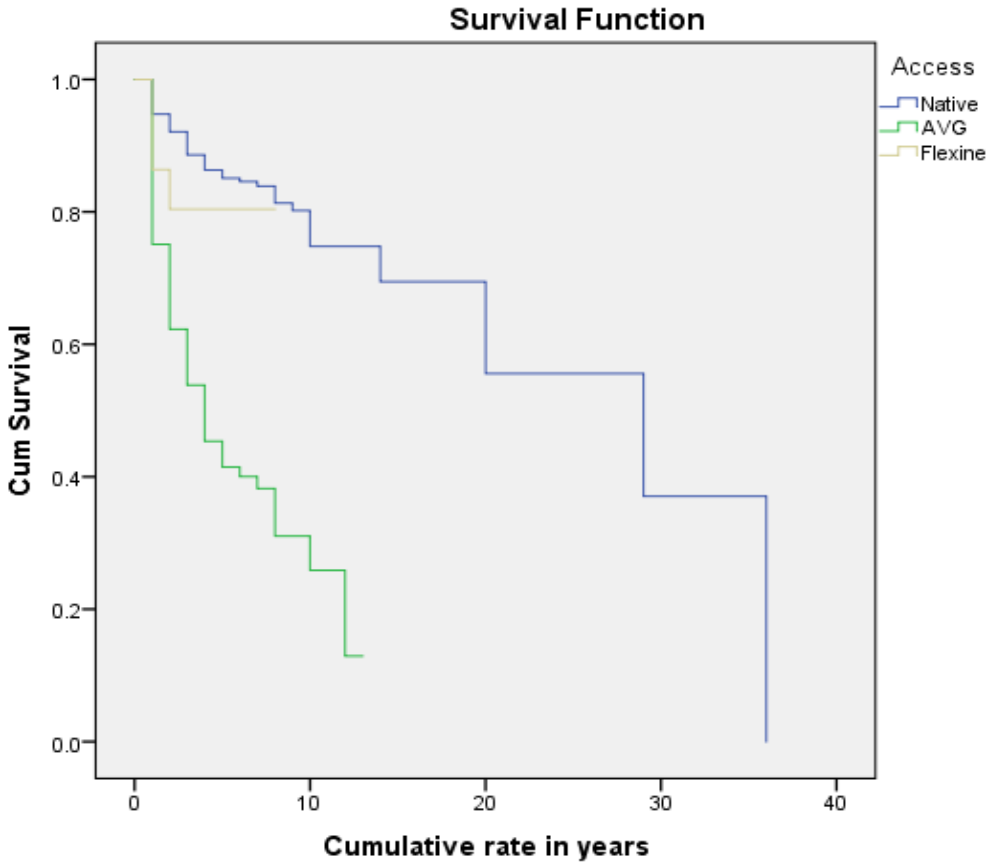


Figure 28. Survival Function

Comments

- Cumulative assisted patency is defined as the number of accesses which remain patent regardless of number of interventions during a time period
- Data includes current and deceased patients since 2004; excludes primary failure
- Endpoint was access lost. Data was censored for deaths; a current functioning access; transplantation or transfer to another unit.
- Cumulative proportion surviving at end of the below intervals
  - AVF at 5 years (85%), at 10 years (75%)
  - AVG at 1 year (62%), 2 years 54%, 3 years (54%)
  - Flexine at 1-3 years (80%)
- Access survival is similar to previous year's results

Central Venous Catheters

Background

- Tunnelled cuffed catheters (CVC) are used to provide temporary access for both acute and chronic haemodialysis patients, including those with a primary AVF still to mature (KDOQI, 2006).

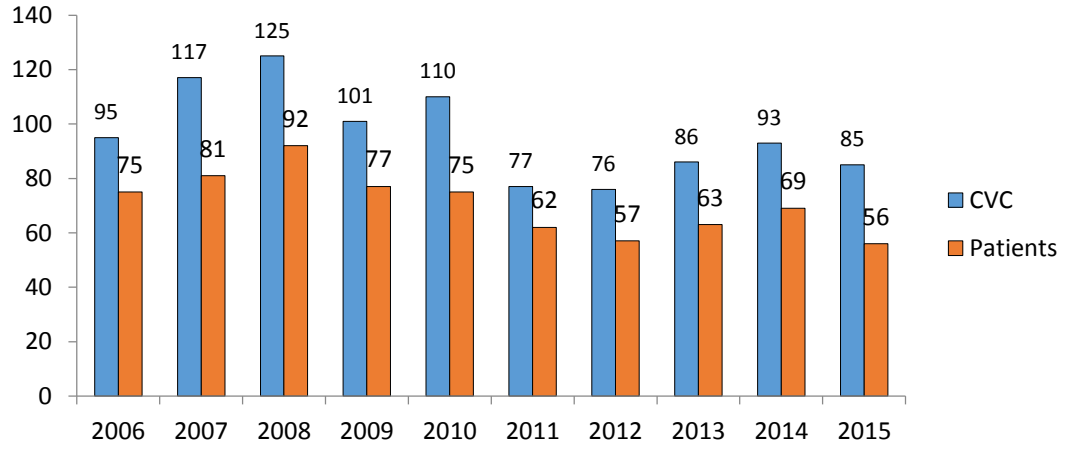


Figure 29. Activity Level

Comments

- Total days all catheters in-situ 5182 days (2015) compared to 4584 days (2014)
- **13%** of catheters placed in chronic patients in 2015 (11/85) as compared to **21%** in 2014 (excluding replacements, fistula and PD issues)

Reason for insertion of catheters

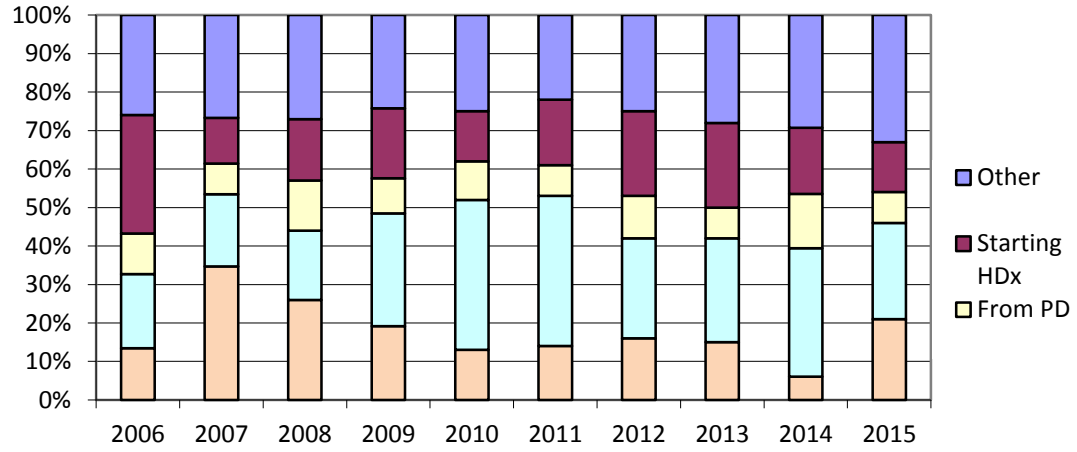


Figure 30. Reason for insertion of catheters

Comments

- Fistula group includes immature, revision, thrombosed or unsalvageable
- Other includes replacing a non-tunneled catheter with a tunneled catheter; malfunction; occlusive thrombus; incorrect placement or infection

- There were no catheter complications related to insertion
- Average days in situ 61 days (2015) compared to 49 days (2014) and 51 days (2013)
- An increased catheter insertion rate occurred amongst patients with an immature fistula or due to a thrombosed access

Catheter infection rates

KDOQI (2006) recommends a catheter related bacteraemia rate < 1.5 episodes/1000 catheter days.

	Catheter related bacteraemia (CRB) rate	Exit site infections (ESI) rate
2015	**1.2% (0.19 episodes/1000 catheter days)**	**Nil**
2014	2.1% (0.28 episodes/1000 catheter days)	4.3% (0.56 episodes/1000 catheter days)
2013	1.2% (0.15 episodes/1000 catheter days)	2.3% (0.31 episodes/1000 catheter days)
2012	3.9% (0.62 episodes/1000 catheter days)	6.5% (1.03 episodes/1000 catheter days)
2011	1% (0.11 episodes/1000 catheter days)	6% (0.53 episodes/1000 catheter days)
2010	4% (0.69 episodes/1000 catheter days)	5% (0.82 episodes/1000 catheter days)
2009	7% (0.57 episodes/1000catheter days)	13% (1.1 episodes/1000catheter days)
2008	10% (0.74episodes/1000catheter days)	10% (0.8 episodes/1000catheter days)
2007	6% (0.72 episodes/1000catheter days)	10% (1.24 episodes/1000catheter days)
2006	13% (1.05 episodes/1000catheter days)	11% (0.88 episodes/1000catheter days)
2005	28% (3.0 episodes/1000catheter days)	17% (1.7 episodes/1000catheter days)

Table 11. Catheter infection rates

Comments

- The benchmark for CRB is being met (CRB 0.19 episodes/1000 catheter days)
- For 2015, 1 catheter-related and nil exit-site infections for a total of 85 catheters in situ
- The gentamicin/heparin lock continued to be utilised as a recommended means to reduce CRB and exit site infections rates (KDOQI, 2006)
- A gentamicin/normal saline lock used for the first week post insertion has reduced the risk of bleeding with minimal impact on lumen patency
- Potential for emergence of antimicrobial resistance (CARI, 2012) - random gentamicin levels of <0.5 mg/L indicates toxicity is unlikely

Future plans

- Vascular Access Clinic will continue
- Quarterly Nephrologist/Vascular Surgeon meeting will continue
- VA PD group will continue to produce the quarterly newsletter for staff
- All vascular access protocols have been revised to be in line with best practice

SUMMARY

- Almost all performance measures are met with vascular access; primary AVF & AVG rates are above national average, infection rates extremely low for fistulae, grafts & catheters, and access survival is excellent.
- One area to address is the creeping increase in thrombosis rates; though these are well managed and not impairing access survival.

7. Peritoneal Dialysis

Claire Cuesta

Peritoneal dialysis was used to treat 23% of all dialysis patients in St George compared to 19.6% reported in the 37th Annual ANZDATA report (2014).

A total of 75 patients were on PD in 2015 (including hospital IPD) compared to 85 in 2014. In December 2015, the proportion of patients receiving automated peritoneal dialysis (APD) was 93%, and the proportion of continuous ambulatory peritoneal dialysis (CAPD) was 7%. Our APD population continues to be above the proportion reported by ANZDATA of 63%.

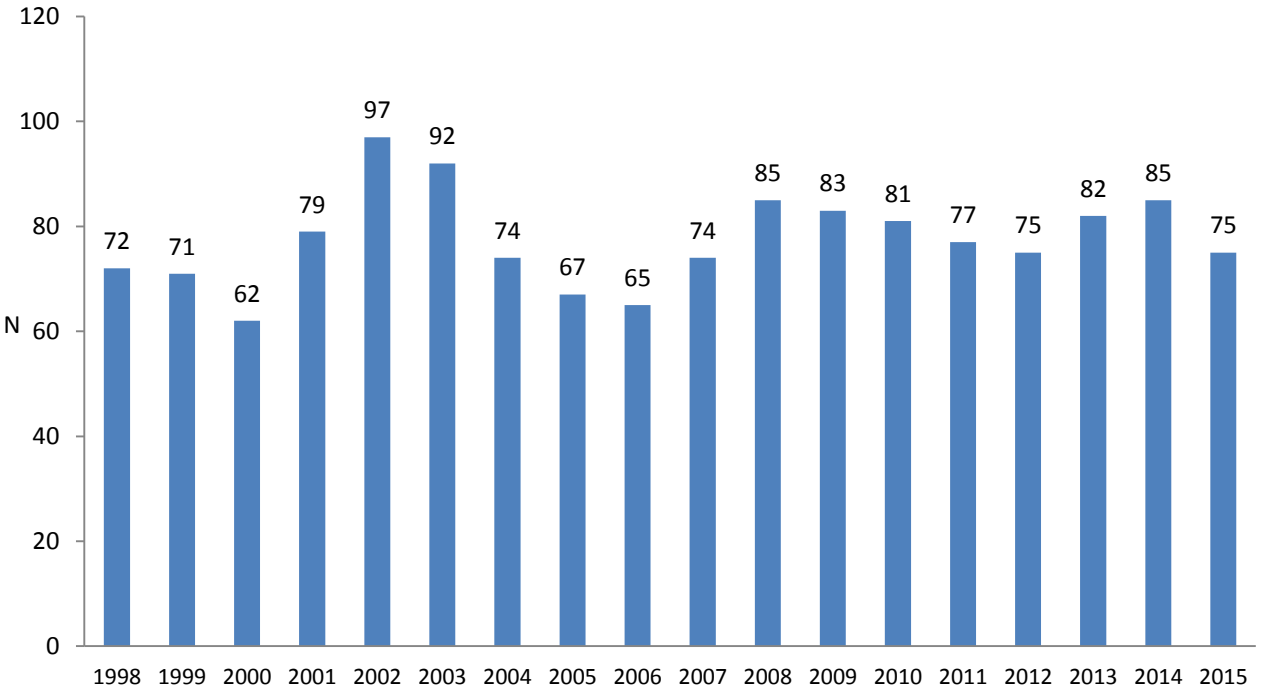


Figure 31. Total persons (prevalent and incident) on peritoneal dialysis

APD	*ANZDATA 63% (1448/2306)*	*St George 93% (50/54)*
CAPD	*ANZDATA 37% (858/2306)*	*St George 7% (4/54)*

PD patient flow

PD patients December 31st 2014		58
In		
New Patients	17	
Transfer from another hospital	0	
Returns from HD	2	
On hospital IPD	2	
Returns from dialysis break	0	
In Subtotal		**21**
Out		
Transplants	9	
Transfer to other units/overseas	2	
Transfer to Home Haemodialysis	0	
Temporary Transfers to Haemodialysis	2	
Permanent Transfers to Haemodialysis	7	
Return of renal function	1	
Withdrawal from dialysis	2	
Deaths on PD	2	
Out Subtotal		**25**
Net loss	**4**	
PD patients December 31st 2015		**54**

Table 12. PD Patient Flow

KPIs

The benchmarks for peritoneal dialysis are mostly set or established by ANZDATA, CARI, KDOQI and ISPD. For outcomes without set benchmark, results are compared to previous year's audits.

1. **Biochemical targets**

Parameter	Target	Apr 14	Oct 14	Apr 15	Oct 15	ANZDATA 14
Corr Ca	2.1-2.4 mmol/L	40	38	56	49	-
PO4	0.8-1.6 mmol/L	42	27	43	46	43
$CaPO_4$	<4.0 mmol/L	31	34	46	43	60
Albumin	33-48 g/L	30	29	35	35	-
PTH	7-45 mmol/L	63	69	69	74	-

Table 13. Biochemical Targets

- Serum Calcium
  - An improvement from previous year is 49% of patients achieved the target for serum corrected calcium in October 2015. The ANZDATA benchmark is for uncorrected calcium only.
  - 54% of patients have serum Ca level 2.2-2.4 in October 2015. The median calcium result is 2.29 (CI 2.27, 2.4); more have mild hypercalcemia and higher CaPO4 product than desired.

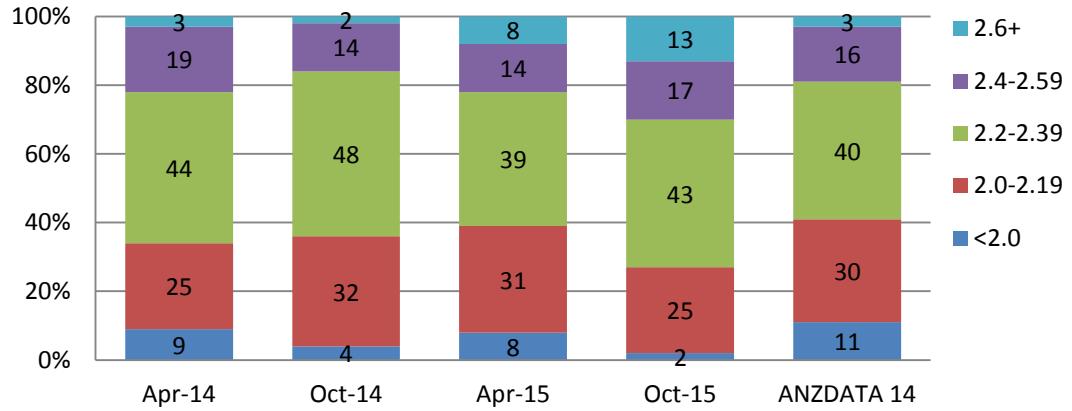


Figure 32. Serum Calcium

- Phosphate
  - In October 2015, 45% of patients were within the target for serum phosphate matching the national data (ANZDATA). The median phosphate result was 1.75 mmol/L (CI 1.65, 1.93)

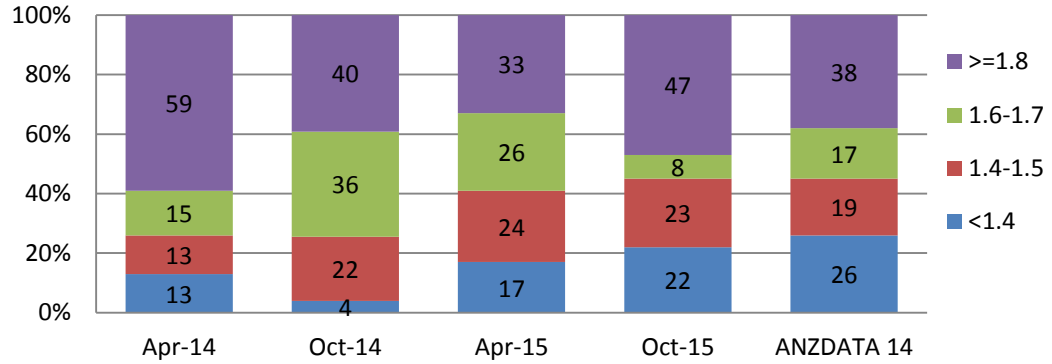


Figure 33. Serum Phosphate

- Calcium Phosphate Product
  - Our profile for Calcium x phosphate product in October 2015 did not match the national data. The median calcium x phosphate product is 4.45 (CI 4.15, 4.9)

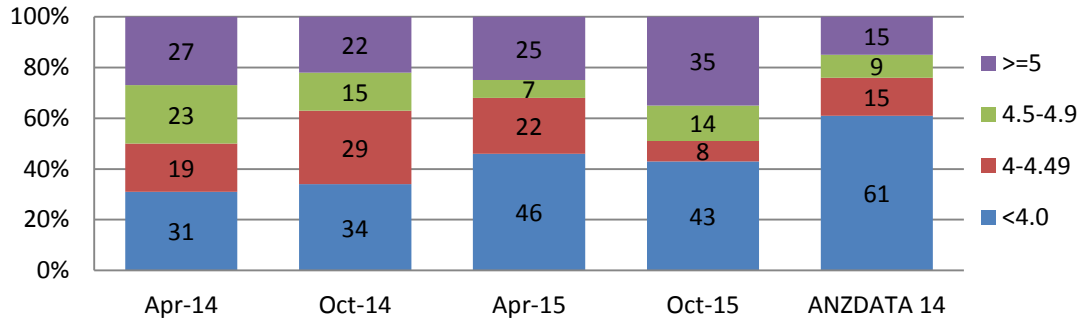


Figure 34. Calcium x Phosphate Product

- Albumin
  - 35% of PD patients had albumin level within 33-48 g/L in 2015, an improvement from previous year's result. 33% of PD patients had albumin level 30-32 g/L and median albumin level was 31 g/L (CI 29, 32). The slight Improvement in nutritional status of PD patients possibly correlates with the 6-monthly dietitian review established in 2015 which remains a work in progress.

- PTH
  - In October 2015, 74% of PD patients had PTH 7-45 mmol/L, another improvement from previous year's result of 69%. The median PTH result in October 2015 was 26.4 mmol/L (CI 29, 46).

2. **Haematological targets**

- Haemoglobin
  - 53% achieved our target of 100-120 g/L in October 2015
  - In October 2015, 86% of PD patients with Hb <100 were receiving erythropoiesis stimulating agents (ESA). 40% of the patients with high Hb (>120) were also receiving ESA. These patients had reduced ESA dose or frequency. 28% of patients who had Hb below 100 g/L had iron studies below the target range (ferritin 200-800 ug/L and transferrin 20-50%).

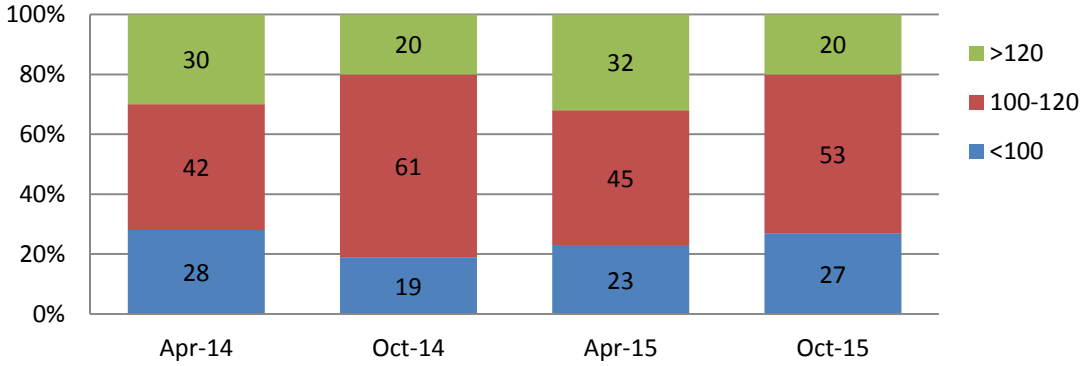


Figure 35. Haemoglobin in Peritoneal Dialysis patients

- HbA1c (Glycosylated Haemoglobin)
  - 50% of peritoneal dialysis patients had diabetes in October 2015. All diabetics were screened for HbA1C with the median result of 6.6% (CI 6.3, 7.3, minimum 5.4%, maximum 9.8%) and 73% had results below 7, an improvement from previous year.

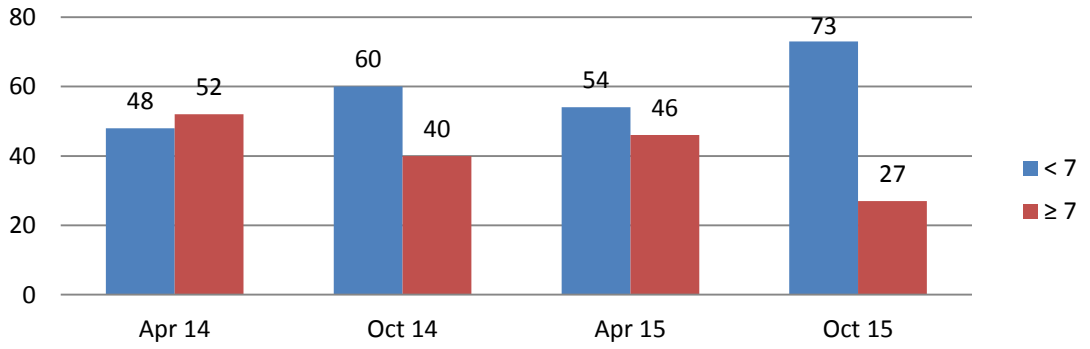


Figure 36. HbA1c results in PD patients

- Lipids
  - 67% of PD patients (N=35) in October 2015 were considered high-risk, these include patients having or suspected of having diabetes, coronary artery disease, cerebrovascular disease and peripheral vascular disease. Lipid studies were collected for 80% of high-risk PD patients. Cholesterol results improved in 2015 and lipoproteins remain stable.

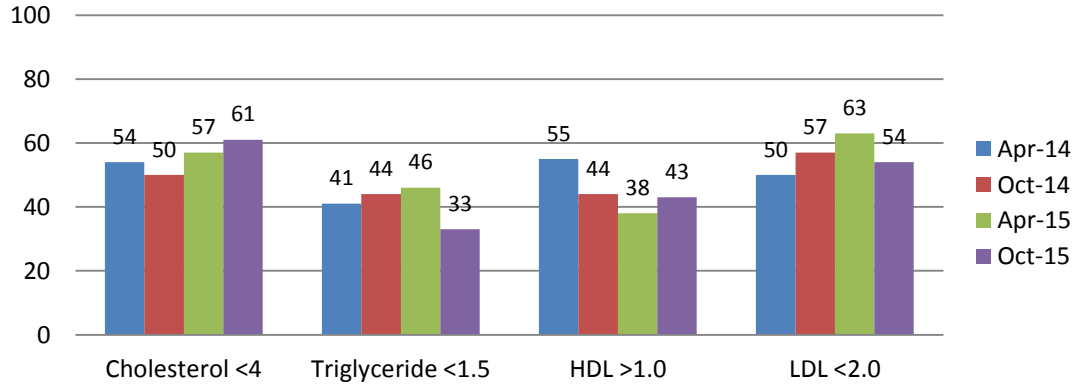


Figure 37. Lipids within normal limits in high risk patients only

- Iron
  - Iron replete refers to ferritin levels between 200-800ng/mL as well as iron saturation between 20-50%. 56% of PD patients were iron replete in October 2015 and median ferritin was 349 ug/L (CI 332, 528), median transferrin was 22.3% (CI 23, 29). Our iron studies profile in 2015 is better than the national data (ANZDATA 2014)

Parameter	Target	Apr 14	Oct 14	Apr 15	Oct 15	ANZDATA 14
Ferritin	200-800 ug/L	48	48	61	52	52
Transferrin	20-50%	70	68	75	73	68

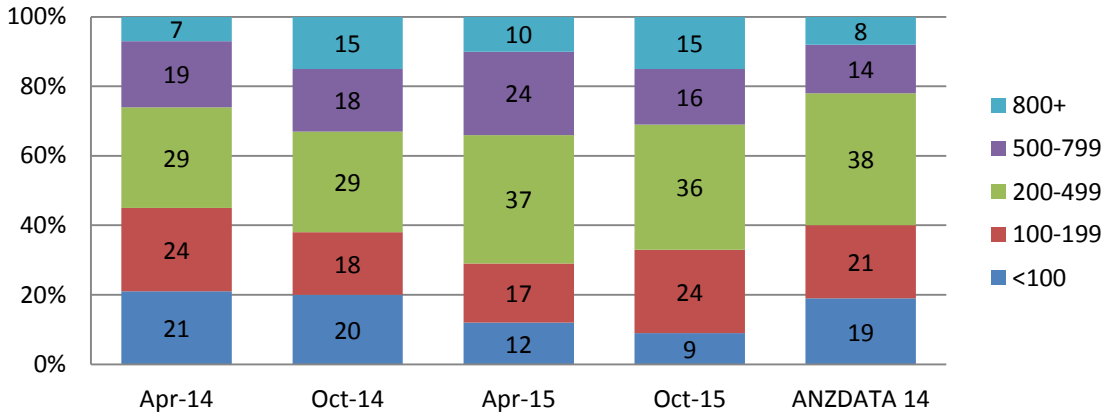


Figure 38. Ferritin

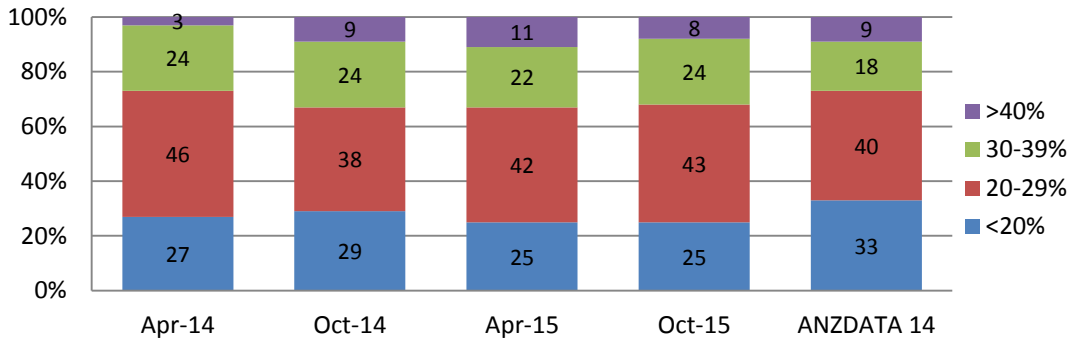


Figure 39. Iron Saturation (Transferrin)

3. **Dialysis Adequacy**

- Improvement was seen over the audit periods for peritoneal dialysis adequacy using solute clearance measurements of:
  - Kt/V – Benchmarked against the KDOQI and ISPD target of at least 1.7 per week. In October 2015, the median Kt/V was 2.10 (CI 2.05, 2.4, min 1.08, max 4.21)
  - Creatinine clearance – Benchmarked against the CARI target of 60 L/week/1.73 m^2 in high and high-average peritoneal transporters and 50 L/week/1.73 m^2 in low-average and low peritoneal transporters. In October 2015, mean creatinine clearance was 72 L/week/1. 73 m^2 (SD 25.7, min 28.31, max 124.32). 73% of APD patients had creatinine clearance of ≥ 45 L/week/1.73m^2 in 2015, this is the ISPD target for patients on APD.

Parameter	Target	Apr 14	Oct 14	Apr 15	Oct 15
KT/V	≥ 1.7	79	81	85	84
CCL	>50L (L & LA) or >60L (H & HA)	66	58	77	70
CCL	>45L (for APD patients)			79	73

Table 14. Dialysis Adequacy

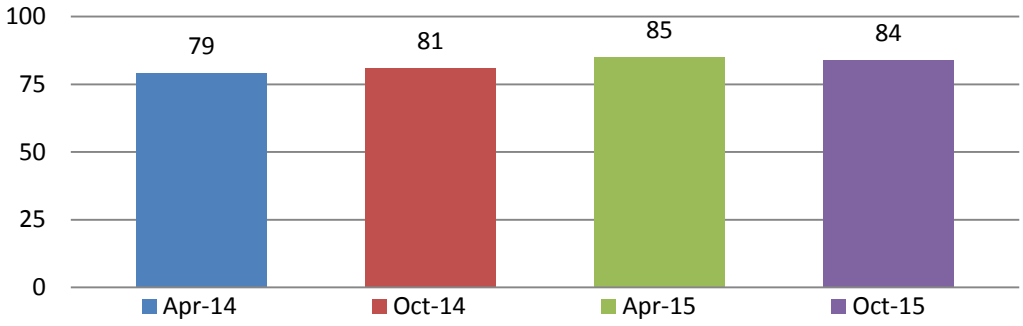


Figure 40. Kt/V ≥ 1.7

4. **Patient and Technique Survival**

- The 5-year PD patient and technique survival data from 2009-2014 were provided by the ANZDATA registry. The 5-year patient survival rates for those on PD for more than a year were significantly better than the national rates for both Australia and New Zealand.

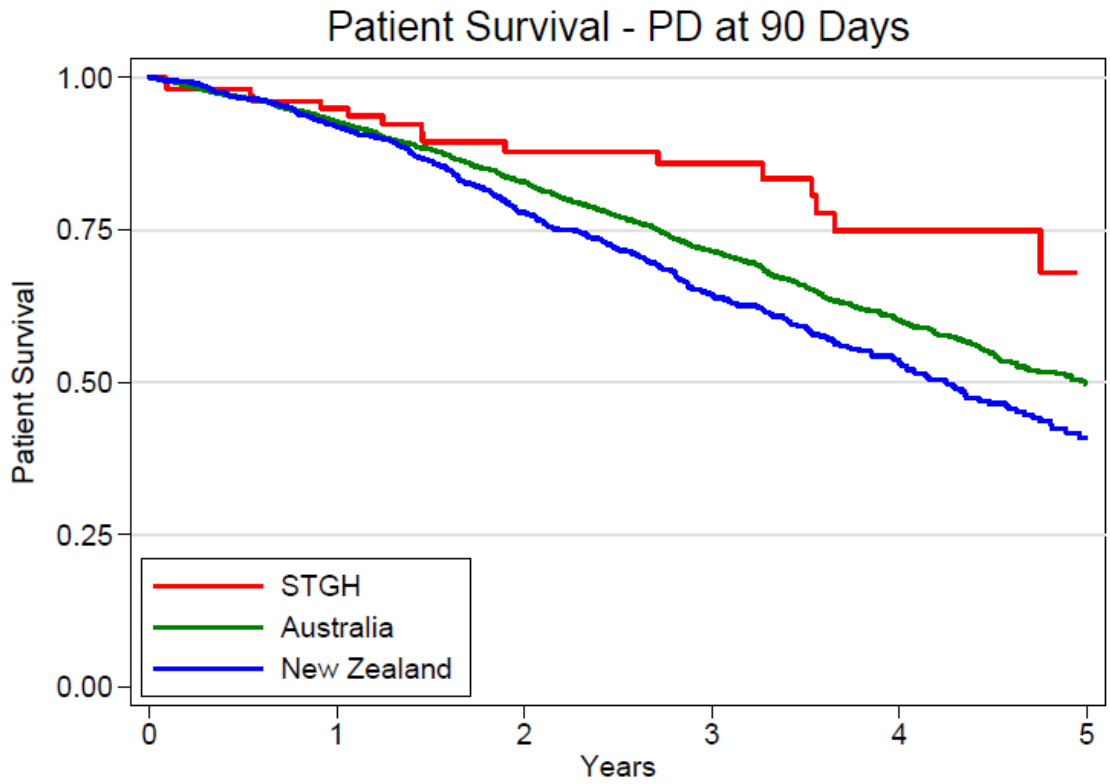


Figure 41. Patient survival – PD at 90 days.

	STGH		Australia		New Zealand	
Time	n	% Survival (95% CI)	n	% Survival (95% CI)	n	% Survival (95% CI)
0	110	100.0	3864	100.0	1221	100.0
3 months	101	98.1 (92.7-99.5)	3506	98.2 (97.8-98.6)	1142	99.0 (98.2-99.4)
6 months	97	98.1 (92.7-99.5)	3179	96.7 (96.1-97.2)	1051	96.6 (95.4-97.5)
1 year	82	94.9 (88.2-97.9)	2517	92.8 (91.8-93.6)	879	91.8 (90.0-93.3)
2 years	52	87.9 (78.3-93.4)	1506	82.9 (81.4-84.3)	549	77.9 (75.0-80.5)
3 years	41	85.9 (75.5-92.1)	815	71.4 (69.3-73.4)	328	64.4 (60.7-67.8)
4 years	22	74.8 (60.0-84.9)	411	60.1 (57.4-62.8)	169	53.4 (49.1-57.4)
5 years	9	68.0 (47.9-81.7)	139	49.8 (46.2-53.2)	53	40.9 (35.6-46.1)

Table 15. Patient survival – PD at 90 days. ANZDATA individual hospital report 2009-2014 (Table 23)

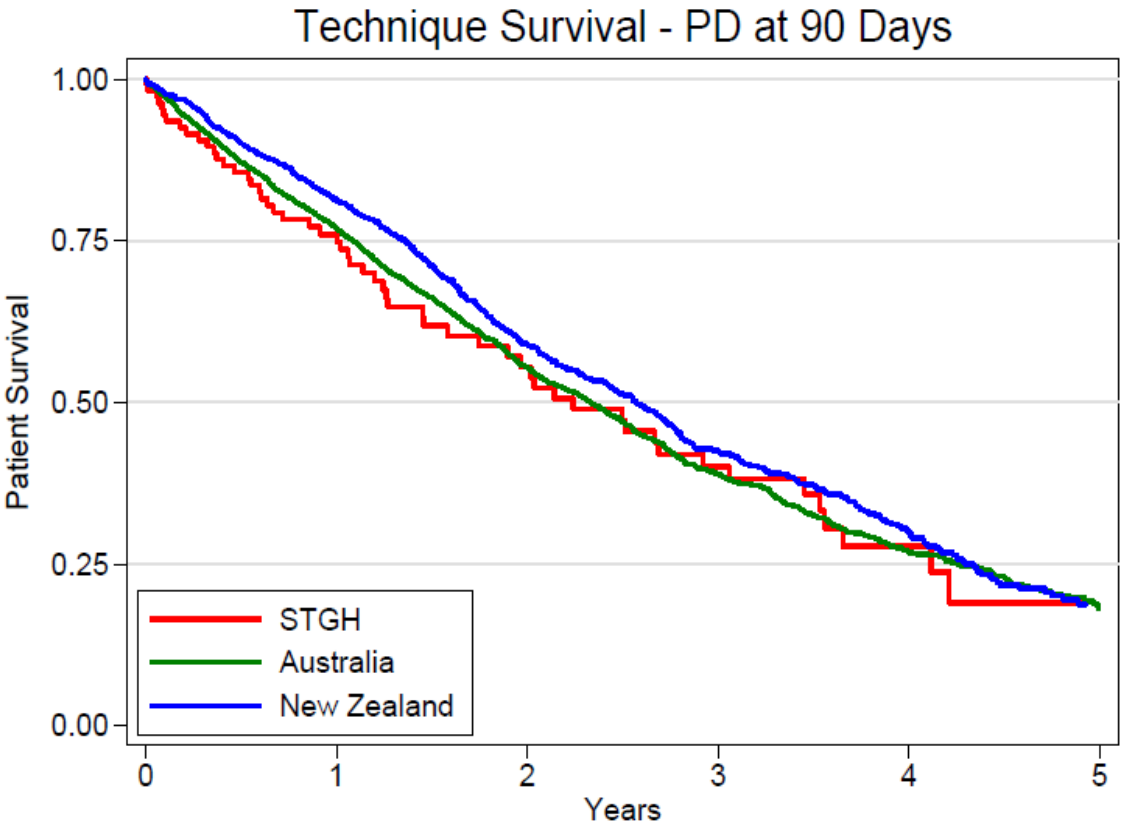


Figure 42. Technique survival – PD at 90 days.

	STGH		Australia		New Zealand	
Time	n	% Survival (95% CI)	n	% Survival (95% CI)	n	% Survival (95% CI)
0	110	100.0	3864	100.0	1221	100.0
3 months	94	91.5 (84.3-95.5)	3326	93.2 (92.4-94.0)	1102	95.6 (94.3-96.7)
6 months	84	85.6 (77.3-91.1)	2861	87.2 (86.0-88.2)	977	90.1 (88.2-91.7)
1 year	66	76.0 (66.3-83.2)	2082	77.0 (75.5-78.4)	779	81.3 (78.8-83.5)
2 years	34	55.4 (43.9-65.6)	989	55.4 (53.4-57.4)	416	58.9 (55.5-62.1)
3 years	22	40.1 (28.4-51.4)	435	38.9 (36.7-41.2)	216	42.4 (38.8-46.0)
4 years	8	27.8 (16.4-40.3)	179	26.8 (24.3-29.3)	99	30.0 (26.2-33.9)
5 years	1	19.0 (8.1-33.5)	49	18.1 (15.3-21.1)	25	18.7 (14.7-23.2)

Table 16. PD Technique survival – PD at 90 days. ANZDATA individual hospital report 2009-2014 (Table 19)

5. **Technique Failure**

- The commonest primary cause of technique failure (ceasing peritoneal dialysis) was "total dialysis/technical failure" at 39%, followed by infection at 29% (ANZDATA 2014). At St George Hospital, the primary cause of technique failure in 2015 was similar to ANZDATA (2014) with "total dialysis/technical failure" being the main cause at 89%. These were due to abdominal surgeries, pleuro-peritoneal leak, fractured catheter and membrane failure resulting in inadequate solute clearance/fluid ultrafiltration.
- Nine patients were transferred to haemodialysis either temporarily or permanently in 2015. One patient transferred to haemodialysis for psycho-social reason due to inability to manage his own care safely. Mean age of patients at time of transfer to haemodialysis was 58 years (min 29, max 75) and mean time on PD at time of transfer to haemodialysis was 36.2 months (min 16.6, max 85.2).

Primary reason for technique failure	2011 n=11	2012 n=9	2013 n=12	2014 n=17	2015 n=9	ANZDATA 2014
Infective	18 %	22%	30%	23%	0%	29%
Total Dialysis/Technical Failure (abdominal pain, inadequate dialysis, leaks, surgery, mechanical, medical)	73%	78%	60%	60%	89%	39%
Social (unable to manage self-care safely)	9%	0%	10%	17%	11%	18%
Other causes or unreported cases	0%	0%	0%	0%	0%	13%

Table 17. Primary reason for technique failure

6. **PD-related Infection rates**

- Peritonitis episodes and rates
  - 2015 peritonitis rate results continue to surpass the national benchmark. The St George peritonitis rate over a 3 year period from 2013–2015 improved to 1/88 months.
  - 85% (46/54) of patients on peritoneal dialysis in 2015 were peritonitis-free
  - The average time on dialysis for current patients who have had peritonitis was 44.6 months, and for those who are peritonitis free was 27.2 months
  - In 2015, 7% of our patients could expect peritonitis in any one year compared to 46% 10 years ago. The proportion of peritoneal dialysis patients who were 3 years peritonitis-free was at 64%. This was a slight improvement from last year of 59% and better than the ANZDATA result of 40%.
  - ANZDATA 2014 reports the proportion of APD patients who were 3 years peritonitis-free was at 50%. St George in 2015 was better at 64%.
  - The number of episodes of peritonitis and the number of patients who had peritonitis in 2015 remained very low.

	STGH			Australia		
Year	Episodes	Years	Rate (95% CI)	Episodes	Years	Rate (95% CI)
2009	33	57.02	0.58 (0.40-0.81)	1253	2160.46	0.58 (0.55-0.61)
2010	16	56.22	0.28 (0.16-0.46)	1116	2101.88	0.53 (0.50-0.56)
2011	15	55.75	0.27 (0.15-0.44)	876	2008.59	0.44 (0.41-0.47)
2012	6	58.39	0.10 (0.04-0.22)	809	2116.71	0.38 (0.36-0.41)
2013	10	56.76	0.18 (0.08-0.32)	882	2213.34	0.40 (0.37-0.43)
2014	9	64.06	0.14 (0.08-0.32)	864	2310.9	0.37 (0.35-0.40)
Overall	89	348.2	0.26 (0.28-0.40)	5800	12911.86	0.45 (0.44-0.46)

Table 18. Rates of peritonitis (per patient-year) ANZDATA Individual Hospital Report 2009-2014

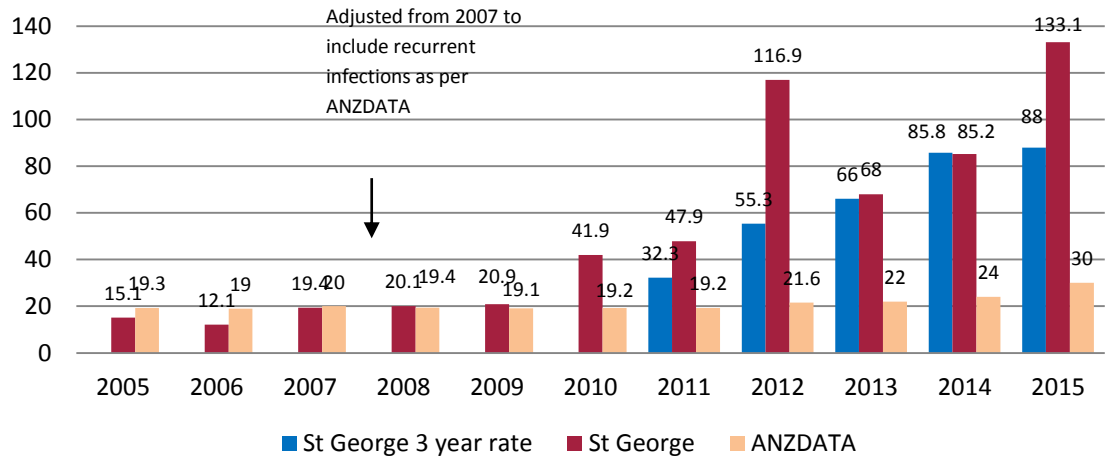


Figure 43. Patient months per episode of peritonitis

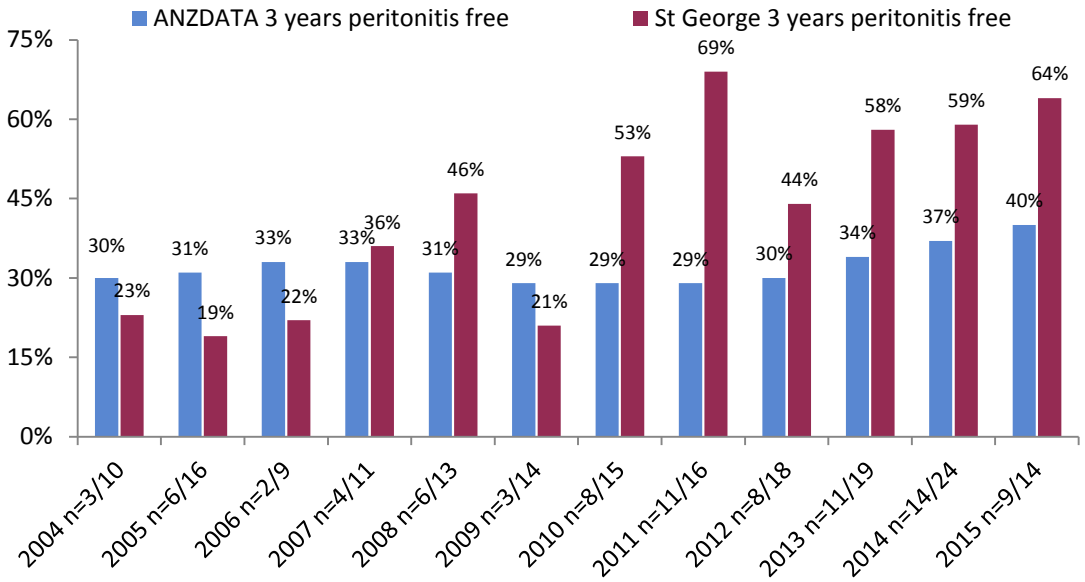


Figure 44. Proportion of patients 3 years peritonitis free

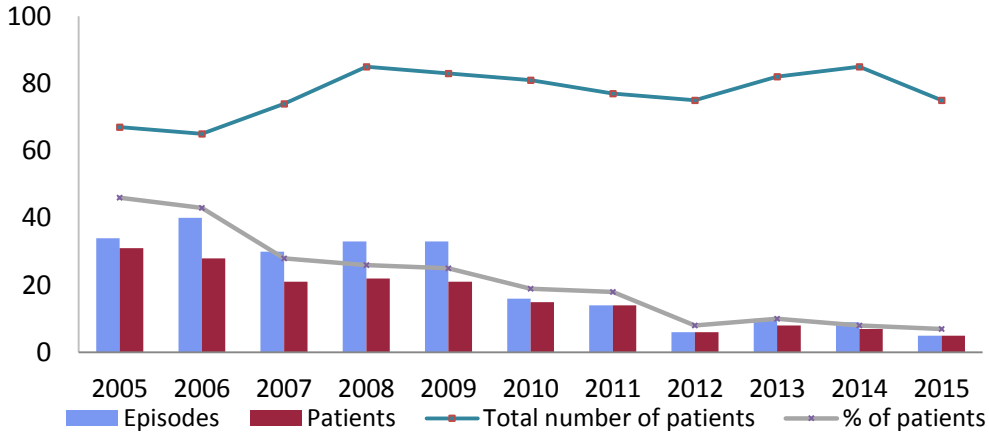


Figure 45. Proportion Peritonitis Episodes

Peritonitis episodes

	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
Total patients	67	65	74	85	83	81	77	75	82	85	75
Peritonitis episodes	34	40	30	33	33	16	14	6	10	9	5
Patients with at least 1 episode of peritonitis	n=31 46%	n=28 43%	n=21 28%	n=22 26%	n=21 25%	n=15 19%	n=14 18%	n=6 8%	n=8 10%	n=7 8%	n=5 7%
Patients with at least 1 episode of Exit site infection	n=16 24%	n=14 22%	n=12 16%	n=12 14%	n=13 16%	n=16 20%	n=16 21%	n=11 15%	n=3 4%	n=8 9%	n=4 5%

Table 19. Peritonitis episodes

- Change of treatment as a result of peritonitis
  - The peritonitis data was measured to determine the rate of transfer to haemodialysis as a direct result of peritonitis. No patient was transferred permanently or temporarily to haemodialysis as a result of peritonitis in 2015

Change in treatment as a direct result of peritonitis (%)	2007	2008	2009*	2010*	2011*	2012*	2013*	2014*	2015
Interim Haemodialysis	10	6	0	6	0	0	0	0	0
Permanent Haemodialysis	13	18	15 (5/33)	24 (4/17)	14 (2/14)	16 (1/6)	30 (3/10)	33 (3/9)	0
Catheter removed	20	24	15 (5/33)	41 (7/17)	14 (2/14)	16 (1/6)	30 (3/10)	33 (3/9)	0

**includes recurrent infections*

Table 20. Change of treatment as a result of peritonitis

- Main causative organism for peritonitis infections in 2015 was gram negative organisms.
  - There were no MRSA or fungal peritonitis infections since 2014.

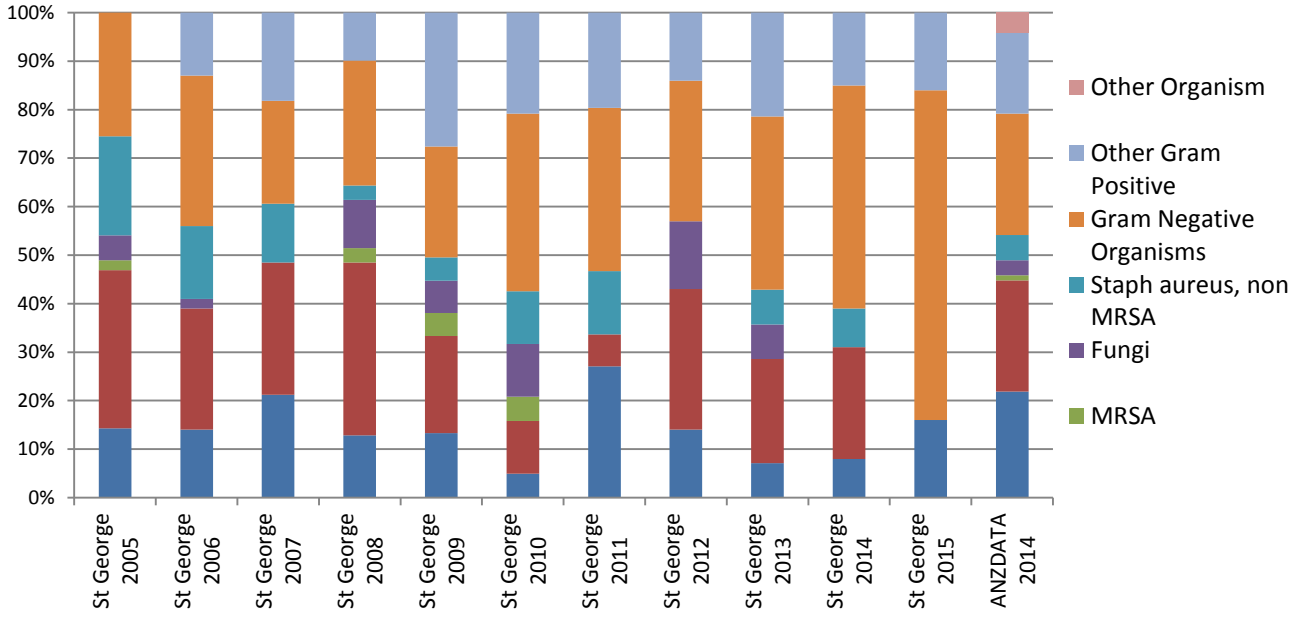


Figure 46. Peritonitis Causative Organism

- Exit Site Infections (ESI)
  - ANZDATA does not collect data on exit site infections; therefore we can only compare to previous year's result.
  - 2015 exit site infection rate improved to 1/166.3 months compared to 1/85.2 months in 2014. Exit site infection rate over a 3 year period from 2013–2015 also improved to 1/117.41 months from 1/79.4 months in 2012-2014.
  - There was no fungal exit site infection and gram positive organism was the commonest cause of exit site infection in 2015.
  - 5% of PD patients had exit site infection in 2015 and was lower than last year at 9%.

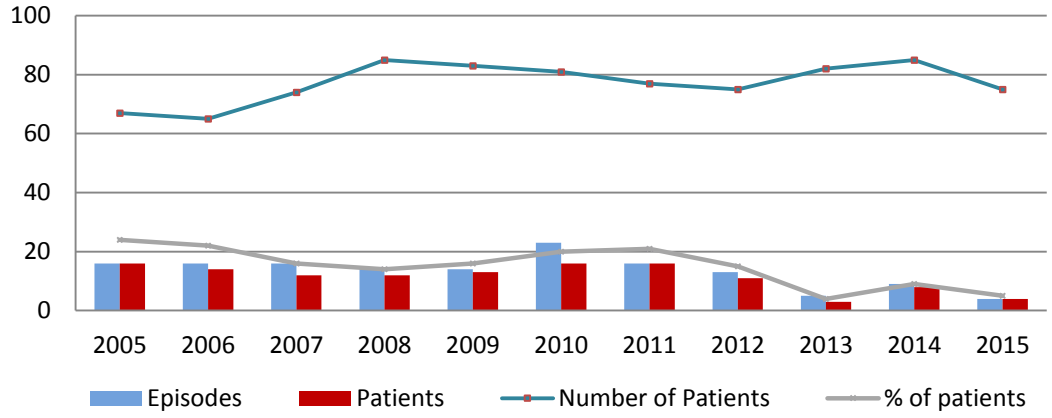


Figure 47. Exit Site Infection Episodes

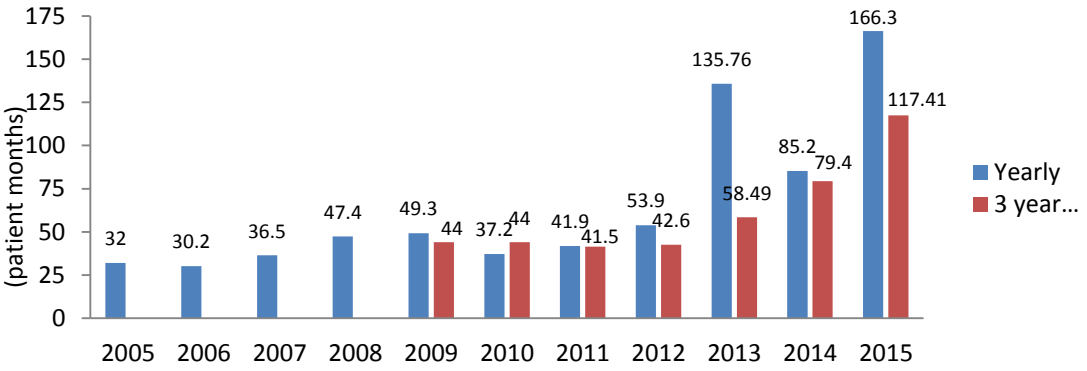


Figure 48. Exit site infection rate per patient months

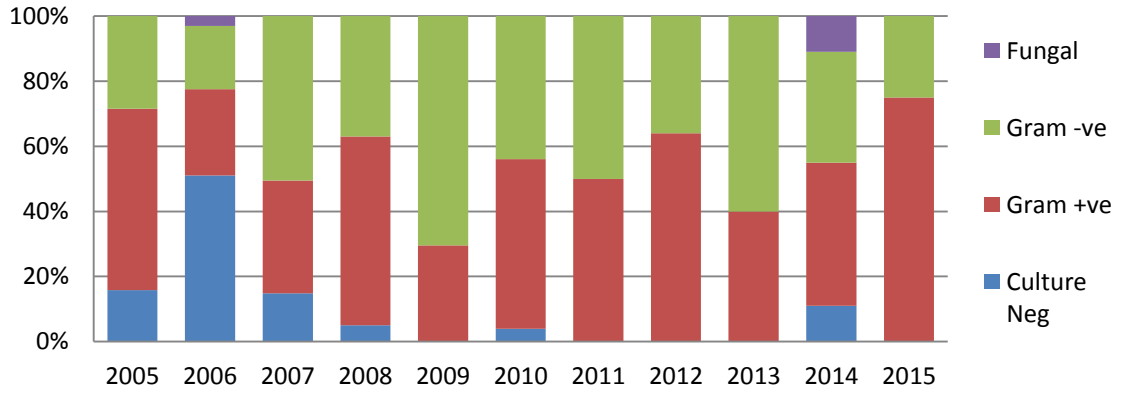


Figure 49. Exit site infection causative organisms

7. **Change of Modality and Deaths**

- We have fewer deaths and transfers to haemodialysis and more transplants than the national average.

	St George 2011 (%)	St George 2012 (%)	St George 2013 (%)	St George 2014 (%)	St George 2015 (%)	ANZDATA 2014 (%)
Transplants	2	5	4	11	17	10
Changed to haemodialysis	17	16	15	26	17	22
Deaths	7	9	8	5	4	11

Table 21. Change of Modality and deaths

Note: The rates are calculated using the total number of patients on peritoneal dialysis at 31.12.2015 (n=54), the method used by ANZDATA to calculate their rates.

Summary

1. ANZDATA results are the benchmark used for comparison with St George results.
2. APD continues to be the preferred PD therapy.
3. There are gradual improvements with iron management, phosphate control and nutrition in 2015 though CaPO4 product may be running too high.
4. All outcome measures of patient survival, peritonitis, change of modality and deaths are better than national outcomes.
5. The percentage of patients who are peritonitis-free at 3 years was 64% in 2015. This is higher than the ANZDATA result at 40%.
6. Combined peritonitis and exit site infection rates improved in 2015 and remained lower since data collection in 2005, while the total numbers of patients were stable.
7. Changed to haemodialysis rate in 2015 was lower at 17% than the national rate of 22% with "total dialysis and technical failure" as the main cause. The transition from PD project from last year helped with the early identification of impending PD failure and is being integrated into PD practice.
8. We will monitor whether we are following our protocol of CT scans to detect sclerosing peritonitis for patients on PD for 5 years or greater as part of the PD KPIs.

Research activities

- St George PD unit is participating in PDOPPS (Peritoneal Dialysis Outcomes and Practice Pattern Study), an international study to identify practice patterns that lead to better care and improved clinical outcomes for PD patients. Data entry and recruitment of new and prevalent replacement patients for the study are continuous. There are 31 PD patients who consented and 22 active patients to the study at present. 9 consented patients were withdrawn from the study due to kidney transplantation, transfer to HD or death
- The "Transition from PD" project is to support a planned patient transition to haemodialysis or conservative care from peritoneal dialysis. A structured risk assessment and management pathway for all PD patients is completed in 2015. Pending approval is the protocol developed to identify potential PD failure early and initiate timely implementation of processes i.e. vascular access creation or renal supportive care referral and patient education/support.

Clinical and QA activities

- Patient satisfaction survey was completed in 2015. 60% of PD patients responded. Survey questions and responses were divided into 3 sections:
  - Overall management of care – All responders were satisfied with the support and clinical advice from the PD nurses. They also found the PD nurses to be kind and courteous to them and their family, and were approachable, easy to contact and provide timely response to their concerns.
  - Educational needs – All responders were satisfied with the PD training/retraining and periodic education (PD newsletter) they received from the PD nurses. Half of them believed they will benefit from more education sessions but only very few would be interested to attend. Less than half of the responders were able to use computers.
  - Open questions to encourage suggestions- majority of the patients praised the PD nurses for their excellent service and some patients requested for more information on average time on PD and transition from PD process.

  Recommendations that came out from the survey are:

  1) Roll out Transition from PD pathway checklist and protocol
  2) Modify Pre-PD education to include average time on PD
  3) Continue the 6 monthly newsletter to PD patients
  4) Continue 1:1 PD training and PD retraining as needed
  5) Discontinue "People on PD" support group and annual PD patient meetings
  6) Repeat the survey in 2018

- Continue the effective initiatives and projects i.e. clinic review checklist project, nurse-facilitated iron management, bi-annual patient newsletters, clinic review, 1:1 comprehensive training and retraining program, outpatient follow-up and support, and pre-PD assessment/education.
- Continue to support the dietitian with all the strategies developed to improve patient nutrition i.e. Promote 6-monthly dietitian review to high-risk PD patients, regular clinical meetings, shared patient tracking database and improved referral process.
- Continue the 2-yearly review of PD policies to keep in line with ISPD best practice guidelines.

8. Transplant

Tania Burns and Kylie Turner

Aim

The aim of this report is to provide data about patients who have had renal transplant and are under the care of a St George Hospital (SGH) nephrologist. It will also provide data about patients who are currently on the National Organ Matching Service (NOMS) transplant waiting list, renal donors and the transplant assessment clinic. Performance measures in the first 12 months post-transplant are:

1. Rates of new onset diabetes after transplant (NODAT) <15%
2. Rates of BK nephropathy <5%
3. Rates of BK viraemia <15% (where BK viraemia defined as >850copies per ml)
4. Rates of CMV viraemia <30% (CMV viraemia defined as PCR CMV measurement > 500 copies/mL)
5. Rates of CMV infection <30%
6. Rates of biopsy proven acute rejection <15%
7. Rates of post-transplant surgical complications < 5% (urological, vascular and wound)

Overview

During 2015 there were 208 patients under the care of SGH nephrologists with functioning renal transplants.

- 197 of these were primary grafts and 11 were second grafts
- 52 of these patient received grafts from live donors
- 15 were pre-emptive transplants

At 31/12/15 there were 38 SGH dialysis patients waiting for a kidney transplant and 12 patients with CKD completed work up and assessed as suitable for transplant.

During 2015

- 24 patients received a kidney transplant and 3 received a combined kidney pancreas. 2 live donors (1 through paired kidney exchange)
- 2 patients died with functioning grafts.
- 4 patients had graft failure and returned to dialysis.
- 8 patients transferred out, and 3 transferred in
- A total of 63 patients were reviewed at the transplant assessment clinic by a nephrologist from Prince of Wales hospital, the transplanting unit.

Transplant patient flow

1/1/15 SGH transplant patients registered with ANZDATA	178
In	
Transplanted	27
Transferred care in	3
In Subtotal	**30**
Out	
Transferred care out	8
Died	2
Graft failure transferred back to dialysis	4
Out Subtotal	**14**
Net Gain	**16**
31/12/15 SGH transplant patients	**194**

Table 22. Transplant Patient flow

Benchmarks to 12 months post-transplant

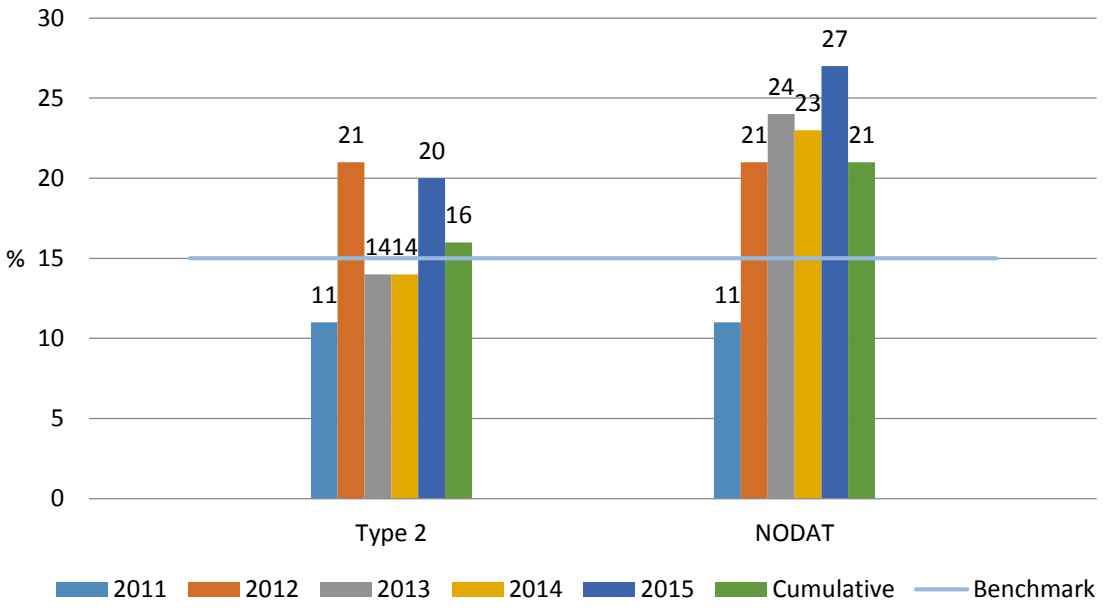


Figure 50. Rate of diabetes in first 12 months after transplant

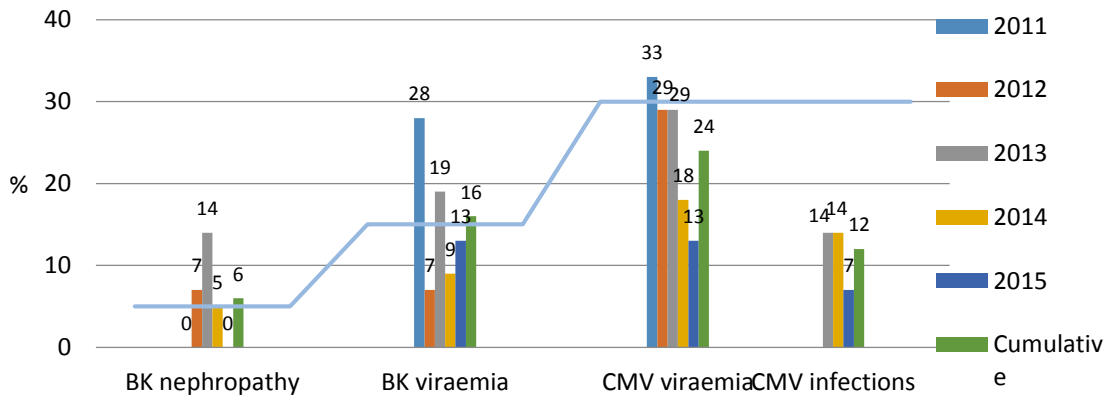


Figure 51. Rate of infection in first 12 months after transplant

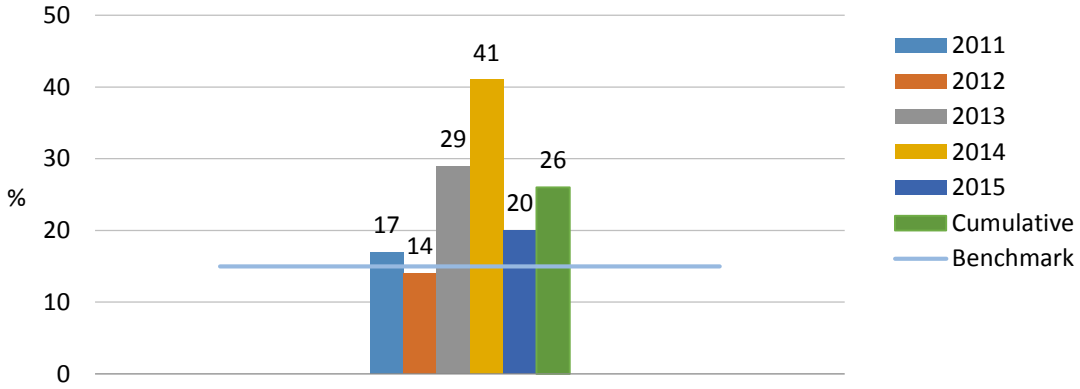


Figure 52. Rate of biopsy proven acute rejection in first 12 months after transplant

Most cases are 'borderline rejection' in the early post-transplant period

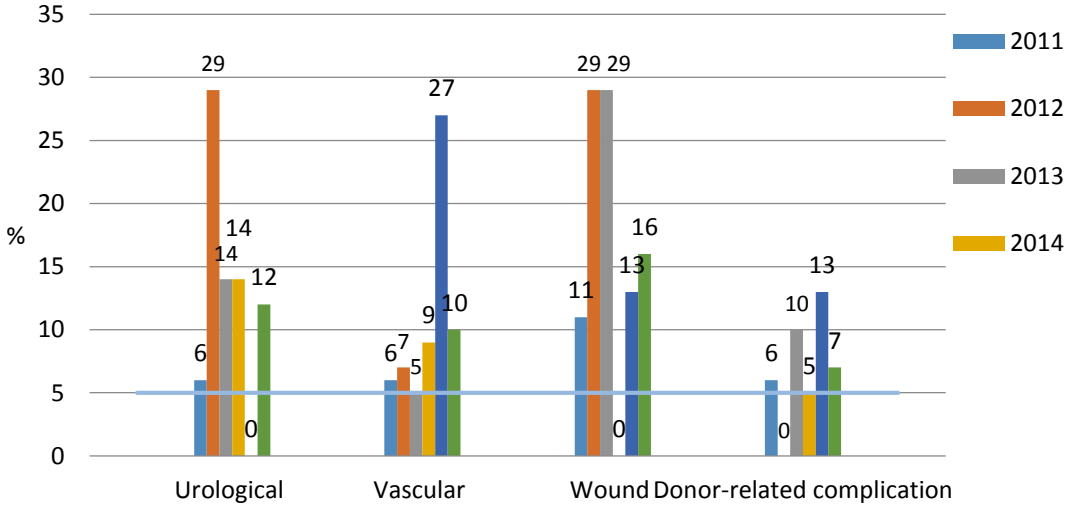


Figure 53. % of patients with post transplant complications Nov 2007 – Dec 2014

27% of patients transplanted in the previous 12 months (4/15) had vascular complications:

- One returned to theatre Day 0 for repair of 2 venous bleeders.
- One returned to theatre Day 13 for evacuation of 1.5L haematoma and subsequently died.
- Two relate to inadvertent cutting of donor organ vessels during dissection.

Patient & Graft survival 2009-2014 (n=82) from ANZDATA reports

Overall outcomes slightly better for LD than DD transplants
More recipients with IHD (30 vs 24%) than nationally but other co-morbidities similar

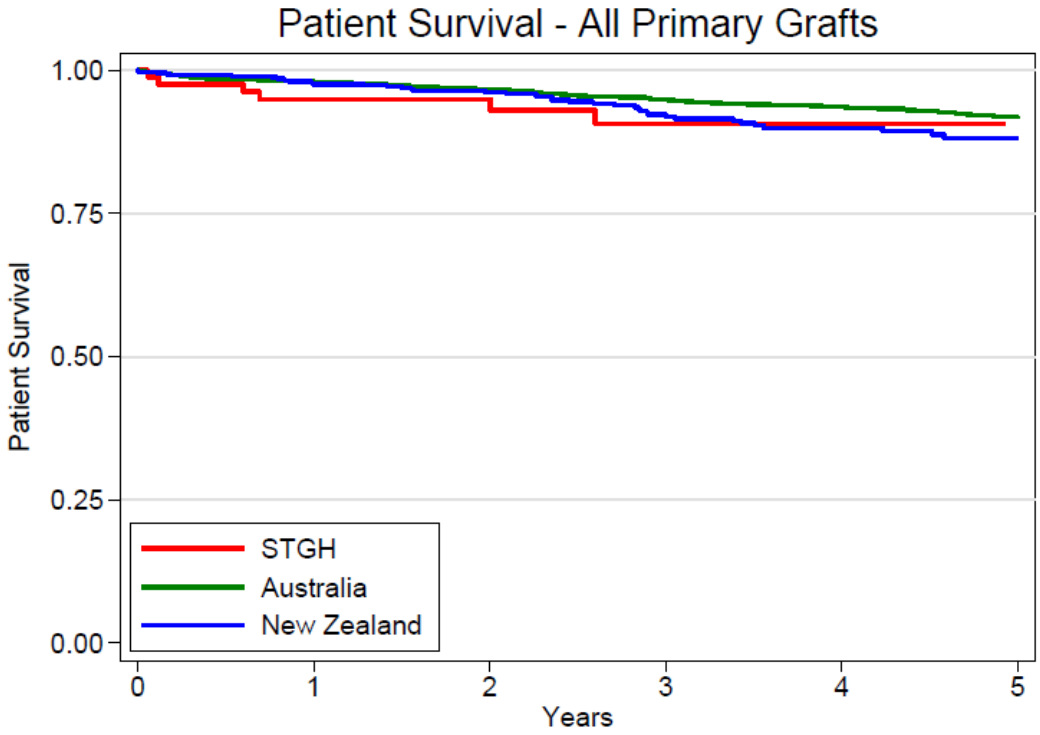


Figure 54. Patient Survival – All primary grafts

	STGH		Australia		New Zealand	
Time	n	% Survival (95% CI)	n	% Survival (95% CI)	n	% Survival (95% CI)
0	84	100.0	3959	100.0	611	100.0
3 months	77	97.6 (90.6-99.4)	3731	99.1 (98.7-99.3)	573	99.2 (98.0-99.7)
6 months	75	97.6 (90.6-99.4)	3544	98.6 (98.1-98.9)	547	99.2 (98.0-99.7)
1 year	69	94.9 (87.1-98.1)	3173	98.0 (97.5-98.4)	479	97.6 (95.9-98.6)
2 years	49	94.9 (87.1-98.1)	2467	96.7 (96.0-97.2)	369	96.2 (94.1-97.6)
3 years	32	90.7 (79.8-95.8)	1804	94.9 (94.0-95.7)	275	91.9 (88.7-94.2)
4 years	24	90.7 (79.8-95.8)	1166	93.6 (92.6-94.5)	177	90.0 (86.3-92.7)
5 years	8	90.7 (79.8-95.8)	544	91.8 (90.4-93.0)	90	88.1 (83.8-91.4)

Table 23. Patient survival for all primary grafts – ANZDATA report table 10

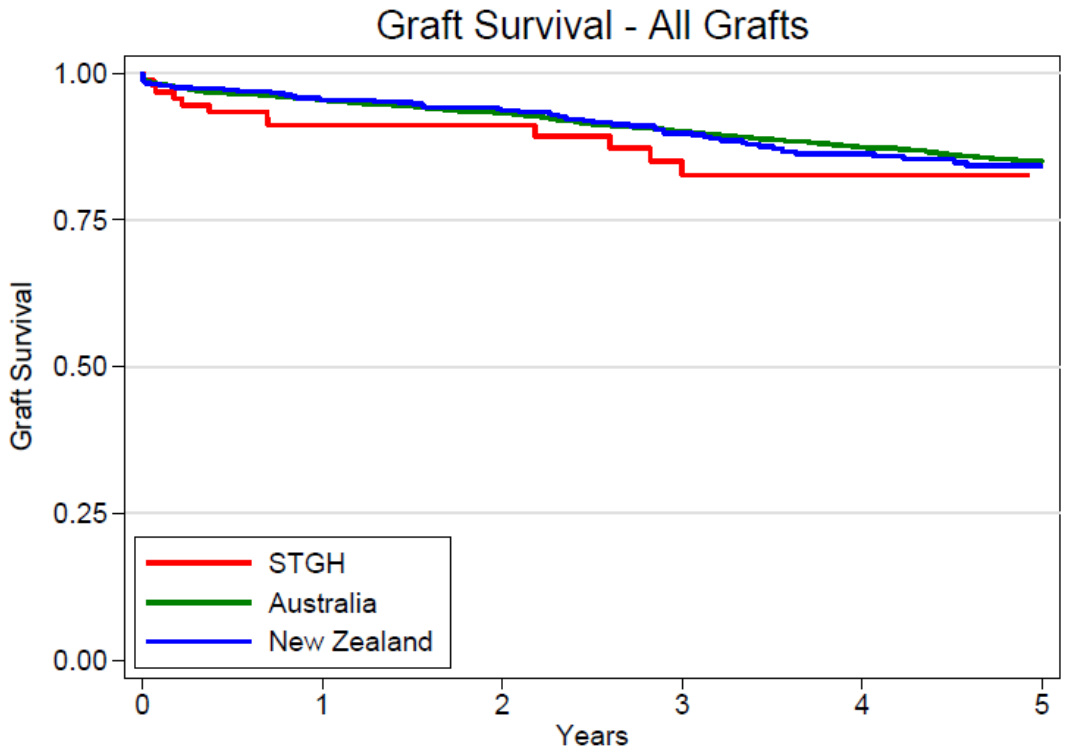


Figure 55. Graft Survival – All grafts

	STGH		Australia		New Zealand	
Time	n	% Survival (95% CI)	n	% Survival (95% CI)	n	% Survival (95% CI)
0	95	100.0	4497	100.0	663	100.0
3 months	84	94.6 (87.5-97.7)	4170	97.4 (96.9-97.8)	611	97.6 (96.1-98.5)
6 months	81	93.5 (86.0-97.0)	3952	96.6 (96.0-97.1)	579	97.2 (95.7-98.3)
1 year	75	91.1 (83.0-95.5)	3504	95.5 (94.8-96.1)	508	95.4 (93.5-96.8)
2 years	54	91.1 (83.0-95.5)	2697	93.2 (92.4-94.0)	392	93.7 (91.3-95.4)
3 years	34	82.6 (70.3-90.1)	1939	90.2 (89.1-91.2)	291	89.8 (86.7-92.3)
4 years	23	82.6 (70.3-90.1)	1241	87.4 (86.1-88.6)	188	86.3 (82.5-89.4)
5 years	8	82.6 (70.3-90.1)	585	85.0 (83.4-86.5)	101	84.2 (79.9-87.7)

Table 24. Graft Survival for all grafts – ANZDATA report table 16

	STGH	Australia	New Zealand
Total Failures	12	434	66
Acute Rejection		58 (13.4)	8 (12.1)
CAN		70 (16.1)	2 (3.0)
Vascular/Technical	3 (25.0)	46 (10.6)	5 (7.6)
Recurrent Disease	2 (16.7)	11 (2.5)	6 (9.1)
Other	3 (25.0)	55 (12.7)	9 (13.6)
Death with Function	4 (33.3)	194 (44.7)	36 (54.5)

Table 25. Cause of graft failure– ANZDATA report table 16

Waiting list data

Age group	NOMS list (Australia)	On dialysis (Australia)	% age group on waiting list	NOMS list (SGH)	Dialysing (SGH)	% age group on waiting list
0-44	431	1524	28%	11	18	61%
45-54	285	1747	16%	15	32	47%
55-64	270	2525	11%	17	44	39%
65+	70	5978	1%	9	155	6%

Table 26. Waiting list data

Summary

- For 2009-2014 patient survival is similar to National average
- For 2009-2014 there was slightly lower DD graft survival, probably not statistically significant, but we will discuss each graft failure in our Unit including death with functioning graft, to ensure there are no factors that need future attention.
- In 2015 rates of NODAT had increased by 4%, higher than the benchmark of 15%.
- Rates of BK nephropathy and BK viraemia, CMV viraemia and CMV infection were lower than the set benchmarks.
- The rate of biopsy proven acute rejection was down to 20% from 41% in 2014.
- All surgical complications remain cumulatively above benchmark but are generally improving:
    - Cumulative Vascular surgical complications remain above the benchmark at 10% but have significantly decreased from 2014 data.
    - Cumulative Urological surgical complications were above the benchmark at 12% but there were none in 2015; wound complications were also increased at 16%.
- An external review of St. George transplant processes in 2016 will hopefully provide further suggestions for improvements
- Overall, outcomes for St. George patients continue to improve and patient and graft survival in the most recent ANZDATA analyses are similar to the national average. We aim to have these rates above national average in the future.

9. Renal Supportive Care Service

Elizabeth Josland and Anna Hoffman

Aim

The aim of this report is to provide data concerning the activity and outcomes of the Renal Supportive Care (RSC) service.

Overview

The renal department has been working closely since 2009 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 Frank Brennan, Hannah Burgess, Maria Chan, Anna Hoffman, Elizabeth Josland, Alison Smyth, Jessica Stevenson, Shelley Tranter, Dr Jan Maree Davis and Prof Mark Brown, comprise the renal palliative care groups and they meet monthly to discuss and implement renal supportive care initiatives.

1. The St George Hospital **Renal Supportive Care Clinic** commenced in March 2009, adding a weekly Sutherland Hospital clinic in January 2014. The St George RSC clinic is staffed by Dr Frank Brennan, a renal advanced trainee registrar, renal supportive care clinical nurse consultants, dietitian, social worker and a research clinical manager.

2. The sixth **Renal Supportive Care Symposium** was held on 21st August 2015. Doctors, nurses and allied health attended. There were over 190 attendees in 2010, 150 in 2011, 100 in 2012, 120 in 2013, 100 in 2014 and 105 in 2015 from around Australia and New Zealand.

3. The inaugural **Renal Supportive Care Masterclass** weekend was held over the 22nd and 23rd of August 2015. Doctors from around Australia and New Zealand were invited to attend. There were 85 attendees.

4. The implementation of a state-wide Renal Supportive Care service through the ACI began its roll out in late 2015. As a one of three Hub training hospitals around NSW, we have successfully conducted two education days and mentored over fifteen visitors to spend time with the Renal Supportive Care team to learn the processes. New staff have been appointed to our team this year and we welcomed Alison Smyth (CNC), Hannah Burgess (social worker) and Jessica Stevenson (dietitian).

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

6. The fifth annual **Renal Memorial Service** was held on April 9th 2015 and was attended by 30 people, consistent with previous year's attendance. This service aims to provide families and friends of past renal replacement therapy (RRT) patients with a supportive environment to commemorate their loved ones and is a unique service in NSW that is coordinated by Hannah Burgess the Renal Supportive Care Social Worker.

Occasions of Service and Outcomes

	St George Clinic Occasions of Service	Sutherland Clinic Occasions of Service	Inpatient Occasions of Service	Home Visits	Phone consultations	Dialysis consultations
Mar 09 – Dec 09	110		Data not collected	0	0	
2010	218		30*	0	0	
2011	403		351	0	15	
2012	498		322	2	64	102
2013	378		511	14	69	207
2014	300	109	415	54	131	225
2015	264	81	692	49	136	405

*(data collection commenced Nov 2010)

Table 27. Occasions of Service

Clinic numbers are divided into St George and Sutherland hospitals; the clinic occasions of service reduced in 2015 (related to clinic closures due to increased demand to provide education and set up the state-wide RSC service during 2015), but dialysis and inpatient consultations have increased rapidly. Table 27 indicates occasions of service for both inpatients and outpatients since the commencement of the service.

Demographics of patients on their first visit to the clinic are tabled below, separated for dialysis and conservative patients. The age of newly referred patients has ranged from 17-99 years with the overall mean age 77 years, diabetes 46%, albumin 35g/L. **Advance care plans are standard practice within the clinic, this includes yearly reviews**.

	Non-dialysis patients	Dialysis Patients
Age (average, yrs)	83	70
eGFR (average)	23	
Diabetic	47%	51%
Dementia	13%	4%
2 or more co-morbidities	52%	49%
Current or former smokers	25%	32%

Table 28. Patient demographics on first clinic visit 2009-2015

There are 3 main categories of patients who use the services of the renal supportive care clinic:

1. Conservative care support
2. Dialysis (or pre dialysis) symptom support
3. Support for those who may be withdrawing from dialysis following a major sentinel event or by other choice.

Inpatient consultation

The service has an average of 57 inpatients occasions of service per month in 2015 which is an increase from 34 in 2014. The average of 5.4 new inpatient referrals per month in 2015 remains consistent with 2014.

Inpatients are predominantly seen by the CNC. The majority of new inpatient referrals continue to be for pain and symptom management.

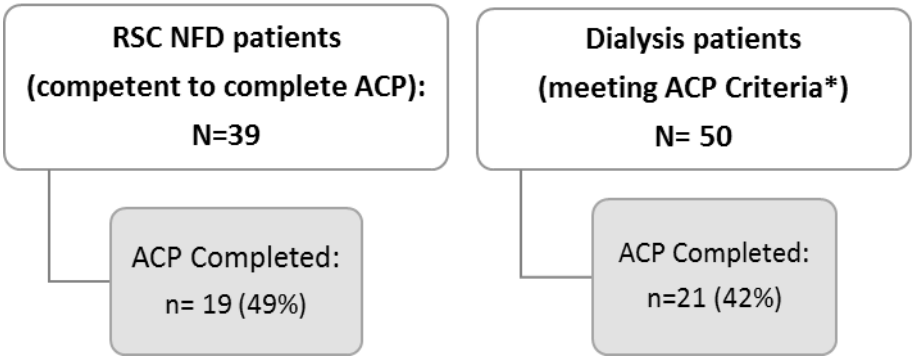
Outpatient services

Telephone consultations commenced in 2012 to assist patients who are too frail to physically attend the clinic. There were 136 phone consultations in 2015.

Home visits by the renal supportive care CNC commenced December, 2012. The CNC attended 49 home visits in 2015. A number of patients were referred to the Calvary Hospital Community Palliative Care Team or their local community palliative care team if they lived out of area, for complex symptom management or if they were approaching end of life.

Advance Care Plans

Advance Care Planning commenced in the Renal Supportive Care clinic in August 2012. As of December 2015, there were 51 current RSC clinic patients who were not for dialysis (NFD). Of these, 39 were competent and 5 were lost to follow-up. 49% (19) of competent patients had an Advance Care Plan (ACP) completed, a further 3 patients have commenced an ACP discussion. These ACP's are sent to the patient's GP and loaded into eMR alerts. ACP's are updated yearly; this update is recorded in eMR. 21 current dialysis patients who met the ACP criteria (as of Dec 2015) have completed an advance care plan, a further 2 patients have commenced an ACP discussion.



**Doctor answered they would not be surprised if patient died (6 or 12 months) OR Predicted 12 month survival <50%*

Figure 56. ACP's completed for current NFD and dialysis patients- as of Dec 2015

Palliative Care Outcome Scale Clinic outcome

Symptom Surveys are conducted at each RSC Clinic visit. 61% of patients had a reduction in total symptom score by the 3rd clinic visit. Pain, Lack of Energy, Poor Mobility, Itch and Difficulty Sleeping were the most prevalent symptoms. By the third visit, the proportion of patients reporting each of these symptoms as severe or overwhelming decreased. 21% of patients reported severe/ overwhelming itch at their first visit, compared to 14% at visit 3.

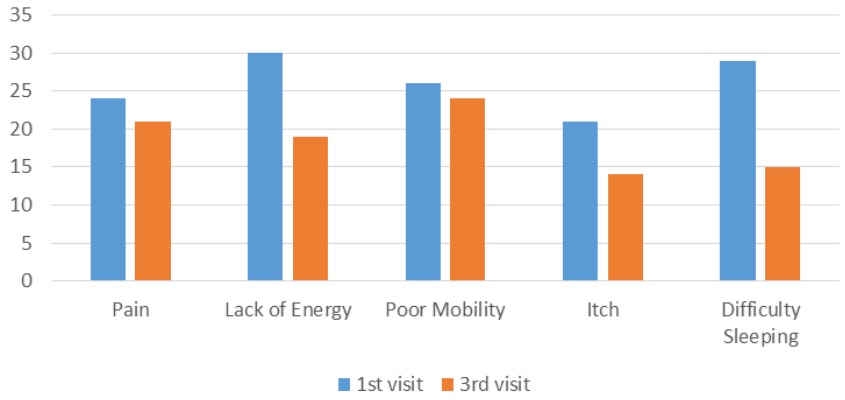


Figure 57. Top 5 Symptoms reported as Severe to Overwhelming (POS 3 or 4) at first and third RSC Clinic Visit

Karnofsky Performance scale

The Karnofsky performance scale was chosen as a measure of functional status. Definitions of scores are: At 10-40 the person in unable to care for self and requires equivalent of institutional or hospital care. At 50-70 the person is able to live at home and care for their personal needs with varying amount of assistance. At 80-100 the person is able to carry on normal activity and no special care is needed. All renal replacement therapy patients are having a Karnofsky score recorded every 6 months. Major deterioration in scores should flag a person for renal supportive care involvement.

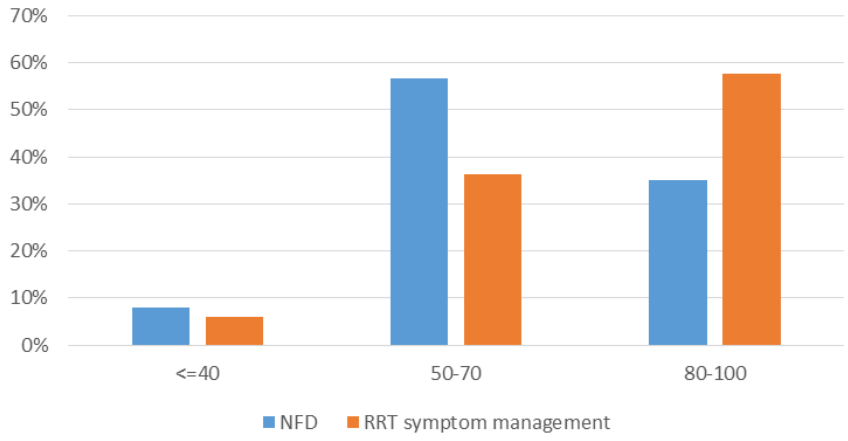


Figure 58. Karnofsky scores for RSC Clinic patients (NFD and RRT)

Research, Publications, Teaching and Presentations

Research

- **Ex**periences of **Pa**lliative **N**ephrology and Pre-**D**ialysis Clinics (EXPAND). (HREC/10/STG/121). A Retrospective Observational Cohort study, to primarily describe the characteristics and outcomes of patients attending standard renal outpatient clinics and patients attending a palliative nephrology clinic (with combined palliative nephrology input), and a secondary outcome, to describe the longitudinal impact of a palliative nephrology clinic on symptom burden, quality of life and patient satisfaction. This study ran from March 2009 to March 2013. Published in CJASN.
- Efficacy and safety of Gabapentin for uraemic pruritus and restless legs syndrome in conservatively managed patients with end stage kidney disease. H. Cheikh Hassan, Dr F Brennan, Gemma Collett, Elizabeth Josland, Prof MA Brown. Published Sept 2014
- **H**elping **O**lder **P**atients with **E**nd-stage kidney disease (HOPE): survival, symptom control and quality of life without dialysis. Brown MA, Collett G, Josland E, Foote C, Brennan F.
- Does dialysis make a difference to symptom burden? Tan T, Collett G, Tranter S, Brown MA and Brennan F.
- The symptoms of patients with CKD Stage 5 being managed conservatively – a survey of symptom prevalence and severity. Frank Brennan, Gemma Collett, Elizabeth Josland, Mark Brown.

Publications

- Brennan FP. **Pathogenesis of Pruritus - An Update for Clinicians**. Progress in Palliative Care (E Pub 2015)
- Brennan, F., Josland, E., & Kelly, J. (2015). **Chronic Pruritus: Histamine is not always the answer**. *Journal of Pain and Symptom Management, 50*(4), 566-570
- Brennan, F., Collett, G., Josland, E., & Brown, M. (2015). **The symptoms of patients with CKD stage 5 managed without dialysis**. Progress in Palliative Care, 23(5), 267-273.
- Brown MA, Collett GK, Josland EA, Foote C, Qiang L, Brennan FP. **CKD in Elderly Patients Managed without Dialysis: Survival, Symptoms, and Quality of Life**. Clin J Am Soc Nephrol. 2015; 10: 1-9
- Davison SN, Levin A, Moss AH, Jha V, Brown EA, Brennan F et al. **Executive summary of the KDIGO Controversies Conference on Supportive Care in CKD: developing a roadmap to improving quality care.** Kidney International, Advance online publication, April 29 2015.
- Cheikh Hassan, H. I., Brennan, F., Collett, G., Josland, E. A., & Brown, M. A. (2015). **Efficacy and safety of gabapentin for uremic pruritus and restless legs syndrome in conservatively managed patients with chronic kidney disease.** *Journal of Pain & Symptom Management, 49*(4), 782-789.
- Koncicki H, Brennan F, Vinen K, Davison SN. **An approach to pain management in End Stage Renal Disease – Considerations for General Management.** Sem Dialysis. Advanced online publication, April 11 2015

Presentations and Teaching

- Dr Frank Brennan (palliative care consultant) gave 35 presentations over 2015, which included national and international conferences, lectures, panel discussions, teaching sessions and running of education days.
- Dr Brennan provided an outreach RSC service rotating around Tamworth, Moree and Armidale, NSW.

- Dr Brennan gave a series of six half-hour tutorials on all aspects of Renal Supportive Care to the junior doctors in the Renal Department. This series of tutorials was repeated during the year to each new group of doctors. In addition, Dr Brennan gave a one hour tutorial summarising Renal Supportive Care four times during the year to each new group of junior doctors at Calvary Hospital, Kogarah.
- Elizabeth Josland (RSC CNC) participated in 7 presentations, provided in-service education, mentored multiple visitors, ran 2 education days and was part of the coordinating committee for the renal supportive care symposium and master classes in 2015. Alison Smyth participated in 5 presentations since commencing her role in August 2015.
- The 6th Renal Supportive Care Symposium took place on August 21st, 2015.
- The inaugural **Renal Supportive Care Masterclass** weekend was held over the 22nd and 23rd of August 2015.

- RSC Education days have been held on October 23rd and November 18th as part of our HUB requirements for the RSC rollout across the state
- Hannah Burgess (social worker) presented to the RSA Conference in Perth in June on the social work contribution to informed consent and the need to have social education and counselling in every renal unit to help enhance our achievement of informed consent to renal replacement therapy and/or conservative management for renal patients. She also presented at the Australian Association of Social Workers (AASW) National Conference on 28th November 2015 and the St George RSC Symposium.
- Prof Brown gave 3 presentations on this topic.

Achievements for 2015

- There have been a number of visiting doctors, nurses and allied health visiting the clinic throughout 2015 including a Program of Excellence in the Palliative Approach (PEPA) placement, a visiting dual trained palliative care and nephrology consultant from the University of Washington.
- The St George Hospital RSC service has a major role within a Renal Palliative Care Working Group which was developed by the NSW Agency for Clinical Innovation (ACI). The ACI Renal Palliative Care Working Group was established to provide the ACI Renal and Palliative Care Networks with expert advice on development and implementation of a state-wide Renal Supportive Care model for patients with ESKD, with the first meeting held in March 2013. St George has 3 members on this group. A position paper has been published: “Development and implementation of a State-wide Renal Supportive Care Service”. The state funded, state-wide renal supportive care service roll out should have completed the recruitment stage by January 1st 2016.
- Dr Brennan has spoken at many conferences including overseas in Ireland and New Zealand and has revised our local policy on appropriate drug dosing guidelines for commonly used palliative medications in CKD using the latest evidence based literature.
- Hannah coordinated another successful Renal Memorial Service which was well attended and received positive feedback.

Performance indicators and outcomes for 2015

1. **Symptom control**: A reduction in total symptom scores within 3 clinic visits.

   Outcome: 61% of RSC clinic patients had a reduction in symptom scores within 3 clinic visits. The RSC service continues to pursue reduction in symptom burden for each patient.

2. **Advance Care Plans**: 100% of competent and consenting ESKD patients who are not for dialysis and are seen in the renal supportive care clinic, or for those who are currently on dialysis but their treating physician has identified that they would "not be surprised if they died in the next 6 -12 months", or have a predicted <50% 12 month survival, have an advance care plan competed and reviewed every year.

   Outcome: 49% of competent NFD patients who are seen in the RSC clinic have an ACP. ACP discussions have been held with an additional 8% who are currently waiting or not keen to proceed. 42% of dialysis patients identified as requiring an ACP in 2015 (n=50) had one completed (another 4% had one discussed). All nephrologists have been sent a list of their current dialysis patients (Dec 2015) to identify those requiring an ACP or a review of current ACPs.

3. **Symptom and functional state assessment**: 100% of patients have a POS-S (renal) symptom survey and Karnofsky performance scale measured in the RSC clinic on each visit.
   Outcome: This is achieved and is used in each clinic visit to identify individual issues and monitor change.

4. **Symptom assessment in dialysis**: All dialysis patients have a POS-S (renal) symptom survey and Karnofsky performance scale measured every 6 months.
   Outcome: These clinical tools will be used twice a year for each patient to monitor progress and identify issues. Analysis of Dec 2015 data is in progress

5. **Research and publications – evidence of ongoing research and presentations**.
   5.1. **Outcome**: Listed on previous pages.

Summary

The RSC service offers holistic service to end stage renal failure patients and their families to reduce symptom burden, improve quality of life and provide support towards end of life care where required. RSC works in collaboration with the palliative care service. Measurements of symptom burden, quality of life and patient satisfaction are collected routinely with ethics approval to monitor clinic outcomes over time. The RSC service is being well utilized by the renal patients and has a growing role in inpatient management and home visits evident by the growth occasions of service. RSC is growing in Australasia and there is a growing demand for education on the topic noted by the growing requests to visit the clinic or provide outside education.

10. Quality of Life Report

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. Nine audits conducted by our unit since 2001 show similar results.

Aim

The aim of this investigation 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.
- Patients excluded from the survey were non-English speaking where there was no translation available, or suffering from dementia or a psychological condition.
- All returned surveys were entered into the QualityMetric Health Outcomes Scoring software and IBM SPSS Statistics 23 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 analysis was also carried out to determine if there were any significant linear relationships.
- Transplant patients are analysed separately from dialysis patients.

SF 36 Questionnaire

The SF-36 is a 36-item questionnaire that 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)

- The SF-36 is a universal tool for the measurement of health status. Data exists for population groups (including Australian populations samples, the most recent being from South Australia) allowing for age and gender matched comparisons.

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.

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.

Results

The total return rate was 60% (254/420); this is an improvement on 2014 (56%). This is broken down into the different modes of renal replacement therapy (RRT) in Table 29 and analysis was undertaken to determine if there was any statistical difference between responders and non responders.

Mode of RRT	Survey Returns n (%)
Night Haemodialysis	7 (100)
Hospital Haemodialysis	57 (67)
Satellite	47 (96)
Home Haemodialysis	25 (61)
Peritoneal Dialysis	28 (55)
Transplant	90 (48)

Table 29. Survey return rates

	2006	2008	2010	2012	2014	2015
Age *mean (±SD)*	63 (14)	63.5 (14)	68 (13)**	67 (13)	70 (14)	67 (14)***
Male %	61.2	70.5	68	61	62	63
Diabetes %	26	31	30	47	42	52
Haemoglobin *mean (±SD)*	118.7 (19)	117.1 (15)	114.7 (14)	115.2 (15)	115 (15)	117 (11)**
Albumin *mean (±SD)*	33 (4.5)	34.2 (4)	34.0 (4)	33.3 (5)	32.5 (4)	32.7 (5)
Kt/V PD *mean (±SD)*	2.1 (0.5)	2.16 (0.7)	2.2 (0.7)	2.2 (0.8)	2.5 (1)	2.2 (0.6)
Kt/V HD *mean (±SD)*	1.63 (0.4)	1.51 (0.3)	1.6 (0.3)	1.6 (0.4)	1.6 (0.3)	1.6 (0.3)

*Significance between responders and non-responders ** p<0.01, ***p<0.001*

Table 30. Demographics of responders

In 2015 there was a significant difference between responders and non-responders in age (Z=-6.9, p=0.000). Crosstab analysis revealed a difference in age groups (<45 years, 45-64 years, ≥65 years) using Pearson Chi-Square (x^2=43, *df*=2, *p*<0.001). Serum albumin, gender or diabetic status revealed no difference between responders and non-responders. Haemoglobin results revealed a significant

difference between the groups also (t=3.1, df=77, p<0.01). There was no statistical difference in Kt/V between responders and non responders both in the haemodialysis or peritoneal dialysis groups.

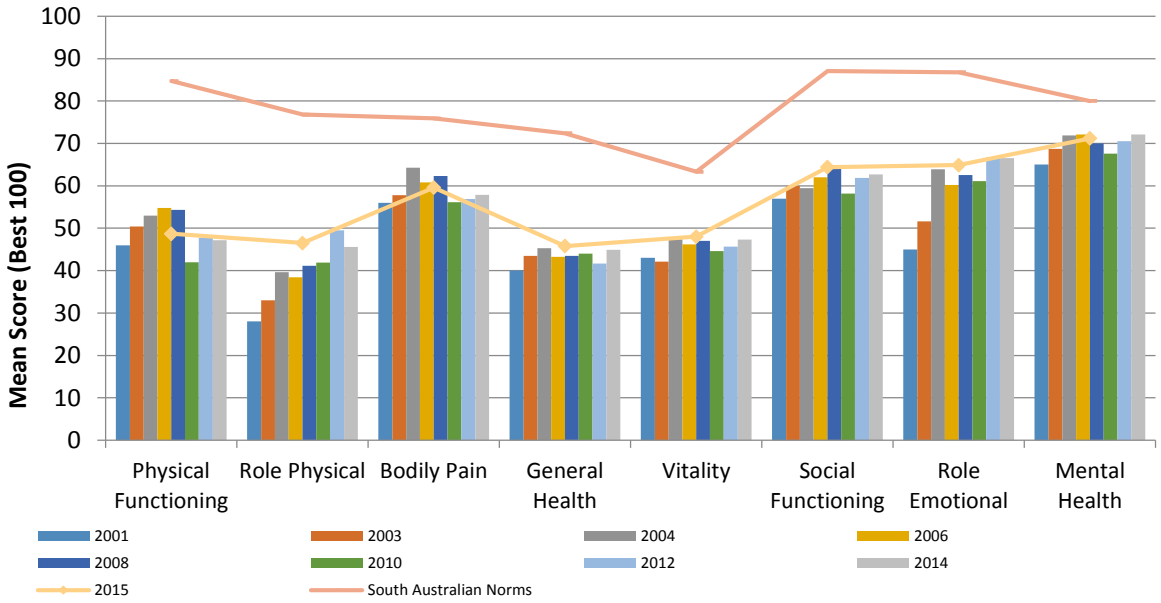


Figure 59. QOL scores excluding Transplant

Parameters	Hospital	Satellite	Home	Peritoneal dialysis	Transplant	Test	p-value
	(n=64)	(n=47)	(n=25)	(n=28)	(n=90)	Statistic[a]	
Physical Functioning	45.8 ± 30.3	46.7 ± 24.3	65 ± 20.4	43.7 ± 25.5	73.8 ± 23.4	X^2=56.2	<.001
Role Physical	42 ± 31.9	48.2 ± 30.2	54 ± 27.2	47.5 ± 30.4	71.3 ± 27.5	X^2=37.5	<.001
Bodily Pain	51.4 ± 32.1	61 ± 29.4	71.9 ± 28.2	65 ± 25.8	73.4 ± 25.2	X^2=20.6	<.001
General Health	46 ± 21.2	45.6 ± 20.7	53.9 ± 22.5	38.4 ± 21.3	54.9 ± 23.1	F=4.1	<.05
Vitality	47.2 ± 18.8	47.4 ± 18.9	53.8 ± 18.8	45.5 ± 21.5	60 ± 18.8	X^2=18.3	<.01
Social Functioning	60.1 ± 30.8	70.4 ± 26.9	71 ± 26	58.3 ± 31.6	81.5 ± 24.2	X^2=25.1	<.001
Role Emotional	57.4 ± 33.7	70.2 ± 30.1	73 ± 27.8	66 ± 31.8	82.9 ± 23.1	X^2=25.9	<.001
Mental Health	69 ± 23	71.1 ± 21.2	76.8 ± 14.7	71.2 ± 18.6	77.5 ± 15.3	X^2=5.2	0.27
Age	71.6 ± 13.6	73 ± 12.7	64.5 ± 11.9	68.8 ± 15.2	59.5 ± 11.5	X^2=52.9	<.001
Albumin	32.2 ± 7.2	34 ± 6.4	-	29.6 ± 5	32.8 ± 4.3	X^2=10.1	<.05
Haemoglobin	113.3 ± 24.7	118.7 ± 12.9	-	110.3 ± 14.5	127 ± 15	X^2=9.1	0.06
Kt/V[b]	1.6 ± .45	1.6 ± .3	-	2.3 ± .7	-	X^2=24	<.001

Table 31. 2015 QOL Results. Data reported as mean ± Standard deviation

[a] *X^2=Chi Square, F= ANOVA*

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

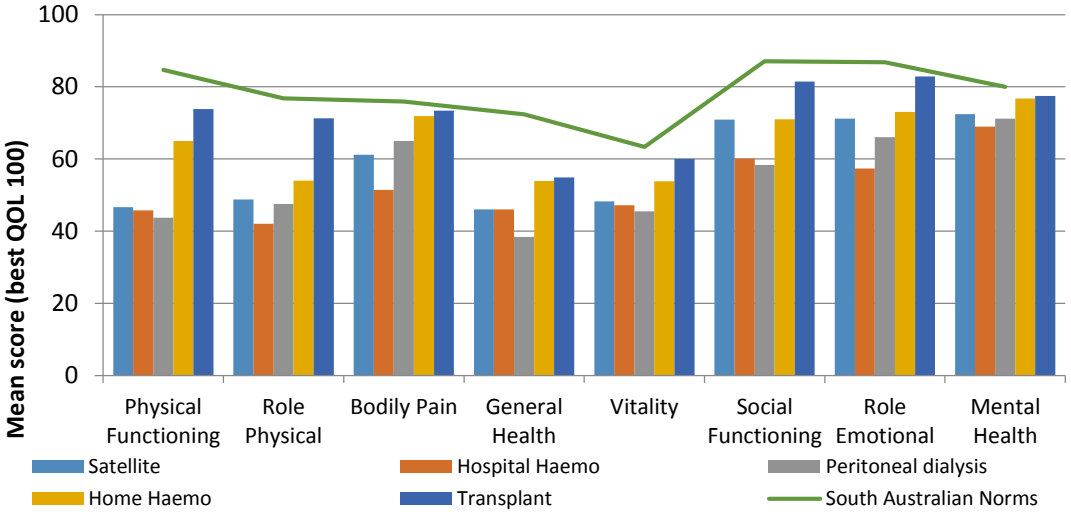


Figure 60. Mean Quality of Life scores by dialysis modality

Figure 60 above clearly indicates home haemodialysis and transplantation having an advantage in self-reported QOL, but Satellite haemodialysis results in bodily pain, social functioning and role emotional are better than hospital haemodialysis and peritoneal dialysis. This is nearly identical to the results reported in 2014 and previous years.

Diabetics excluding transplant

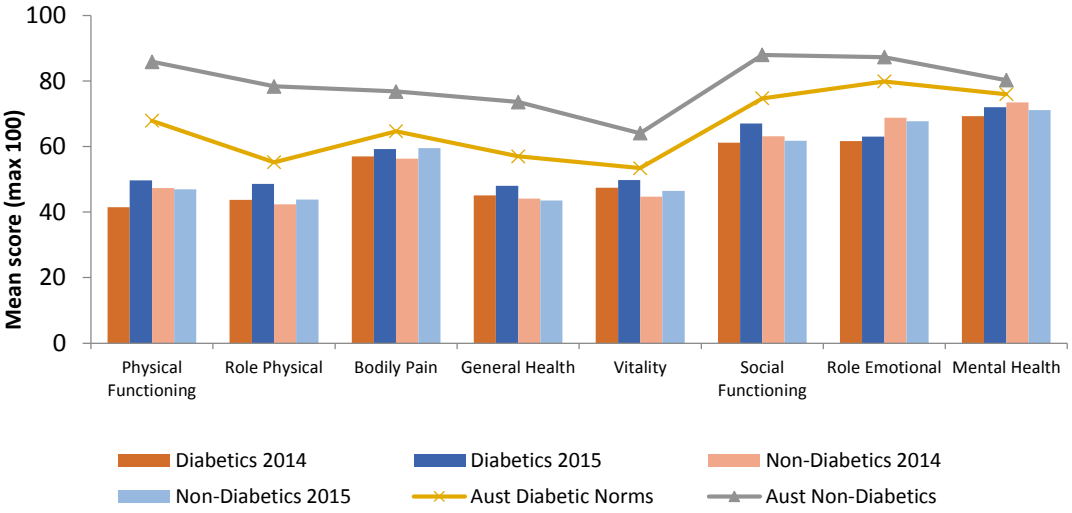


Figure 61. Quality of Life scores by diabetic status

There was no statistically significant difference in QOL, albumin, haemoglobin or Kt/V between diabetics and non-diabetics in 2014 or 2015 using the Mann-Whitney Test. Diabetics appear to have a slightly better self-reported QOL in a number of variables in the graph above, there is no explanation for this.

Impact of QOL scores by Functional Status using the Australian-modified Karnofsky Performance scale (AKPS)

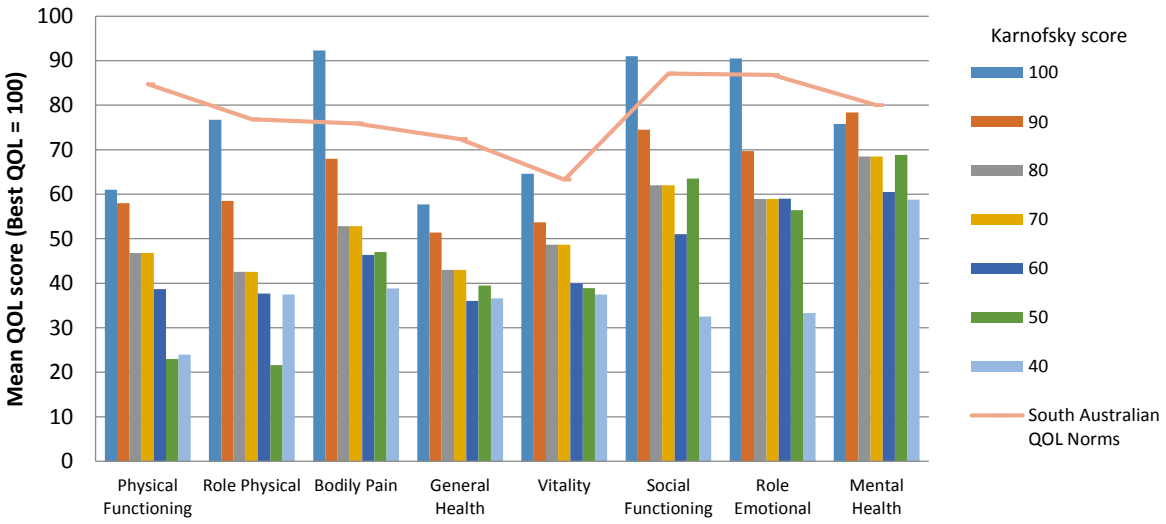


Figure 62. QOL scores according to each Australian Karnofsky Performance score in Haemodialysis and Peritoneal Dialysis 2015

AUSTRALIAN KARNOFSKY PERFORMANCE SCALE		
Definition	**Score**	**Criteria**
Able to carry on normal activity and to work. No special care is needed.	100	Normal; no complaints; no evidence of disease
	90	Able to carry on normal activity; minor signs of symptoms of disease
	80	Normal activity with effort; some signs or symptoms of disease
Unable to work. Able to live at home, care for most personal needs. A varying amount of assistance is needed	70	Cares for self. Unable to carry on normal activity or to do active work
	60	Requires occasional assistance, but is able to care for most of his needs
	50	Requires considerable assistance and frequent medical care
Unable to care for self. Requires equivalent of institutional or hospital care. Disease may be progressing rapidly.	40	Disabled, requires special care and assistance
	30	Severely disabled; hospitalisation is indicated although death is not imminent
	20	Very sick, hospitalisation necessary, active supportive treatment necessary.
	10	Moribund; fatal processes progressing rapidly

Table 32. AKPS legend

The AKPS is a measure of functional (dependence) status. Functional decline (declining AKPS) score) is an indication of increased clinical needs and alerts the clinical team to the potential for increasing requirements for support to meet care needs. The graph above indicates that as the AKPS declines, the QOL is significantly impacted, this was also shown in the study by Sclauzero et al. (2013), and mirroring this study, mental health shows to be the QOL variable that is least impacted by deterioration in functional status (increase in dependence). The AKPS is measured every 6 months

for all dialysis patients due to current evidence indicating that in the last three months of a renal patient's life, there is a steep decline in functional status and a need for a rapid response to the increasing needs of the patient (Murtagh et al., 2011). If there is a deterioration noted in the audit, the nephrologist should be notified which may indicate referral to the renal supportive care team for increased support.

Transplant

Renal transplantation is not a cure for kidney failure but an alternate form of renal replacement therapy (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.

	2015
Age	59.5 ± 11.5
Male	57%
Diabetes	47%

Table 33. Transplant responder demographics

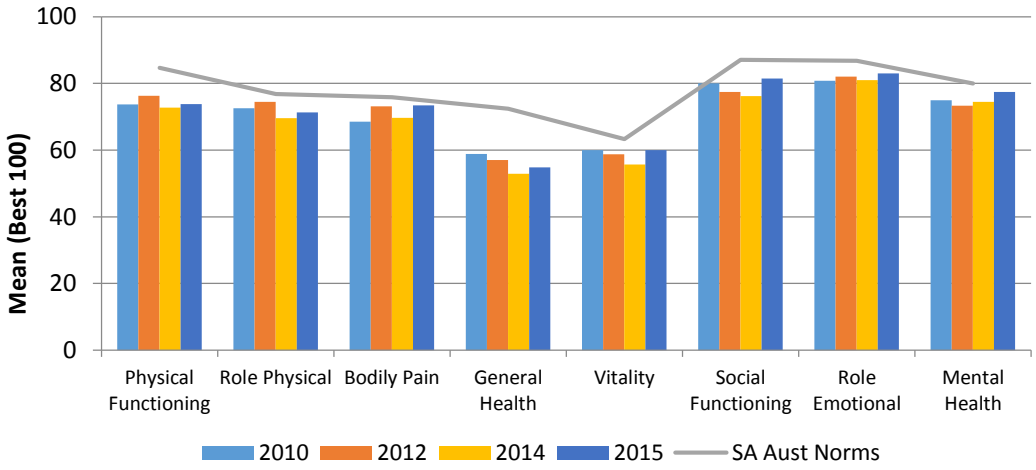


Figure 63. Quality of Life score for transplant patients in St George Hospital 2010-2015

Auditing the QOL of transplant patients commenced in 2010. Scores are similar to the Australian population scores in every parameter. Transplant is a form of renal replacement therapy as is dialysis, therefore it was important to capture this information. Some transplant patients may have never received any dialysis if they received a live donor transplant. It would be of interest to further capture pre and post-transplant outcomes on QOL and AKPS especially for those who had a deceased donor transplant.

11. Hypertension in Pregnancy

Franziska Pettit and Jennifer Beddoe

Aims

The aim of this report is to review the maternal and fetal outcomes of women presenting with a hypertensive disorder of pregnancy.

Activity

- In 2015 there were 2475 pregnancies at St George Public Hospital.
  - 191 (8%) of these were complicated by hypertension in pregnancy.
  - 150 of these were consulted to the Renal Obstetric Medicine group.
- There were 515 DAU (Day assessment) attendances throughout the year.
- There were 437attendances at the Monday obstetric medicine clinic in 2015.
- There were 7 twin pregnancies that were analysed separately.
- There were 3 Perinatal deaths in pregnancies with severe HT at 22/40 (twins) & 24/40.
- There were no maternal deaths.
- There were no episodes of Pulmonary Oedema or women requiring dialysis.

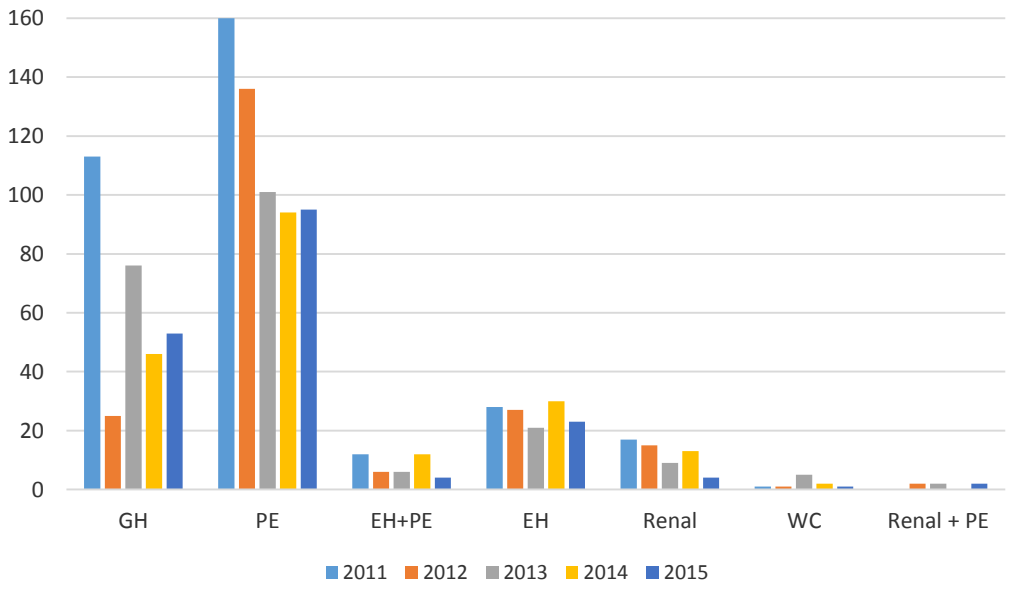


Figure 64. Comparison 2011-2015 diagnosis of women with Singleton Pregnancies
GH=Gestational hypertension
PE=Preeclampsia
EH+PE=Essential hypertension +Preeclampsia
EH= Essential hypertension
WC=White coat

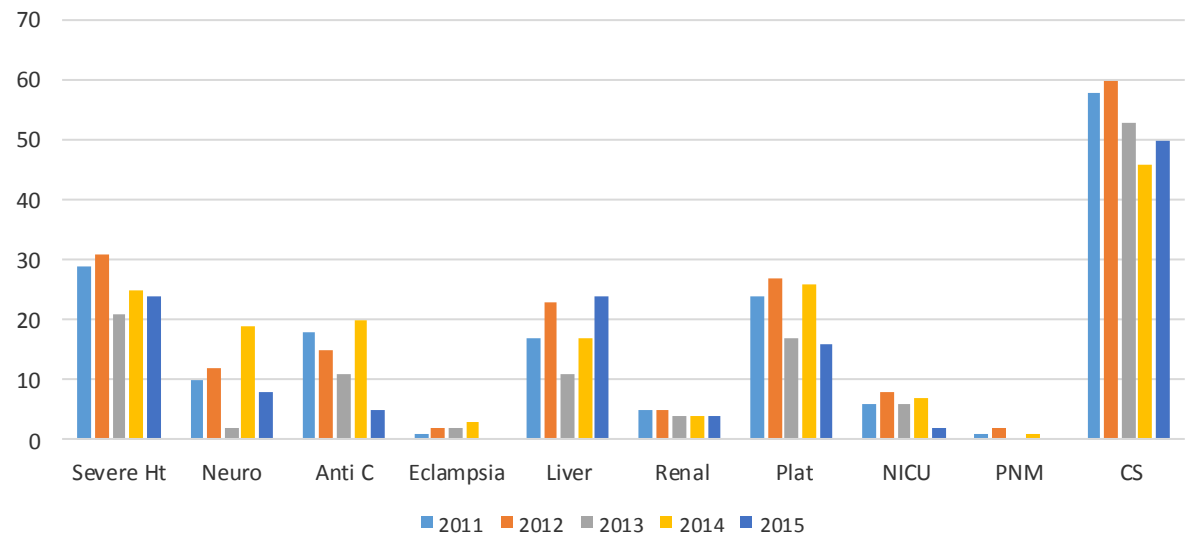


Figure 65. Trend in Outcomes of PE for singleton pregnancies 2011-2015

Singleton Pregnancies

	No	Severe HT	Neuro	Anti C	Eclampsia	Liver	Renal	Platelets	SGA<10	NICU	PNM	CS
GH	53	1(2)	0	0	0	1(2)	0	0	7(13)	0	0	15(28)
PE	95	24(25)	8(8)	5(5)	0	24(25)	4(4)	16(17)	13(14)	2(2)	0	50(53)
EH+PE	4	2(50)	0	1(25)	0	1(25)	1(25)	0	0	0	1(25)	2(50)
EH	23	2(9)	0	0	0	0	0	0	3(13)	0	0	16(67)
Renal	4	1(25)	0	0	0	0	0	0	1(25)	1(25)	0	2(50)
Renal + PE	2	1(50)	1(50)	1(50)	0	0	0	0	2(100)	0	0	2(100)
WC	1	0	0	0	0	0	0	0	1(100)	0	0	0

Table 34. Singleton Pregnancies
GH=Gestational hypertension, PE=Preeclampsia, EH+PE=Essential hypertension +Preeclampsia, EH= Essential hypertension, WC=White coat

Conclusions:

- There appeared to be a further fall in the number of women presenting with hypertensive disorders of pregnancy to our unit.
- There was a small fall in the overall number of deliveries and of these 8% developed a hypertensive complication and had data collected on them.
- Fewer women were seen in DAU also.
- Both maternal and fetal outcomes continued to be favourable with less than 30% of women with PE developing severe hypertension and there were no cases of eclampsia in the year.
- Caesarean section rates continue to be high overall.
- SGA rates were <16% overall as recommended however due to small numbers in particular groups this was difficult to interpret.
- PNM rate was 14.6/1000 which was higher than in previous years and higher than that for the general population of 7-8/1000. Overall perinatal mortality rates remain low for this high risk population.

12. Chronic Kidney Disease

Ivor Katz, Saiyini Pirhabhar and Vishwas Raghanath

Aim and Background of the Report

The department has a strong interest in the early management of patients with chronic kidney disease (CKD) ensuring appropriate referral and management in the pre-dialysis phase of CKD i.e. CKD Stages 1-4. Information from this type of patients is also presented in two other sections of the Annual Report i.e. Pre-Dialysis Clinic and Renal Supportive Care Clinic. The aim of this report is to describe the patterns of referral to the St George Hospital Nephrology and Hypertension outpatient clinics for the years to 2015. With this data we aim to provide and improved service as was trailed through our recent research trail looking at the role of a virtual consultation service which was completed in 2015. Data was captured from all new patients referred to two consultant clinics.

Introduction and Recommendations for referral

The Kidney Check Australia Taskforce (KCAT) CKD management initiative outlines in the General Practice' Guidelines and suggests a referral to a Specialist Renal service should be for

- an eGFR < 30ml/min/m^2 or
- a rapid decline in eGFR (decline >5ml/min/m^2 over a 6mo period and confirmed on 3 readings,
- macroalbuminuria irrespective of eGFR (uACR >30mg/mmol),
- suspected glomerulonephritis and
- CKD with uncontrolled of difficult to control hypertension.

Variations in referral take into account that an individual's wishes and comorbidities may also be taken into account when considering a referral.

Referral patterns

We have analysed the referral patterns to our department and this forms part of an approach to better service General Practitioners (GP) and patients with CKD in our local health area. This also provides continuity in the spectrum of CKD, adding to the Pre-Dialysis, Dialysis, Transplantation and Renal Supportive Care Cohorts.

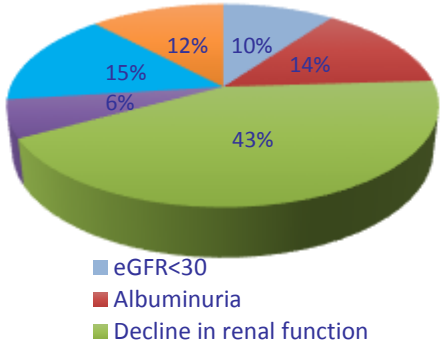


Figure 66. Reason for referral to St George Hospital Renal Department

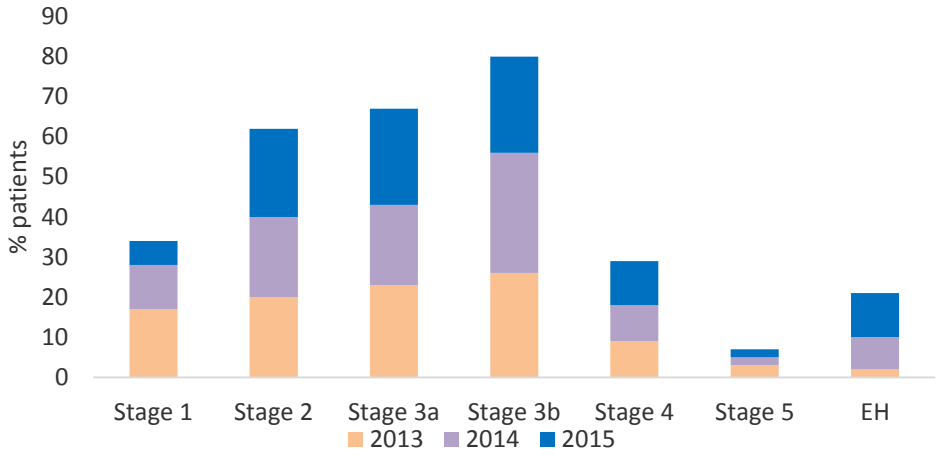


Figure 67. eGFR distribution of new referrals

The majority of patients were referred for decline in renal function (Figure 66) but there was uncertainty about the chronicity of this decline. The GPs often require decision support on patients outside the standard referral criteria, as evidenced by the fact that most patients had an eGFR >30ml/min/m2 (Figure 67). Only 3 patients were referred with an eGFR < 15ml/min/m2, which is a consistent finding over the previous years (Figure 67) and encouraging as this group represents the 'late referrals' for renal replacement therapy.

The 2nd most common reason for referral was hypertension management (21 patients this year), many of whom don't meet the guideline for CKD and hypertension, with issues of apparent 'resistant' hypertension. This is another region where GP decision support was key to patient management.

Annual intake of new patients

There are 8 nephrologists servicing the St George and Sutherland Hospitals area. Data for this report on CKD was collected from 2 out of 4 General Nephrology Clinics. It should also be noted that many CKD patients are seen in Private Nephrologist Clinics.

There were a total of 194 new referrals in 2015 (compared to 139 in 2014 and 159 in 2013) to the public outpatient clinics (Figure 68).

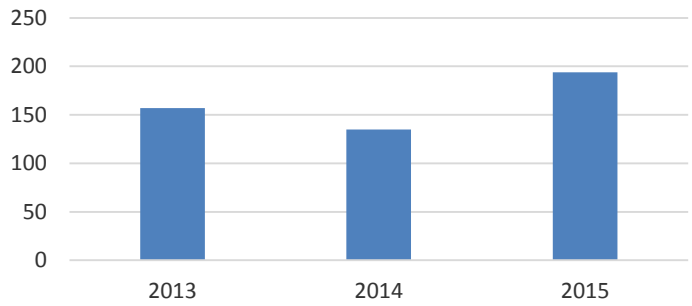


Figure 68. New CKD referrals

Age at referral – The majority of patients referred were > 60 years of age. The implication of having an abnormal eGFR in this age group reflects their age and also their overall increased kidney and cardiovascular risk, rather than the likelihood of their requiring dialysis. There seemed to be an equitable gender distribution across stages of CKD and hypertension. The most common diagnosis at referral was diabetes mellitus

Comorbidities in CKD – The most common risk factors for CKD were diabetes, hypertension, dyslipidaemia and cardiovascular diseases. Risk factors are multiple and require input from multiple chronic disease specialists e.g. endocrinology or cardiology.

Albuminuria was one a strong factor associated with worse renal function. Reduced eGFR and albuminuria are independent risk factors cardiovascular disease and higher proteinuria reflects higher risk of kidney function deterioration.

	Stage 1	**Stage 2**	**Stage 3a**	**Stage 3b**	**Stage 4**	**Stage 5**	**Essential Hypertension**
Number	11	44	48	46	21	3	21
Age (SD)	49 (18)	60 (16)	68 (11)	73 (13)	74 (20)	78 (8)	48 (18)
Male	36%	54%	54%	52%	57%	33%	43%
Female	64%	46%	46%	48%	43%	67%	57%
BMI	25 (5)	30 (7)	30 (6)	29 (5)	29 (6)	29 (8)	24 (11)
Primary cause							
Glomerulonephritis	27%	15%	5%	6%			5%
Renal vascular/ Hypertension	36%	37%	54%	61%	44%	33%	15%
Diabetic Nephropathy	10%	11%	7%	16%	15%	34%	
Reflux/Obstruction		2%	4%	3%	10%		
Pyelonephritis		5%		6%			24%
Loss of single kidney		11%			10%		
Others	27%	8%	15%	4%	15%	33%	8%
UNK		11%	15%	4%	5%		48%
Laboratory results							
Serum Creatinine (mmol/L)	65 (13)	88 (17)	112 (16)	141 (21)	210 (51)	444 (101)	64 (17)
eGFR (ml/min/m^2)	>90	74 (8)	51 (5)	37 (3)	24 (3)	9 (4)	>90
Alb:Crt ratio (mg/mmol)	27 (30)	32 (51)	26 (72)	47 (94)	110 (135)	428	7 (11)

Table 35. Demographics of CKD patients referred to the Renal Unit.

Acute Kidney Injury (AKI)

AKI is a common syndrome, especially in hospitalized patients and now independently recognised to be associated with increased morbidity and mortality and likelihood of CKD. CKD increases the risk of AKI, and an episode of AKI in turn increasing the likelihood of developing CKD. Thus there is a need for ongoing surveillance and increased awareness in the hospital and primary care setting. This is currently not taking place.
A patient was considered to have an AKI hospitalization if a diagnosis code for AKI was associated with their inpatient stay, but not necessarily as the primary diagnosis.

IConnect Care and Virtual Consultation as a component of CKD management

A unique model of care has been trialled at St George Hospital from 2013-2015, whereby a virtual consulting service was offered as an interface between GPs and Hospital Specialists (instead of traditional face to face consultations). We report some results of the 70 patients who were recruited and their progress was tracked over 1-2 years. The high risk patients (23 in number) were randomised to virtual vs face-to-face review and followed up by a Clinical Nurse Case Manager. Our specialist team comprised a Nephrologist, Endocrinologist, Cardiologist and a Palliative care Physician.
It was found that over 2 years there was no significant decline in renal function in either group i.e. Virtual consultation versus Face to Face. An independent evaluation of the program revealed that the program was widely accepted by patients and GPs, but faced logistical issues due to poor system integration and information compatibility. This program also ensured reduced wait-times to consult a specialist.

Figure 69. Demonstrating how the iConnect CKD model of care work for CKD

Seventy (70) patients were recruited (n=47 female; 53% and n=33 male; 47%), with mean age 72+22 years and eGFR42mls/min/1.73m^2 (interquartiles 32-70). There was no difference in baseline demographics or gender for those referred by GPs or directly from the clinic. The GP referred patients tended to be older but this was not significant. Table 35 describes the demographics of patients enrolled from GP and from specialist clinics. It also describes the demographics of patients after they were divided into low risk (LR) and high risk (HR), remembering that only the high risk patients were randomised into virtual vs. face-to-face management. All low risk patients were managed virtually unless the patient requested otherwise or it was needed for other reasons e.g. difficult blood pressure control. As would be expected the low risk (LR) patients had significantly

better eGFR 47ml/min/m2 compared with 28ml/min/m2 for the high risk (HR) patients. This significant difference existed for albuminuria.

	GP Referral n=27	Clinic Referral n=43	Study Total n=70	Low Risk n=47	High Risk n=23
Age (yrs)	81 (66, 86)	76 (57, 80)	78 (62, 83)	75 (60, 81)	81 (73, 86)*
Gender (n (% male))	11 (41%)	22 (51%)	33 (47%)	21 (45%)	12 (52%)
Creatinine (µmol/L)	128 ± 11	133 ± 8	131 ± 7	111 ± 5	172 ± 14***
eGFR	39 (35, 77)	46 (31, 67)	42 (32, 70)	47 (38, 75)	28 (20, 52)***
Urine ratio (n)	n=21	n=18	n=58	n=40	n=18
Albumin/Creat (mg/mmol)	9.7(1.8, 19.7)	6.3(1.3, 41.0)	7.1(1.3, 30.0)	3.2(0.8, 12.4)	45.6(3.8, 120.4)**

Table 36. Baseline Demographics and according to risk stratification
Data expressed as Mean ± SEM and Median (interquartiles) (predominately nonparametric data)
**p< 0.05, **p< 0.001, ***p<0.001 vs. LR*

Referral to the program occurred either 'virtually' (n=27; 39%) either by fax or loading patients data directly onto the website or through the specialist clinic (n=43; 61%) and thereafter were followed according to their risk but if they were high risk were randomised to virtual or a face-to-face clinic follow up (Figure 69). The majority of referrals were low risk (n=47; 67%) and all were followed virtually but 31 (66%) continued follow up by the GP with results being faxed to the clinical nurse case manager (CNCM) and 16 (34%) required that their results were tracked by CNCM. The number of patients with severe CKD meeting the criteria for referral to nephrologist i.e. eGFR<30ml/min/ 1.73m2 was 33% (n=23) i.e. high risk (HR) and were randomised to a virtual (n=14; 61%) vs. clinic face-to-face (F2F) follow up (n=9; 39%) (Table 40). Again half of patients needed to be tracked by the CNCM to ensure results and progress were known.

i.	*GPs supported software but not user friendly, inefficient and time consuming*
ii.	*iSome GPs reported a high level of satisfaction for the system*
iii.	*Seventy five percent (75%) would participate more actively if it was more user friendly and easier to refer patients*
iv.	*Fifty percent (50%) felt such a system did not diminish patient care and that patients were satisfied to receive 'virtual care' through them*
v.	*Eighty five percent (85%) of patients felt they were well managed and 80% reported being 'very happy' with 'virtual care'*
vi.	*Sixty percent (60%) of patients >70 years were happy to be seen 'virtually' and this was 70% for those between ages 55-69yrs.*
vii.	*'Younger' patients preferred to have a hybrid model of having face-to-face consulting followed by virtual care*
viii.	*Thirty percent (30%) did not mind waiting to see a specialist at the hospital but 75% preferred the convenience of an online opinion*

Table 37. Summary of Qualitative Evaluation of Virtual Consultation

There is an ongoing plan to expand the model further by establishing equivalence across the public and private clinics domain, enabling greater enrolment.

Although piloting in CKD, the model is potentially transferrable to many chronic health care service deliveries such as diabetes mellitus, cardiac failure, chronic liver disease, chronic lung disease and cancer.

13. St George Renal Biopsy Review – Audit of Complications

Partha Shanmugasundaram

	Total	Transplant biopsies
Number	98	41
Total complications	12 (12.2%)	4 (9.8%)
Macroscopic haematuria	9 (9.2%)	3 (7.3%)
Symptomatic Perinephric haematoma	3 (3.1%)	0
Transfusion	5 (6.1%)	1 (2.4%)

Table 38. Data for 2015

One patient who had gross haematuria following a native kidney biopsy also developed a perinephric haematoma.

	2008	2009	2010	2011	2012	2013	2014	2015
Total Number	67	107	85	109	86	118	123	98
Complication rate	9%	7.5%	9.4%	10%	7.2%	5.1%	6.5%	12.2%

Table 39. Comparison of total complication rates from previous years

Year N	2012 N=86	2013 N=118	2014 N=123	2015 N=98	Last 4 years N=425
Total complications	7.2(6)	5.1(6)	6.5(8)	12.2(12)	7.5(32)
Macroscopic Haematuria, %(n)	3.5(3)	3.3(4)	6.5(8)	9.2(9)	5.6(24)
Perinephric Haematoma, %(n)	3.5(3)	1.7(2)	0.8(1)	3.1(3)	2.1(9)
Perinephric bleed – angioebolisation, %(n)	0(0)	0(0)	0(0)	0(0)	0(0)
Required blood transfusion	4.7(4)	0.8(1)	0(0)	6.1(5)	2.4(10)

Table 40. Comparison of specific complication rates expressed as percentage (number)

Our bench marks (Am J Kidney Dis 60(1):62-73. 2012) are:

- Macroscopic hematuria 3.5% - not met
- Blood transfusion 1%- not met
- Angio-embolisation 0.6%- met

The rate of complications over the last 4 years have been stable around 7.5%. The year 2015 saw a relatively higher number of complications, mainly from the number of episodes of macroscopic hematuria. The hematuria resolved in all of them without the need for angioembolisation or operative intervention. Three of these patients however required blood transfusion.

Individual patient records were reviewed and opportunities to improve outcomes were identified. One example was the inclusion of a protocol for renal biopsies done by the radiology department at the Sutherland hospital, so patients who needed DDAVP can be identified.

Besides, a structured (formative and summative) assessment of renal biopsy skills of the advanced trainees will be started from 2016, to help in the reflection and improvement of this skill.

14. Nutrition Services

Maria Chan, Su Bahceci, Alyssa Wilson and Ashleigh keep (TSH), Renal Dietitians

Nutrition management protocols

Nutrition management protocols for the SESLHD have been updated in accordance to the best practice guidelines and consultation to relevant staff in Departments of Renal Medicine and Nutrition & Dietetics. This document consists of the recommended dietary prescription, nutrition care process, referral guidelines and the key performance indicators (KPIs) for all stages of kidney failure and is available via \\sesahs\chn\STG\Medicine and Emergency\Renal\RISCDOC\Nutrition and Dietetics\Guidelines & Protocols\Renal Nutrition Management Protocols (SGH-SESLHD) August 2015.pdf

Inpatient

An audit was performed over 2 x 6 months (total = 12 months) in 2013-4 and 2015 to evaluate the service provision by dietitians in acute setting at SGH. Patients' nutritional status in relation to the length of stay (LOS) was also examined.

Service profile

- Total number of patients reviewed: 218
- Average number of renal admissions/day: 12.8±3.9 (range 5-24)
- Average number of patients under the care of dietitian/day: 5.7±2.3 (range 0-14), accounting for 45.4±15.9% of renal admissions.
- Average number of new patients for dietitian/day: 1.3±1.2 (0-8)
- Source of referral: (1) automatic (blanket) - all dialysis ~57.1% + CKD patients known to dietitian ~10.1%, (2) referred by MOs: 31.2%, (3) transferred from other wards or hospitals: 1.6%

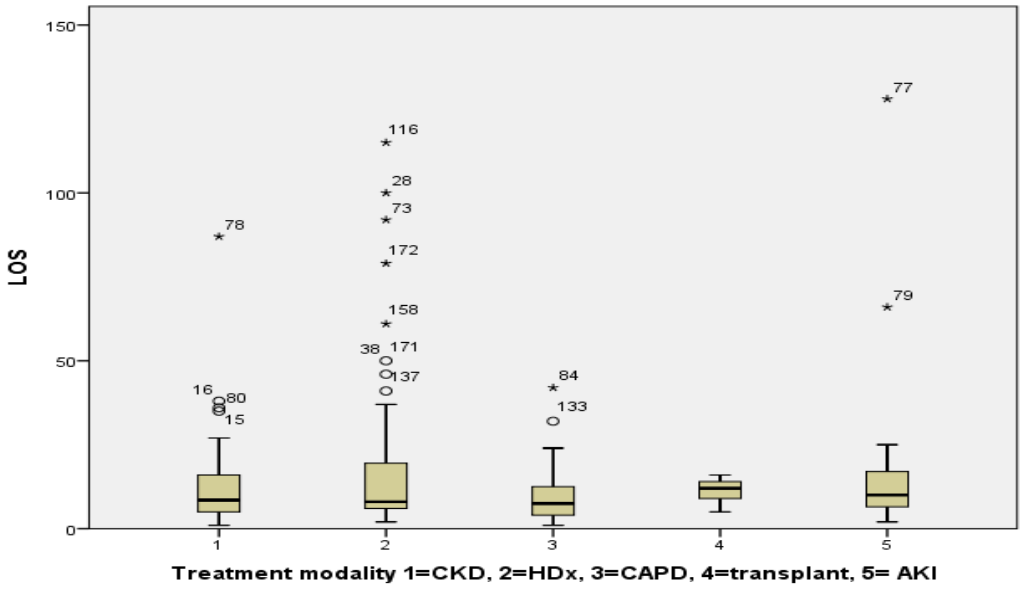
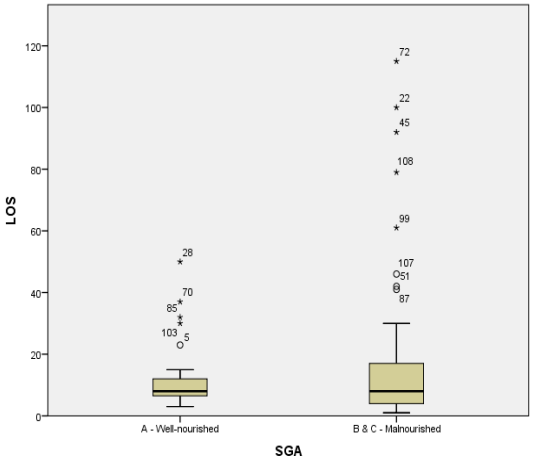


Figure 70. Relationship between treatment modality and LOS

Malnutrition and LOS:



Age: 68.0±14.3yr (24.0-99.0)
Prevalence of malnutrition: 63.6% (SGA was assessed on admission or when first referred by MOs)
LOS: Well nourished (SGA=A) vs. malnourished (SGA=B and C) was 12.2±11.5 vs. 16.5±22.6 days respectively *p*=0.09 and was considered clinically significant. Many of the initial well-nourished patients' nutritional status deteriorated during extended hospital stay which may impact the overall LOS figures.

Comments:

- malnutrition prevention prior to admission may make a difference to the LOS e.g. regular dialysis patients should be reviewed periodically, especially to prevent malnutrition
- the need of post-discharge follow-up to treat malnutrition was high
- At SGH, renal admissions are screened by dietitian(s) who provide intervention to patients under "blanket referral" as per protocols, as well as by referral. Such practice is very unique to SGH to ensure quality care and is uncommon in other renal services that patients are seen by doctor's referral only.

Chronic Kidney Disease - Pre-dialysis clinic

Parameters (baseline)	Time period		
	Apr 2002-Mar 2007	Apr 2007-Mar 2012	2015
Number	n=176	n=324	n =49 / total 65, ~ 70% S/B dietitian
Age	65.2±13.8	66.4±15.2	66.8±15.9
Gender: male (%)	61.9	59.1	66.2
GFR(ml/min/1.73m^2)	13.2±4.5	17.2±5.5	16.5±3.7
Diabetes mellitus (%)	32.4	51.4	51.0%
BMI (kg/m^2)	28.1±5.9	29.6±6.8	29.8±6.6
BMI > 26 kg/m^2 overweight (%)	61.7	68.0	73.1
BMI > 30 kg/m^2 obese (%)	32.0	44.7	41.2
Malnutrition, SGA B &C (%)	39.7	42.0	36.5%

Table 41. Nutrition characteristics of patient attending the pre-dialysis assessment clinic

Comments on the 2015 audit:

- Mean eGFR was 16.5±3.7ml/min; referrals were too late to benefit from the full effect of nutrition intervention before dialysis is needed
  - 95% of patients did not receive nutrition intervention for CKD prior to the clinic
- Prevalence of malnutrition was high
- Prevalence of obesity was high

- ~51% of patients have diabetes, > 95% of these patients did not receive structured nutrition intervention for diabetes prior to the clinic
- ~ 30% of patients were on phosphate binders, but have not received diet education prior to the clinic
- 49/65 total (~70%) were seen by a dietitian; 30% missed assessment was due to problems such as long consultation by 3 disciplines (CNC, social work and dietitian) in one clinic, some patients felt too tired to stay for the last session with the dietitian, parking problem and dietitian on leave etc.

Renal Supportive Care: Jessica Stevenson, senior dietitian (0.4FTE) commenced working in November, 2015.

Haemodialysis:

Six monthly routine nutrition assessment

Patients attending SGH & TSH dialysis centres receive 6 monthly routine nutrition assessment and intervention as per protocols

St. George Hospital:

	April, 2015	October, 2015
Total number of patient in the unit	121	122
No. of patient assessed*	108	109
Prevalence of Malnutrition % (SGA score B and C)	39.8	32.1
Albumin within reference range, > 33g/L (%)	58.1	61.7

Table 42. Nutrition audit at SGH

Comments:

- ~11% of patients did not received urea kinetic, biochemical and nutrition assessment because of newly starting on dialysis, hospital admissions, or being away on holiday etc.
- Compliance to 6 monthly review by dietitian was ~ 99%.
- Of the 39.8% (n=43) malnourished patients identified in the April audit, 58% of these have improved or stabilised by the October audit (Table 42)

	SGA score B & C (malnourished) & progress			RIP	Not assessed in October audit e.g. change to night shift, moving away etc.
	Improved	Stabilised	Deteriorated		
number	17	8	8	6	4

Table 43. Malnourished patients in April and outcomes after intervention

64.6% of patients (93/144) received assessment on both data April and October 2015 audits. Patient flow is summarised in the Table 43.

Patient flow	%
Received nutrition assessment in both April and October audit	64.6
Reasons for receiving assessment <u>once</u> in April <u>OR</u> October 2015 only	
RIP after 1st assessment in April	6.3
Transplant after 1st assessment in April	3.5
Hospitalised, no urea kinetics/biochemical markers measured	0.7
New patients after April	8.3
New permanent transfer from home or TSH after April	2.1
Temporary dialysis – patient of TSH or home program	6.9
Night patients, unable to see	4.2
Holiday and away temporarily	0.7
Refusal for assessment	1.4
Discharged from or moving away from SGH	0.7
Missed dietitian's assessment	0.7

Table 44. Patient flow at HD dialysis unit

Change of nutritional status according to SGA score in the assessed patients (both well-nourished and malnourished) in both April and October audits, 2015 indicated improvement and stabilisation in the majority of patients ~80% (Table 45)

Change of nutritional status according to SGA score	**%**
Improved	27.7
Stable	52.1
Deteriorated	20.2

Table 45. Change of nutritional status according to SGA score for all patients at SGH

Comment:

- The "prevalence" of malnutrition appeared to remain high (~39.8% & 32.1%) in both periods. However, only 64.6% of the patients stayed for assessment in both periods (Table 4). These reflected the general nature of our dialysis population which consists of many new, unstable, recent hospitalised patients entering and leaving the program.
- Once patients were identified as malnourished, all received nutritional support including nutrition intervention, counselling ± oral nutrition supplementation. Despite a few patients (~ 6 %) have passed away, majority of patients had improved or stabilised nutritional status. Table 3 and 5. Nutritional deterioration in a number of patients between the audit periods was due to hospitalisation and illnesses.

The Sutherland Hospital:

	April, 2015	**October, 2015**
Total number of patient in the unit	41	50
No. of patient assessed*	41	50
Prevalence of Malnutrition % (SGA score B and C)	17.1	26.0

Table 46. Malnutrition rate at TSH

Comments:

- 100% compliance for routine 6 monthly nutrition assessment. All malnourished patients received nutrition intervention & nutritional support after assessment

Serum phosphate management QI

A QI project was performed with an aim to improve taking phosphate binders practice with meals by patients in haemodialysis centres at both SGH and TSH.

Methods:

- Surveyed all haemodialysis patients with hyperphosphatemia and assessed their compliance with low phosphate dietary recommendations and phosphate binder medications
- Reviewed the prescription/timing of phosphate binder medications
- Implemented a visual resource reminding patients to bring their phosphate binders to haemodialysis and consume with food http://stgrenal.org.au/sites/default/files/upload/Dietitian/Phosphate_poster_2015.pdf
- Redesigned the low phosphate diet resource further highlighting the role and appropriate timing of phosphate binder medications http://stgrenal.org.au/sites/default/files/upload/Dietitian/Phosphorus_Controlled_Diet_2015.pdf
- Provided verbal dietary education to all patients with hyperphosphatemia
- Re-audit post implementation phase to review outcome

Results of TSH have been collated

	Oct- 14 (pre)	**Apr 15 (post)**
Total at TSH*	48	48
N on binders *	32 (80 %)	29 (~73%)
Pt's on P04 binders had hyperphosphatemia	22 (68%)	13 (44%)
compliant with P04 binders as prescribed	24 (75%)	24 (82%)
Taking P04 binders with snacks	6 (18%)	18 (62%)
bringing P04 binders to HDx	8 (25%)	22 (75%)
Improvement of PO4 levels	-	14 (48%)

Table 47. Phosphate practice audit

29 patients participated in both pre and post evaluation (same sample):

	April, 2014 (pre)	October, 2015 (Post)
Bringing phosphate binders to HDx and consumed with meals	7	20
Didn't bring phosphate binders to HDx and consumed diet	22	10

Table 48. Phosphate practice audit results

- Improved compliance (43%) with phosphate binder medication
- Improvement (57%) in phosphate level working towards the normal range

Peritoneal dialysis (PD)

- At commencement:
  - 16/19 of patients were brand new on PD program. 15/16 received initial assessment and education by the dietitian (93.8% compliance)
  - Mean eGFR=6.9 ±2.6 ml/min
  - Albumin 28.0±9.0g/L
  - BMI: 25.6±3.3kg/m^2
  - Malnutrition rate was 37.5%, none of these patients were appropriately referred nor received structured nutrition care by dietitian prior to staring dialysis.
- Follow – up:
  - No regularly follow-up or structured care program has been implemented at present due to insufficient renal dietitians staffing level. However, all patients were attended once referred in general.

Transplant

- 23 of the 24 patients newly transplanted renal patients received nutrition intervention during their attendance to the acute transplant clinic, achieving ~96% compliance. However, <50% received structured follow-up care within 3 months compared to protocols due to insufficient renal dietitians staffing level.

Visiting dietitian

- One renal dietitian from Singapore received clinical attachment for 2weeks in August 2015

Staffing

- Dietitian staffing was ~ 1.6 FTE at SGH for the estimated clinical load of 4.5FTE, this is insufficient to implement best practice. Data was reported on 16-7-2015, renal unit QI meeting.

Conclusions

- Nutrition care is a multidisciplinary process to provide structured, timely and quality care as per best practice guidelines. There is a need to review strategies to improve current practices.

Plan

- To review dietitian staffing level
- To liaise with team to implement better referral strategies
- To evaluate the feasibility of implementing Medicare Benefits Schedule - “multidisciplinary case conference - medical practitioner (other than a specialist or consultant physician)” to improve patient outcomes through cost effective and better structured follow –up practice by dietitians.