Department of Renal Medicine
St George & Sutherland Hospitals

2017

Annual Report

and

Quality Indicators

Health
NSW GOVERNMENT
South Eastern Sydney
Local Health District

Introduction

It gives me great pleasure to present the 2017 Annual Report of the Department of Renal Medicine.

The following pages highlight the key findings from our report. In brief, we are meeting most of our targets and exceed 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. The M&M process is formalised as a regular quality improvement activity.

The next 12 months will be exciting with the commissioning of a new satellite haemodialysis clinic in Kogarah and with enhancements to the transplantation program across the SESLHD. I am grateful to the Prince of Wales Department of Renal Medicine for their commitment to quality outcomes in the transplantation service.

I wish to thank everyone in our Department for their contributions to this report and to the care of our patients.

I welcome any feedback.

A/ Prof. George Mangos

Head of Department

Renal Medicine. St. George Hospital.

George.mangos@health.nsw.gov.au

Table of Contents

Contents

1. Executive Summary

ANZDATA Activity Overview

- Dialysis and transplant patient numbers at St George Hospital have increased steadily between 1990-2016
- The commissioning of a new satellite dialysis facility in Kogarah in late 2018 should reduce the proportion of patients on Hospital haemodialysis (HD) substantially (currently 51% of dialysis patients to an estimated 25%, Australian average 22%)
- The proportion of St George patients on home dialysis is higher than the Australian average (31% compared to 28%).

Chronic Kidney Disease

- Most referrals are for patients with a decline in renal function (41%)
- A total of 396 new referrals were seen in 2017. Approximately 19% of patients had eGFR <30ml/min/1.73m^2 and 9% of patients were referred for uncontrolled hypertension.
- The average time to review from referral was 20 days
- To improve efficiency of the outpatient service we have introduced a triage process for prioritisation of referrals and feedback to GPs about appropriate referrals.

Advanced Kidney Disease and Renal Option Clinic (ROC)

- After attending the Pre-dialysis clinic, approximately 44% opt to have a home therapy, more commonly PD. A high proportion were undecided, similar to last year (21% compared to 20% in 2016).
- New patients starting dialysis at St George are older than national average
- Benchmarks for Pre-dialysis
  1. 51% of patients (excluding late referrals) have a timely referral to the Pre-dialysis Program (Benchmark: 100% ≥eGFR 15). This benchmark will be reduced to eGFR 10-15 ml/min because of change in local policy.
  2. 81% of patients who are known to the unit and have attended Pre-dialysis Clinic commenced their planned dialysis choice (Benchmark: 70%).
  3. 100% 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. 25% of patients commenced with vaccinated immunity in 2017. This is a 5% decline from 2015 and wasn't reported on in 2016. A new process was initiated to improve this.

Vascular Access

- 83% of patients had a mature access at their first haemodialysis.
- Average time from initial referral to access creation was 64 days (benchmark: 30 days).
- 57% of patients commenced dialysis with a native fistula compared to the ANZDATA benchmark of 40%.
- 38% of patients commenced their first haemodialysis via a tunnelled catheter compared to the ANZDATA benchmark of 43%.
- 87% of patients were using a fistula/graft for haemodialysis, compared to the ANZDATA benchmark of 86% and KDOQI benchmark of 40%.
- 7% of patients were using a permanent catheter (below the KDOQI benchmark of < 10%)
- Thrombosis rate for St George Hospital does not meet benchmark: AVF = 1.25 episodes/pt-year (aim <0.25). AVG/SVG = 0.25 episodes/pt-year (aim <0.5)
- For the 64 catheters inserted in 2017, 2 catheter-related bacteraemia and 3 exit-site infections occurred

Haemodialysis

- Activity was steady in 2017 with an overall growth of 0.8% across the sites.
- At Sutherland Hospital 7208 HD treatments were completed in 2017; 179 less than in 2016. On average, 47.3 patients dialysed each month.
- At St George Hospital, 20,596 treatments were completed in 2017, compared with 20,651 in 2016. On average 128 patients were dialysed each month
- There was a reduction in activity on night shift, with chairs numbers reducing from 16 to 8 at the end of December.
- Clearance, using both Kt/v and Urea Reduction Ratio (URR) are better than national averages

Peritoneal Dialysis

- A total of 69 patients were on PD in 2017 (including hospital IPD) compared to 73 in 2016.
- Patient survival and peritonitis rates are better than the national outcomes.
- There is a gradual decline in our total patient numbers and combined peritonitis and exit site infection rates from 2015 to 2017. Despite this, our combined peritonitis and exit site infection rates in 2017 remained better since data collection in 2005.
- Changed to haemodialysis and death rate in 2017 is twice than that of the national rate.
- Similar to national data is "total dialysis and technical failure" as the primary reason for PD technique failure in 2017.

Transplants

- 227 kidney transplant recipients and 63 living kidney donors were seen in 2017.
- Twenty three people received a kidney transplant: twelve from live donors and eleven from deceased donors. Eleven people donated a kidney.
- Patient survival slightly lower at 12 months than national average, 95.4 vs 97.5%; equivalent patient survival at 5 years, 90.3 vs. 89.6%
- Deceased donor graft survival is less than expected at 12 months (90.8 vs 94.3%)
- Living donor patient and graft 1 year survival is 100%, and 5year survival is 100% and 94% respectively.
- 89% of living donors attended an annual review in 2017

Renal Supportive Care

- There was a reduction in Outpatient clinic activity due to clinician unavailability during the year.
- There were double the number of home visits from the previous year due to an escalation in nursing home patients.
- Inpatient consultations decreased by 5% from 2016 with an average of 79 inpatient consultations per month in 2017 and an average of 7.2 new inpatient referrals per month
- There was an average of 16 consults per month for patients on dialysis.
- 82% of non-dialysis patients attending the RSC clinic have an advance care plan
- 38% of RSC dietetic consultations were for patients attending for symptoms support (e.g. pre-dialysis, dialysis-dependent, transplant), with 31% of symptom support patients being reviewed one or more times in clinic.

Hypertension

- Four hundred and thirty two 24 hour ABPM studies were performed (82 of these were for research purposes, 25 were on pregnant women) & 48 home monitor BP checks were attended.

Obstetric Medicine

- In 2017 there were 2435 pregnancies at St George Hospital down from 2544 in 2016. 215 (9%) of these were complicated by a hypertensive disorder. 8 of these were twin pregnancies & 4 were women who presented with a hypertensive disorder within 2 weeks of delivery, and were not included in this analysis.
- 1 neonatal death occurred at 2weeks of age. There were no episodes of pulmonary oedema, dialysis or maternal deaths here at St George in 2017.
- Both the Day Assessment Unit (DAU) and Obstetric Medicine clinic (OMC) saw an increase in activity.
- Although there was a further small decline in the number of births at St George, 9% of these were complicated by a hypertensive disorder of pregnancy, up from 8% in 2016.

Renal Biopsy

- The rate of complications over the last 5 years was 7%.
- All three parameters above met the accepted benchmark in 2017 similar to 2016. (Am J Kidney Dis 60(1):62-73. 2012)
    - Macroscopic hematuria 3.5%
    - Blood transfusion 1%
    - Angio-embolisation 0.6%

Nutrition Services

- All 18 new PD patients received initial assessment and education by the dietitian (100% compliance)
- 92% (22/24) newly transplanted renal patients received nutrition intervention at the acute transplant clinic
- Dialysis patients accounted for approximately 60% of caseload for the inpatient dietitian, and 100% of these required follow-up after discharge from hospital.
- 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.

Overall Summary

- Increase in activity, particularly haemodialysis
- Local emphasis on encouraging home haemodialysis as a long term treatment option
- 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

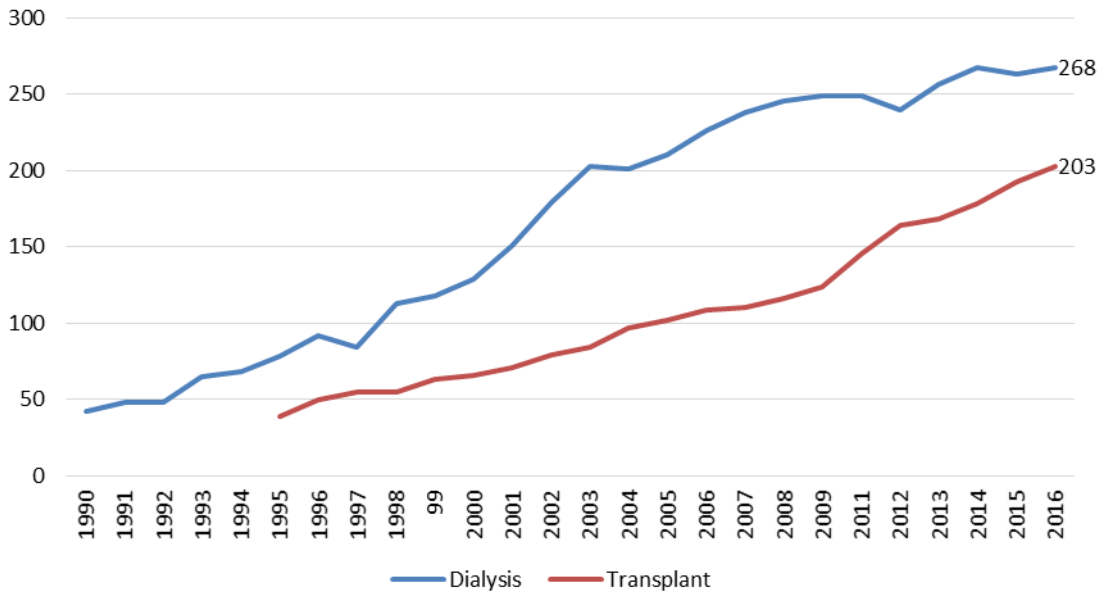


Figure 1. *All Dialysis & transplant patients St George hospital 1990-2016 (ANZDATA 31/12/16)*

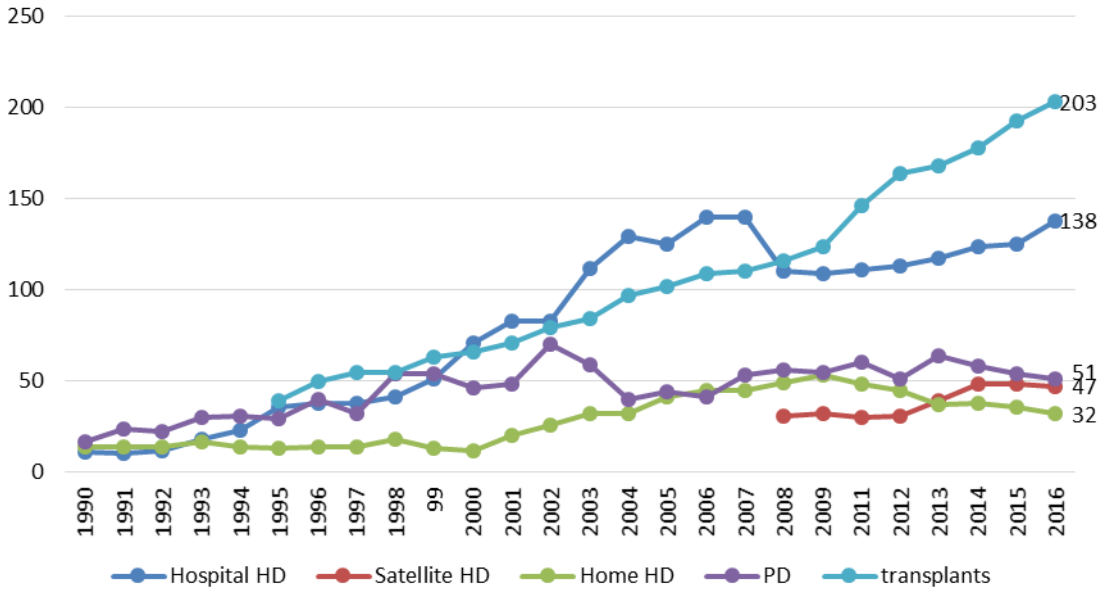


Figure 2. *Dialysis & transplant patients St George hospital 1990-2016 (ANZDATA 31/12/16)*
NB. Sutherland Satellite unit opened in 2008

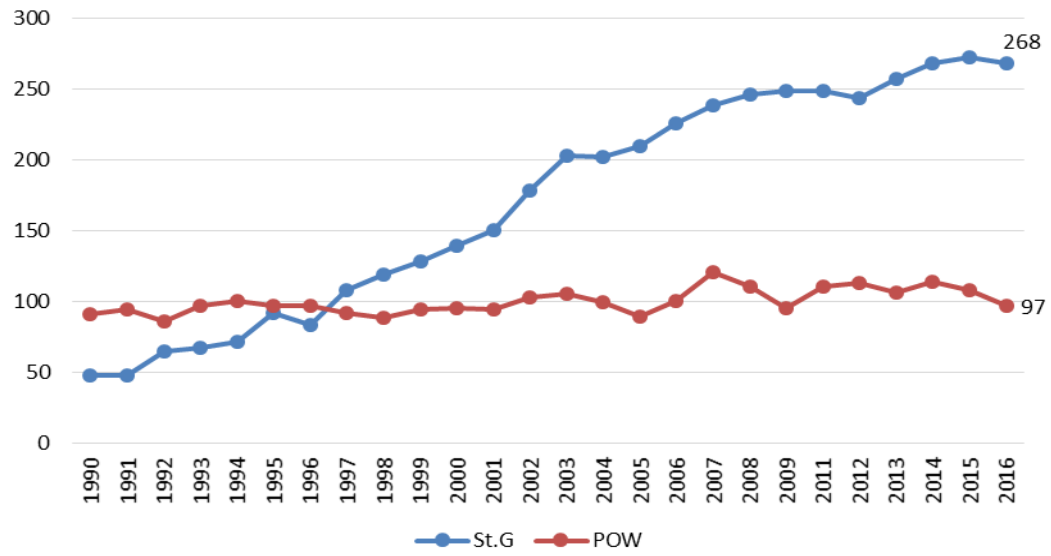


Figure 3. *Dialysis patients South East Sydney LHD (ANZDATA 31/12/16)*

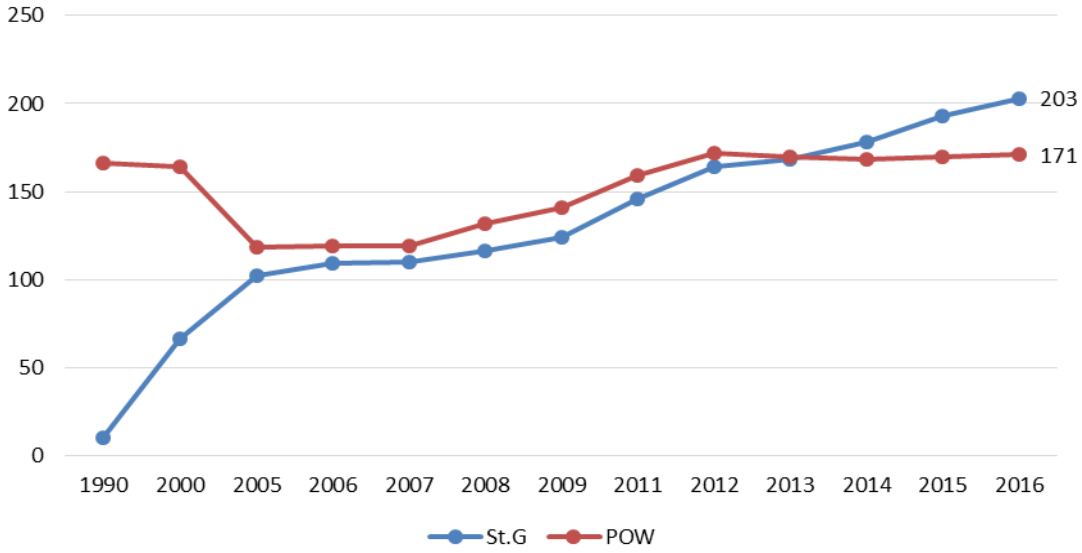


Figure 4. *Functioning Transplants South East Sydney LHD (ANZDATA 31/12/16)*

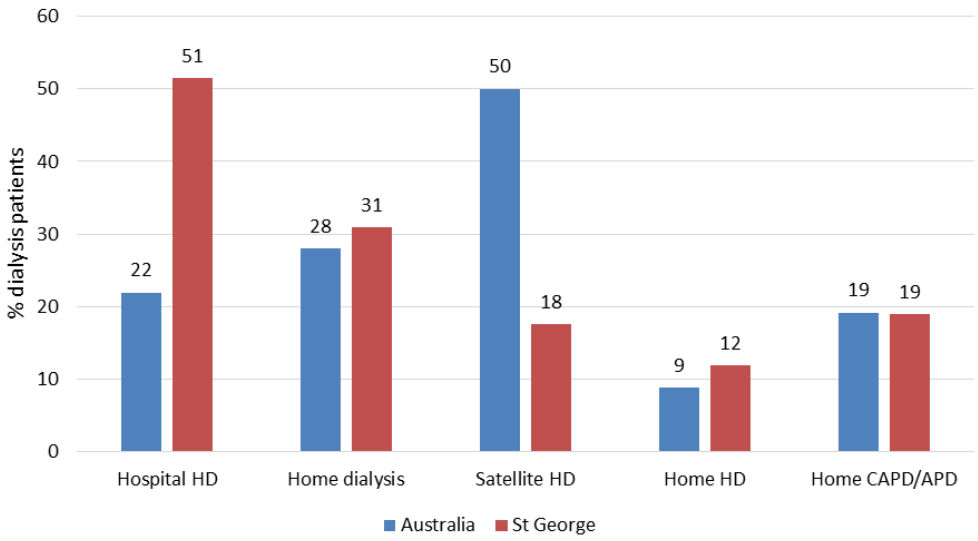


Figure 5. *Mode of dialysis Australia & St George 2015 (ANZDATA 31/12/16)*

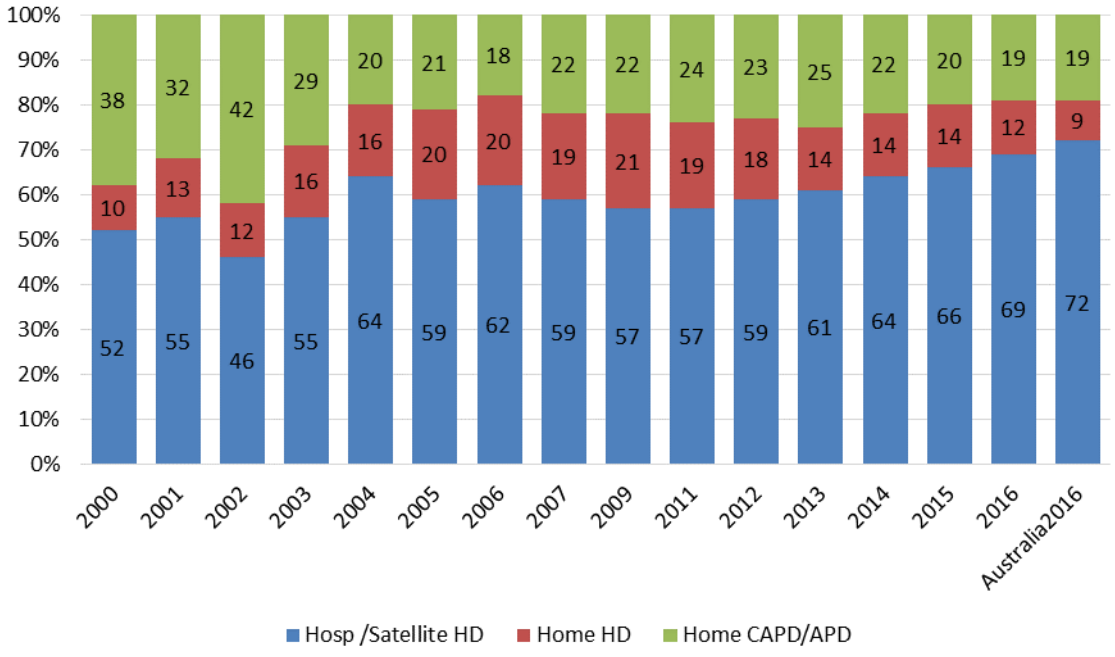


Figure 6. *Mode of dialysis Australia & St George 2016 (ANZDATA 31/12/16)*

3. Chronic Kidney Disease

Ivor Katz, Saiyini Pirabhahar and Kylie Turner

Aim and Background of the Report

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 2017. With these data we aim to set CKD KPIs for our unit. Data for this period were a capture of all new CKD or uncontrolled hypertension patients seen in the St George Hospital outpatient clinics.

Current Recommendations for referral to a nephrologist:

The Kidney Health Australia (PEAK) 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 sustained decrease in eGFR of 25% or more OR a sustained decrease in eGFR of 15mL/min/1.73m^2 within 12mths
- macroalbuminuria irrespective of eGFR (uACR >30mg/mmol),
- suspected glomerulonephritis and
- CKD with uncontrolled or difficult to control hypertension already on antihypertension treatment.

Reference: Chronic Kidney Disease (CKD) Management in General Practice (3rd Edition) Kidney Health Check (PEAK), Melbourne

Referral patterns

We analysed the total number of patients seen in our outpatient clinic and the reasons for their referral. As noted, patient referral numbers continued to increase. In 2017, there were 94 additional new referrals compared with the previous year. An increase of 24%.

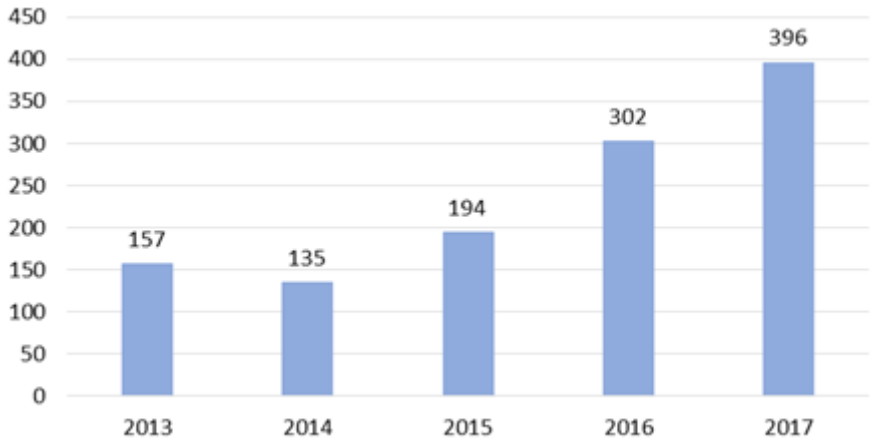


Figure 7. *Total number of new outpatient referrals to St George Hospital Renal Department*

Reasons for referral are based on information written in the GP referral letter. Most referrals are for patients with a decline in renal function (41%). Other referrals included 15% for an eGFR<30ml/min/1.73m^2 and 12% with macroalbuminuria (urine ACR>30mg/mmol .

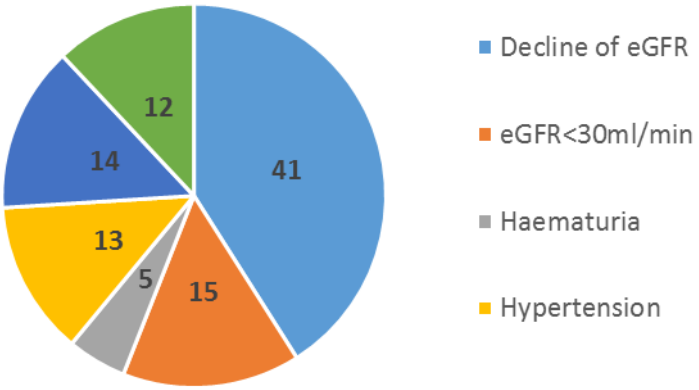


Figure 8. *Reason for referral to St George Hospital Renal Department*

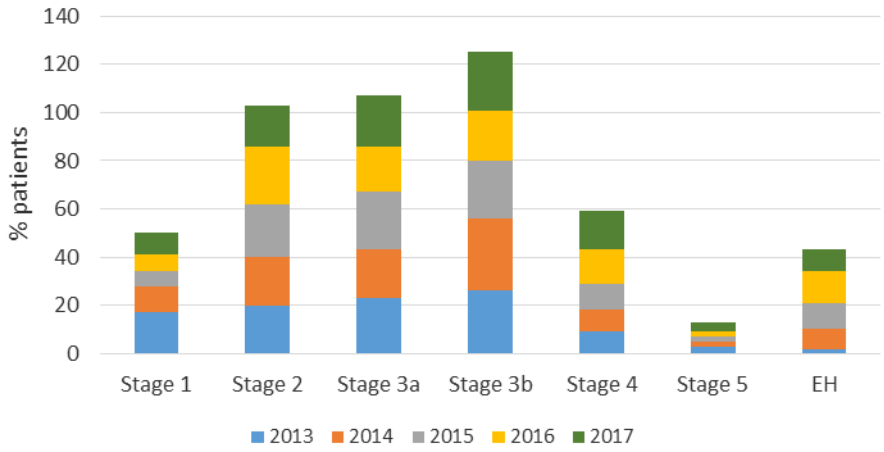


Figure 9. *Referral by Stage and Year*

Most patients are referred early in stages 2-3b i.e. when eGFR is >30mls/min and this despite the referrals protocols indicating referral to a nephrologist should be at stage 4.

Profile of New Patients referred to the service

Most patients are referred from general practitioners in the St George and Sutherland area (57%). However, about 30% of referrals are for patients following a hospital admission and a further 13% from other specialists.

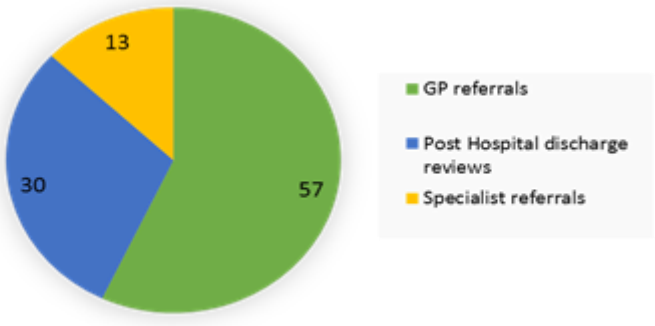


Figure 10. *Origin of CKD referrals to Renal Outpatient*

New referrals to St George Renal Outpatients clinic

2017	Stage 1	Stage 2	Stage 3a	Stage 3b	Stage 4	Stage 5	Essential Hypertension
N	37	69	83	96	61	16	34
Age (SD)	44(15)	56 (18)	68 (16)	72 (16)	75(16)	74(13)	47(14)
BMI (SD)	24 (7)	22 (6)	24(5)	25(5)	24(5)	22(8)	23(5)
Male	43%	46%	70%	53%	57%	63%	41%
Female	57%	54%	30%	47%	43%	37%	59%
Blood pressure (SD)	130/77 (24/14)	135/77 (22/14)	137/72 (18/11)	138/71 (21/14)	139/70 (21/13)	141/76 (26/17)	138/84 (16/13)
Risk factors (%)							
Diabetes	30	25	46	58	48	38	6
Hypertension	43	67	82	91	93	100	71
Cardiovascular	11	17	37	46	51	50	9
Hyperlipidaemia	32	41	51	63	59	63	35
Biochemical markers							
Blood Creatinine umol/L	64 (12)	86 (17)	117 (17)	155 (114)	214 (49)	454 (146)	64
eGFR ml/min/1.73m²	>90	75 (9)	50 (4)	37(4)	23 (4.2)	11(3)	91
HbA1C (%)	6.1 (0.8)	6.6 (1.5)	6.8 (1.2)	7.6 (1.7)	7.2 (1.3)	7.3(1.6)	5.5
Chol mmol/L	5.3 (2)	5.3 (1.3)	4.5 (0.9)	4.1 (0.9)	4.3 (1.3)	5.6	
TG mmol/L	1.75 (0.8)	2.08 (2.5)	1.9 (0.6)	1.7 (0.7)	2.2 (1.4)	0.7	
Iron Sat (%)	25(20)	26 (13)	24 (10)	22(9)	23(11)	19(13)	
Ferritin ug/L	68(14)	224 (90)	225(318)	183(168)	226 (276)	443(365)	
Alb:Crt mg/mmol	118 (272)	82 (218)	60 (176)	59 (110)	78 (172)	118 (208)	2.8 (5)
Prot:Crt mg/mmol	310 (398)	188 (371)	65 (132)	92 (152)	204 (298)	115 (84)	22(33)
On ARB/ACE	41%	55%	57%	55%	36%	19%	
Origin of referral (%)							
Post hospital discharge	35 (AKI 7%)	28 (AKI 32%)	21 (AKI 59%)	24 (AKI 60%)	41 (AKI 96%)	75 (AKI 83%)	32
GP referral	60	65	60	60	48	19	50
Specialist referral	5	7	19	16	11	6	18
Referral to review (days(SD))	35 (24)	45(29)	43(34)	44(34)	37(33)	20(24)	53(45)
Follow up Status							
On Follow up	67%	67%	74%	84%	85%	69%	73%
Discharged from Clinic	30%	32%	25%	15%	12%		27%
Lost to Follow up	3%		1%				
Other						6%	
Dialysis					3%	13%	
Death		1%		1%		12%	

Table 1. Demographics of CKD patients referred to the Renal Unit

A total of 396 new referrals were seen in 2017. Approximately 19% of patients had eGFR <30ml/min/1.73m^2 and 9% of patients were referred for uncontrolled hypertension. Mean age varied among the stages of CKD with mean age in stage 4 of 75years (SD 16). The lower the eGFR the higher the number of patients with risk factors such as diabetes mellitus, hypertension and hyperlipidaemia. BMI remind stable over the different stages of eGFR (Table 1)

Patients who are referred to the nephrologist with stage 5 CKD were mostly from post hospital admission (75%) and 83% of these admissions were for AKI.

The average time taken to review a patient from time of referral (for stage 5 patients) was 20 days (SD 24). About 33% of patients were discharged from the clinic within one year and of these 20% were only seen once. Measures are getting implemented to reduce unnecessary referral by educating GPs on KHA referral guidelines and also by implementing Virtual Medical Clinic.

Diabetes Risk factor

159 patients had diabetic risk factors. 77 of these (52%) had no measurement of HbA1c with their referral. About 40% of the new referrals were patients with diabetes and 25% had an HbA1C less than 7.0.

	HbA1C< 7 n=39	HbA1C≥7 n=43
Age (SD)	69(18)	71(11)
Male		
Female		
BMI (SD)	24(4)	26(5)
eGFR classes (%)		
Stage 1	13	2
Stage 2	15	7
Stage 3a	28	23
Stage 3b	26	44
Stage 4	18	19
Stage 5		5
Essential Hypertension		
ACR Category		
<3.5mg/mmol	20	23
3.5-30mg/mmol	36	26
>30mg/mmol	44	51
PCR Category		
<15mg/mmol	33	33
15-45mg/mmol		17
>45mg/mmol	67	50
On ARB or ACR	62	74

Table 2. Diabetic Risk factors

Distribution of referrals by KHA algorithm and Missing information at the time of referral

Kidney function stage	GFR (ml/min/1.73m^2)	Normal (urine ACR/PCR) ACR<3.5mg/mmol or PCR<15mg/mmol	Microalbuminuria ACR≤ 3.5-35mg/mmol PCR≥15 -45mg/mmol	Macroalbuminuria ACR ≥35mg/mmol or PCR≥45mg/mmol	missing urine protein measurements at baseline
1	≥90 (n=37)	23%	13%	21%	43%
2	60-89 (n=69)				
3a	45-59 (n=83)	24%	17%	16%	43%
3b	30-44 (n=96)	43%		23%	34%
4	15-29 (n=61)	62%			38%
5	<15 (n=16)				

Summary and Conclusions

No National data exist for patient referral to renal specialist health services nor is their clear indication of the progression of CKD over time in Australia.

We are currently working on benchmarks in our unit, but the collection of information by Saiyini Pirabhahar (Research and CKD Clinical Nurse Specialist) over the past 2 years has gone a long way to improve our understanding of our patients and reasons for referrals. In the future we will be working on improved prediction modelling to assist with triage and management of patients.

Referral numbers increased by 24% to our unit and it is clear that GPs continue to refer for reasons not always in keeping with the Kidney Health Australia referral criteria. Of course the protocols encourage individual evaluation of patients and understandably GPs need decision support. However, the aim is to ensure appropriate referrals and use of resources. Now that we have improved risk stratification of patients this should assist us with early referral back to GPs and we can also use the other available option in our service, that of our Virtual Medical Consultation service run by our CKD Clinical Nurse Consultant Kylie Turner.

4. Advanced Kidney Disease and Renal Options Clinic

Kylie Turner / A/Prof Ivor Katz

Activity summary

The Renal Department guideline for referral to the multidisciplinary Renal Options Clinic is eGFR ≤ 15 or dialysis predicted in the following year. As of December 31st 2017, there were ***115 patients on the Predialysis Program with an active plan for renal replacement therapy***. This was an 8% decrease from the previous year.

Since April 2002 there have been 975 people who have attended the clinic. In 2017 eighty one new patients attended the Renal Options Clinic compared to 68 new attendees in 2016. There were 95 follow up appointments compared to 69 follow up appointments in 2016.

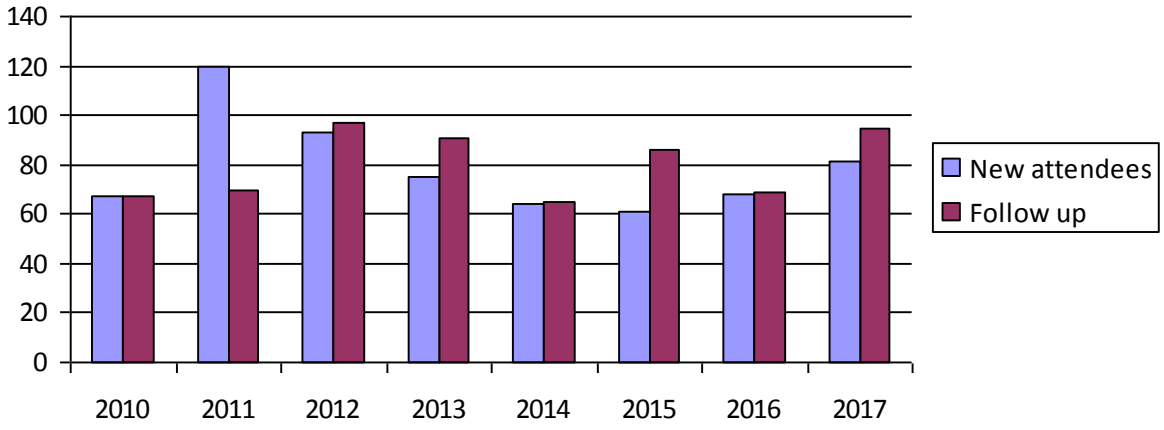


Figure 11. *New attendees and follow up numbers for 2010-17*

The age range of new patients seen in 2017 was 26 – 86 years. The average age was 66.7 years.

Following the visit to the clinic, patients were asked to choose a tentative treatment option. Figure 11 indicates patients treatment option choice for specific RRT therapies (including non-dialysis pathway) from 2013 -2017. These choices may be influenced by their pre-dialysis education.

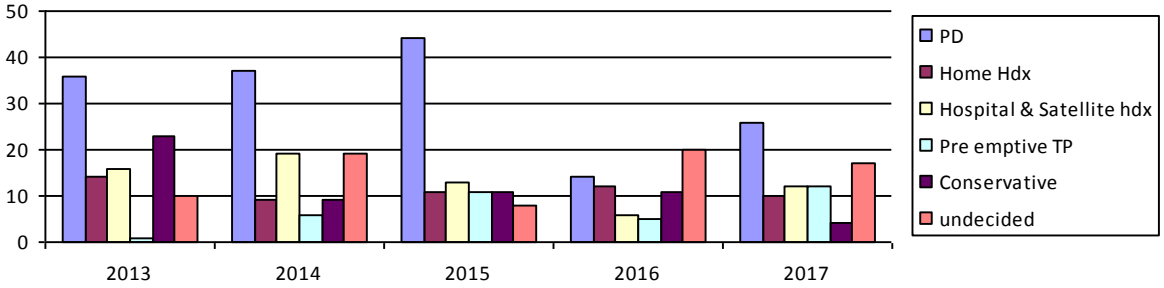


Figure 12. *Percent of patients who opt for specific RRT therapies as a result of pre-dialysis education 2013-17*

KPIs for Pre-dialysis program

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

1. Timely referral to Predialysis Program when eGFR ≥ 15. Benchmark 100%.
2. Seventy percent (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. This review will be at least 3 months prior to starting dialysis and at also within the last 12months.
4. Sixty percent (60%) starting RRT had vaccinated immunity

1. Timely referral to Predialysis Program - 100% ≥ eGFR 15.

In 2017, 51% of patients were referred with an eGFR ≥ 15, this is a decrease from 2016 where it was 66%. This decrease is most likely due to the introduction of a new renal options pathway flow sheet which has lower eGFR referral criteria. Referral was reduced from an eGFR ≤ 20 to ≤15ml/min/m^2. Patients attending with eGFR above 15ml/min/m^2 were extremely reluctant to make decisions regarding RRT potentially so far into the future. We continue to work on better methods to track patients within an ideal time before dialysis initiation.

2. 70% of patients who are known to the unit and have attended Predialysis Clinic commence planned dialysis choice.

For patients commencing dialysis in 2017, 81% started the planned dialysis choice.
Five patients who had originally chosen home haemodialysis (hdx) had hospital hdx due to an acute decline in renal function and had been admitted to hospital when they commenced RRT. Two patients that had chosen PD and had to commence hospital hdx, one had a rapid decline before a PDC was able to be inserted and the second patient had issues with housing and could not be considered for a home based therapy. One patient was due to have a transplant but started PD prior to the transplant being performed. This patient has since been transplanted and only required short term PD.

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

100% of new dialysis patients (excluding late referrals) had pre-dialysis education or review within 12 months before dialysis commencement. This result is an increase from last year, 89%.

4. Sixty percent (60%) starting RRT had vaccinated immunity (this includes pre-emptive transplant recipients)

This benchmark means 60% of patients starting RRT had 'vaccinated immunity' defined as 'anti-HBs ≥10 International units/L'. Those with natural immunity were excluded in this analysis. Only 25% of patients commenced with vaccinated immunity in 2017. This is a 5% decline from 2015 and wasn't reported on in 2016.
In 2017 every patient seen in the Renal Options Clinic (ROC) was asked if they had been vaccinated for HepB. Those patients who were 'unsure' or said 'no', had a letter sent via mail to the GP requesting they start the Hep B immunization process. Therefore, we hope to see ongoing improvements so that we can achieve this benchmark in the future and may need to alter our practice further.

Summary and Recommendations

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 100% had received this education prior to starting dialysis and that 81% started their planned dialysis modality.

Interesting facts include that although we had fewer patients referred (a drop by 8%) compared with the last year we continued to have a high number of follow up visits.

We continue to have low numbers on PD. This requires ongoing investigation to determine if having an older cohort of patients with greater cardiovascular disease is a factor. We need to investigate methods by which we can ensure all (or at least more) patients selecting PD can have it.

In 2018 we will focus on:

- Utilization of the St George Renal Department information handout on dialysis and non-dialysis treatments as a decision making tool for patients being seen in the renal option clinic.
- To review the Renal Options Clinic flow chart to include more variables including the utilization of the Tangri kidney function risk equation (KFRE) score as well as symptoms and an eGFR value for referral between 10-15. This will change the benchmark for the next annual report for 2018. The aim is to be more efficient in the selection of patient who we should follow and better select those likely to need dialysis within a year
- Better tracking of patient Hep B immunization status and an improvement in our benchmark of patients commencing RRT vaccinated for Hep B. Serology testing to be conducted following initial appointment at ROC and the prescribing of hepatitis vaccine at the patient's next nephrologist appointment and encouraging patients to attend the GP to administer vaccine.

CKD Virtual Medical Clinic

St George Hospital Renal Department initiated virtual medical consulting in 2013, where a pilot study was conducted that produced positive results:

- High level of satisfaction within the GP community
- Issues with software integration (time consuming)
- Patients happy with 'virtual' model of care
- Improved time to specialist review.
- No issues of computer literacy

As the outcomes were positive, and at least no different to 'standard' face to face clinic care, it was decided we would continue with this model of care.

Patients who are referred to this form of consultation are those deemed by their nephrologist to be stable CKD patients whose blood pressure is controlled and simply require more 'active' tracking.

Virtual Medical Clinic as of the 31.12.17

New Referrals	Active Patients	Discharged back to face to face appointments	Deceased
35	44	27	3

The 27 patients referred back to face to face generally had a deterioration in there renal function or had a recent hospital admission and became unstable. Of note is that of the 3 patients who died only 2 were still part of the Virtual Medical clinic at the time of their death. They both passed away due to medical issues not directly related to their renal disease.

5. Acceptance onto dialysis

Kylie Turner / A/Prof Ivor Katz

Out of 37 new patients who started dialysis in 2017, 13 (35%) patients commenced peritoneal dialysis, 3 (8%) started home haemodialysis and 21 (57%) started haemodialysis. Patients were analysed according to their first mode of dialysis. There were also 4 failed transplant patients that commenced dialysis but these patients are not included within the analysis as they are not new patients. The modalities chosen by these patients were; 1 commenced PD, 1 home haemodialysis and 2 hospital haemodialysis.

- There were only 5 (14%) late referrals which was below the National average (18%). Of note is that 2 of the late referrals received PD as first modality. Unfortunately both peritoneal dialysis catheters (PDC) were required to be surgically placed. The first patient had to have a PDC due to severe coronary artery disease and needed to commence dialysis prior to having an angiogram. The second patient required surgical insertion due top body habitus.
- Mean age at commencement in 2017 was 62 years for PD and 64 years for haemodialysis. The age of patients starting haemodialysis was younger than in previous years but this is still older than the National average age which is 60 years (ANZDATA 2016).

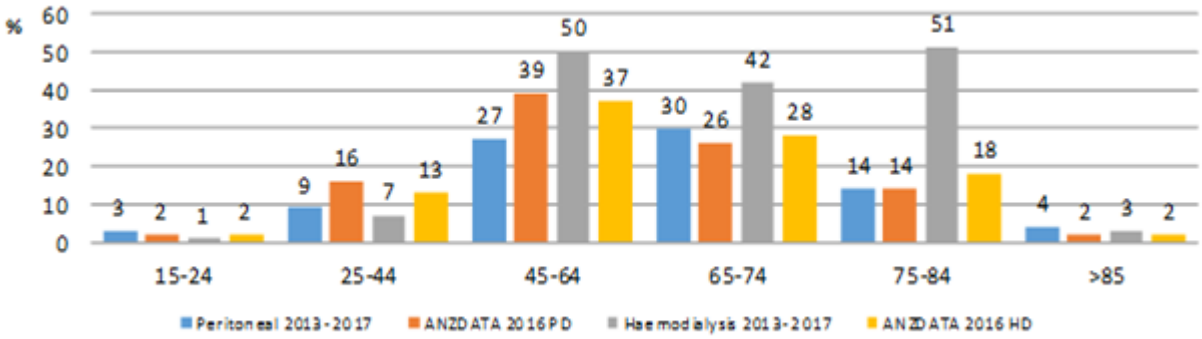


Figure 13. *Age Groups of New Patients 2013-2016 compared to ANZDATA 2016*

Major features in our data were a high number of older patients selecting haemodialysis in our cohort. We continue to start more patients than nationally in the 75-84 age groups. This does require further investigation**.**

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 following the IDEAL study, with the vast majority of our patients commencing at an eGFR below 10ml/min.

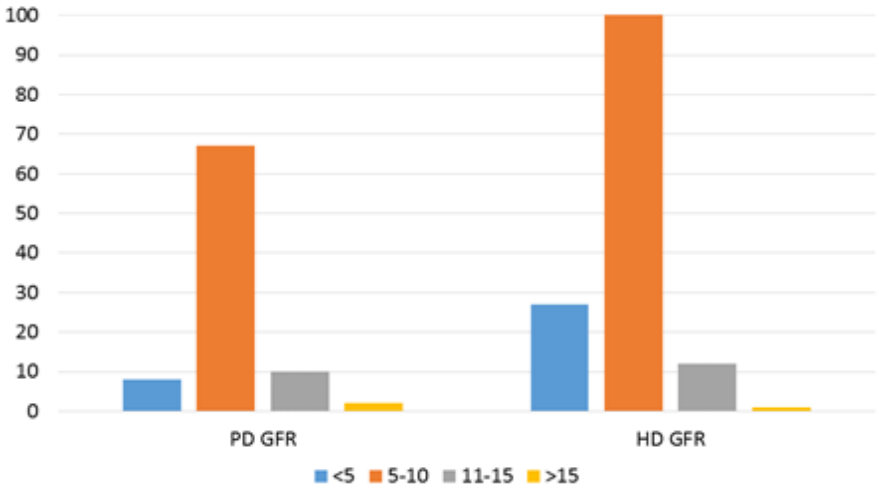


Figure 14. *PD and Haemodialysis eGFR at commencement 2013-2017*

Baseline characteristics of new patients

Body mass index

Body Mass Index (kg/m)	PD 2013 – 2017 (%) N=87	HD 2013 – 2017 (%) N=154
<20	7%	5%
20-24	29%	19%
25-30	26%	29%
>30	29%	29%
>35	10%	18%

Table 3. 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 2013-17 (n=154*)	ANZDATA HD 2016 (n=1923)	St George PD 2013-17 (n=87*)	ANZDATA PD 2016 (n=791)
Age	Average age in years	62	60	63	64
Gender	Male	63%	63%	72%	64%
	Female	37%	37%	28%	36%
Late Referral	<3mths before 1st treatment	19%	21%	9%	10%
Co-morbidities	Smoking (Current and former)	46%	48%	44%	46%
	Chronic Lung Disease (yes and suspected)	17%	15%	22%	10%
	Cerebrovascular Disease	9%	12%	15%	8%
	Coronary Artery Disease	42%	34%	48%	23%
	Peripheral Vascular Disease	18%	22%	25%	17%
	Diabetes	52%	52%	51%	45%

Table 4. Baseline characteristics of new patients (Excludes patients who had previous mode of dialysis)

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.

6. Vascular Access

Yanella Martinez-Smith, Christopher Cowland, Jayson Catiwa

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 2016 report, KDOQI 2006 and CARI 2012 guidelines.
- The key performance measures for vascular access are:
  1. > 40% patients commencing haemodialysis with a functioning access (ANZDATA 2016)
  2. > 79% of prevalent patients dialysing through a native fistula (ANZDATA 2016)
  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% graft 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 44% for patients having a functioning access at first dialysis (ANZDATA 2016).

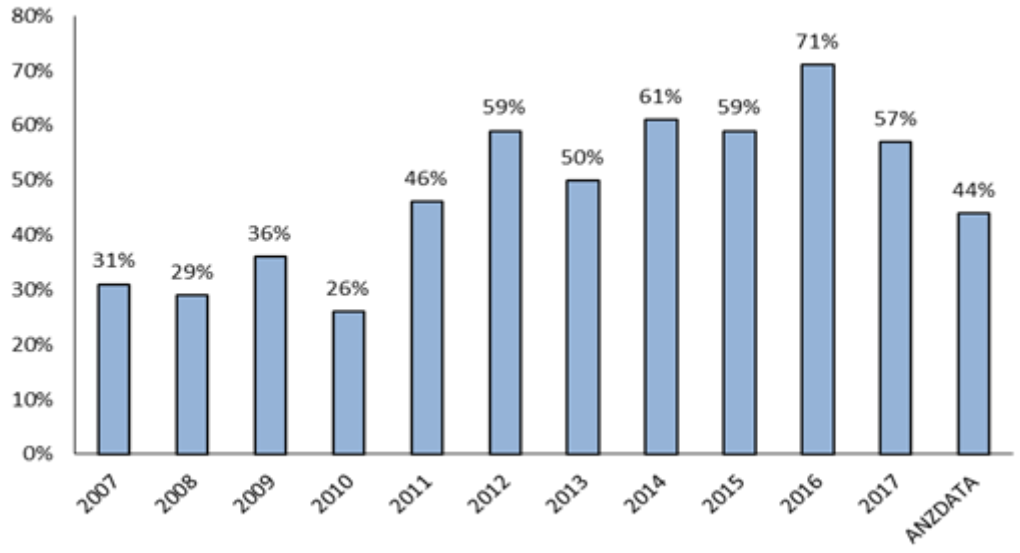
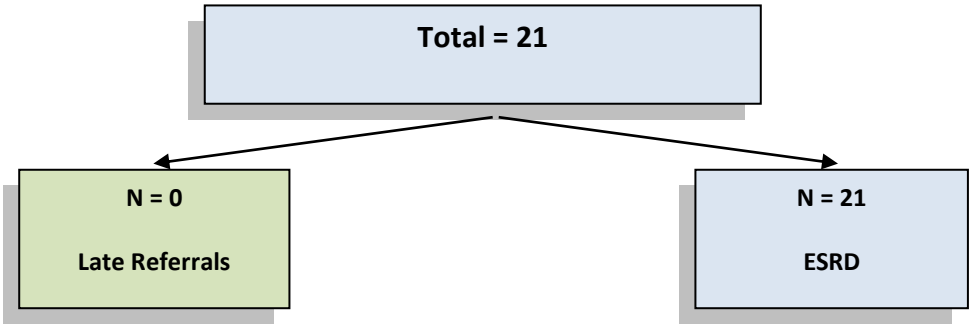


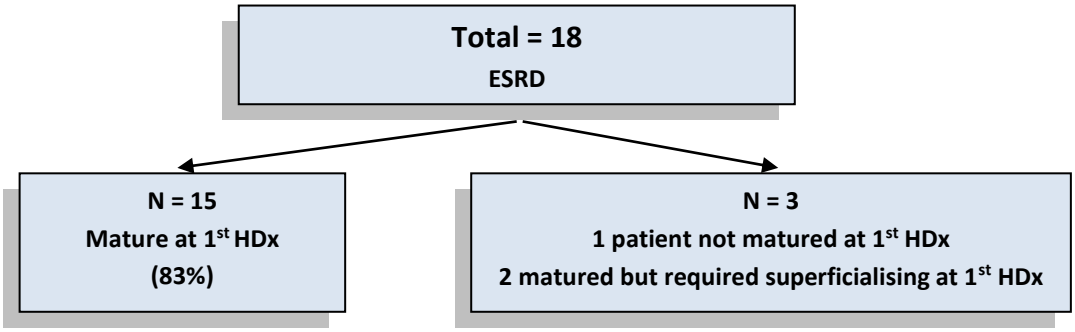
Figure 15. *Functioning access at entry*

- In comparison, 57% of all St George Hospital Renal Department patients had a functioning access at first haemodialysis

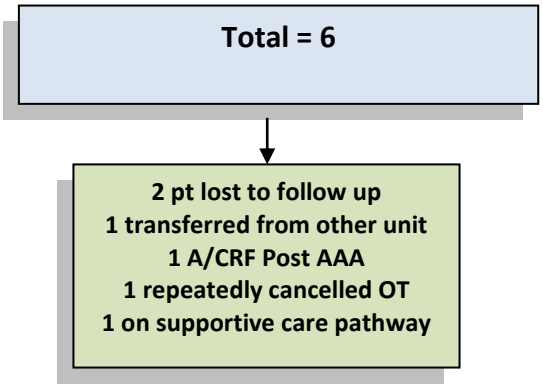
Patients new to haemodialysis in 2017



Access created before initial haemodialysis



No access created before initial haemodialysis



Comments:

- 15 (83%) patients had a mature access at their first haemodialysis.
- There were no late referrals at St George Hospital Renal Department compared to the ANZDATA Report (2016) at 17%.
- Average time from initial referral to access creation was 64 days
- The aim is to have access created within 30 days of initial referral
- Average time to first cannulation in 2017 was 6 months

Vascular Access at first HDx

ANZDATA (2016) benchmark: 40% commenced with a native fistula (AVF) and 2% with a graft (AVG) equating to 42%.

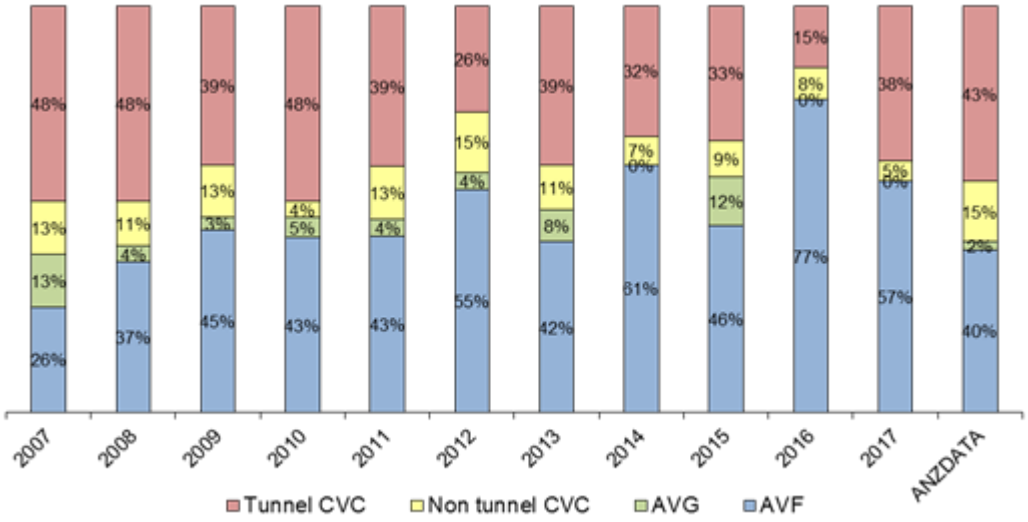


Figure 16. *Vascular access at first HDx*

Comments:

- In comparison, St George Hospital Renal Department achieved 57% with a native fistula compared to the ANZDATA benchmark of 40%.
- 38% of St George Hospital Renal Department commenced their first haemodialysis via a tunnelled catheter compared to the ANZDATA benchmark of 43% (ANZDATA 2016)

Prevalent Data: (n = 211)

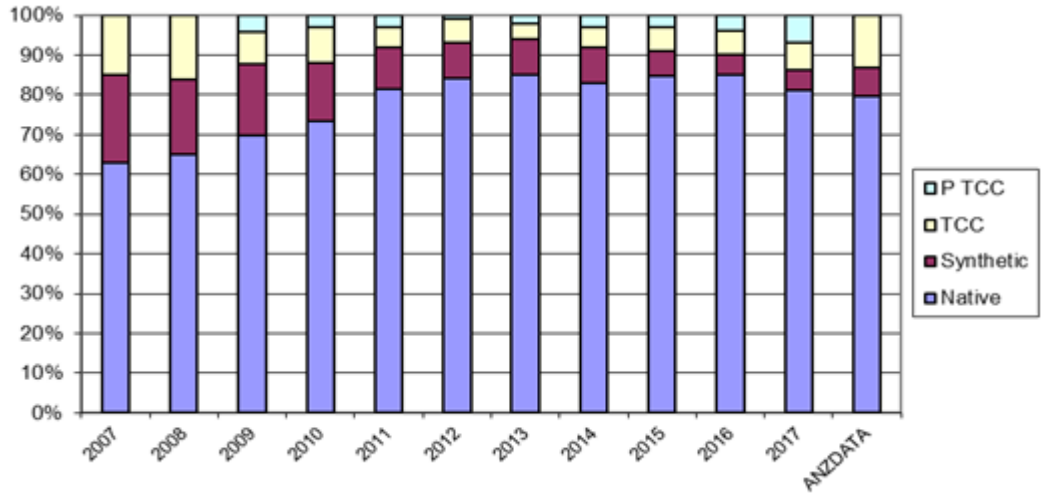


Figure 17. *Prevalent access*

Comments:

- 87% of St George Hospital Renal Department patients were using a fistula/graft for haemodialysis, compared to the ANZDATA benchmark of 86% and KDOQI benchmark of 40%
- 7% of St George Hospital Renal Department were using a permanent catheter which is less than the KDOQI benchmark of < 10%

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
2017	**3 BSI (0-0.27 BSI/100 pt months)**	**0 BSI (0 BSI/100 pt months)**
2016	1 BSI (0-0.08 BSI/100 pt months)	0 BSI (0 BSI/100 pt months)
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 5. Access infection rates

Comments:

- St George Hospital Renal Department patients' infection rate for fistulas was 1.7% 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
2017	9 (9pt)	6 (5pt)	1.25
2016	15 (14pt)	3 (3pt)	1.5
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 6. Thrombosis events

Comments:

- Thrombosis rate for St George Hospital Renal Department is below target for AVF = 0.25 episodes/pt-year
- Thrombosis rate for St George Hospital Renal Department is above target for AVG/SVG = 0.5 episodes/pt-year
- The average thrombosis rate per month across all fistula types is 1.25
- The number of patients with AVG continues to reduce which has impacted on the thrombosis rates

Access survival

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

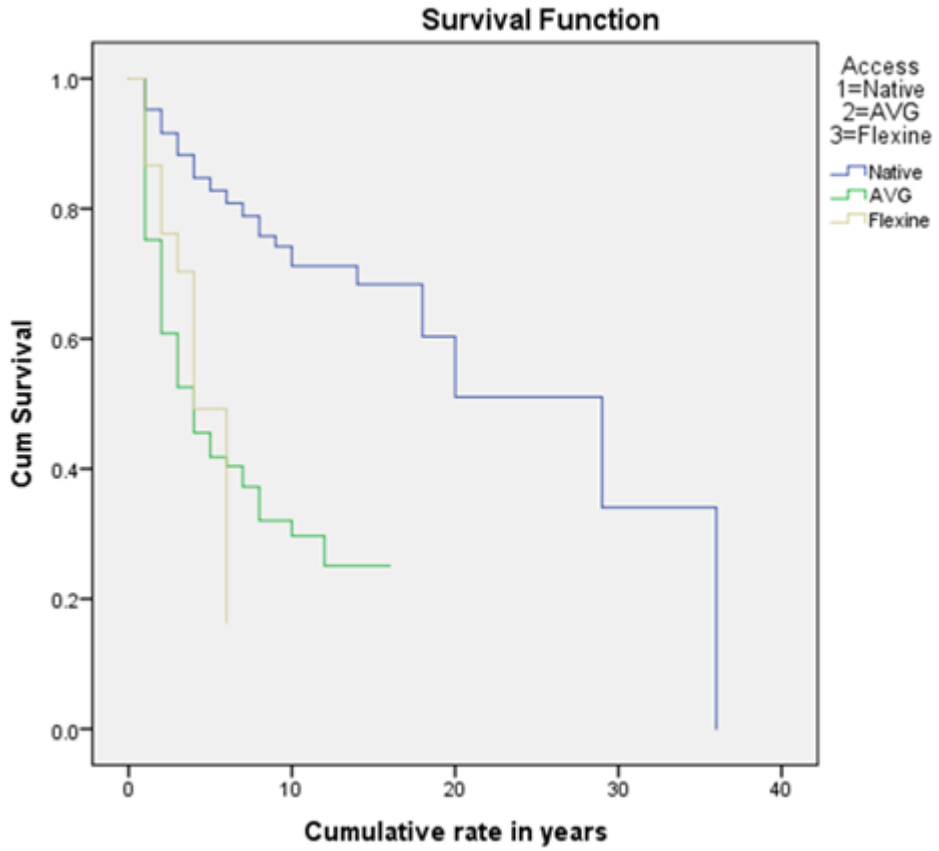


Figure 18. *Survival Function*

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 (81%), at 10 years (71%)
- AVG at 1 year (61%), 2 years (53%), 3 years (46%)
- Flexine at 1 year (76%), 3 years (49%)
- 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).

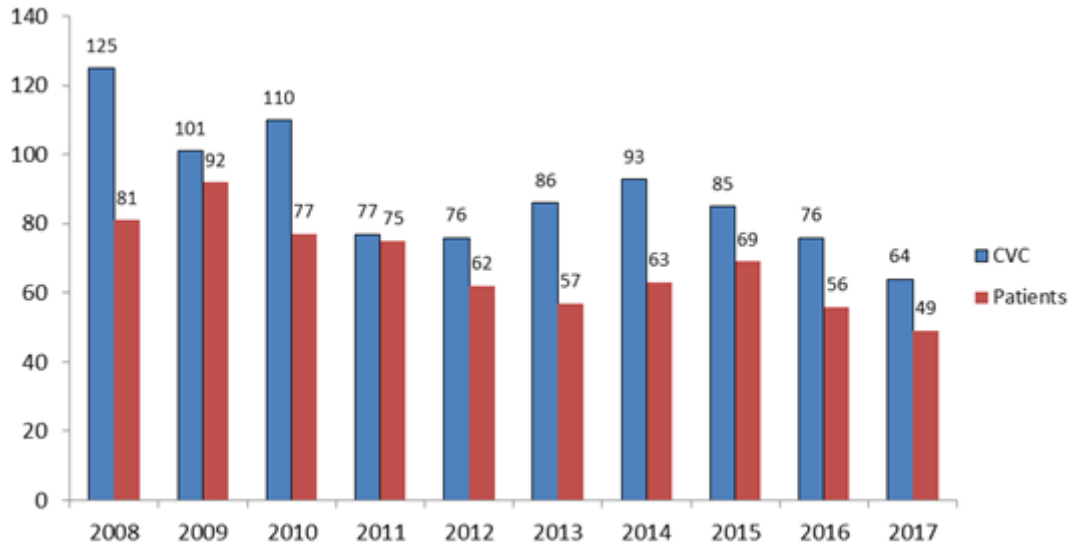


Figure 19. *Activity Level*

Comments:

- Total days all catheters in-situ 5557 days compared to 4831 days (2016)
- Average days all catheters in situ 87 days compared to 63 days (2016)

Reason for insertion of catheters

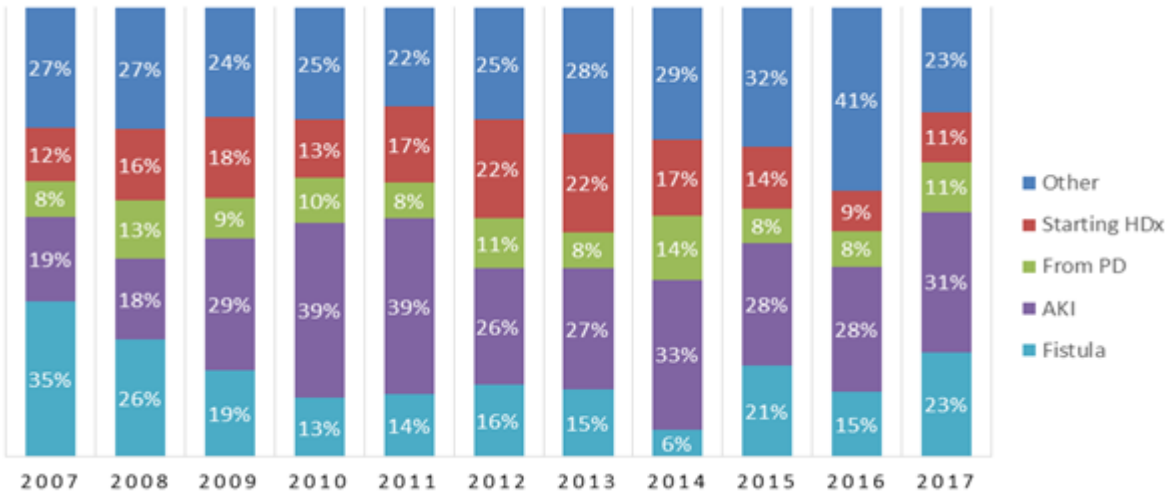


Figure 20. *Reason for insertion of catheters*

Comments:

- Fistula group includes immature, revision or thrombosed
- Other includes replacing a non-tunneled catheter with a tunneled catheter; malfunction; occlusive thrombus; cuff extrusion or infection
- There were no catheter complications related to insertion

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
2017	**3% (0.36 episodes/1000 catheter days)**	**4.7% (0.54 episodes/1000 catheter days)**
2016	4% (0.62 episodes/1000 catheter days)	1.3% (0.21 episodes/1000 catheter days)
2015	1.2% (0.19 episodes/1000 catheter days)	4.7% (0.47 episodes/1000 catheter days)
2014	2.1% (0.26 episodes/1000 catheter days)	4.3% (0.64 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% (0.10 episodes/1000 catheter days)	6% (0.6 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 7. Catheter Infection rates

Comments:

- The benchmark for CRB is being met (CRB 0.32 episodes/1000 catheter days)
- For the 64 catheters inserted in 2017, 2 catheter-related bacteraemia and 3 exit-site infections occurred
- 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 remains at twice weekly
- The combined Nephrologist/Vascular Surgeon meeting will continue quarterly
- 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 for fistulae, grafts & catheters are low, and access survival is excellent.
- Thrombosis rates have improved compared to 2015

7. Haemodialysis

Tracey Blow, Ivor Katz, Saiyini Pirabhahar, Louise Jordan and Elizabeth Hogan

Activity

St George Hospital operates a 34 chair haemodialysis service providing high level care haemodialysis and home haemodialysis training. On average in 2017, 128 patients were dialysed each month and a total of 20,596 treatments were completed, a marginal drop when compared with 2016 activity, where 20,651 treatments were performed. The reduction in activity was noted on night shift, with chairs numbers reducing from 16 to 8 at the end of December. Influenza and gastroenteritis outbreaks impacted heavily on inpatient activity in winter, resulting in an initiative to vaccinate patients against influenza in 2018.

The Satellite haemodialysis service at The Sutherland Hospital operates twelve chairs for low care patients. In 2017, 7208 treatments were performed, 179 treatments less than in 2016 and on average, 47.3 patients dialysed each month.

Home haemodialysis activity increased in 2017 with fourteen (14) patients commencing training, three failing the program and two in training at the end of 2017. Respite dialysis increased towards the end of the year with regular sessions provided for ten patients, assisting with cannulation, re-education with lines or following hospital admission. Of the home HD patients, six dialysed more than 7 hours a night with the remaining patients dialysing on average 19.7hrs per week i.e. alternate days between 4-6 hours.

Activity for haemodialysis

Total activity across the two sites plateaued in 2017 with a total of 27,804 sessions performed (in-centre and satellite treatments). The graph below shows growth patterns from 2012 with only 0.8% increase in 2017. This includes haemodialysis for acute kidney injury and chronic kidney disease stage 5/end stage kidney disease (ESKD).

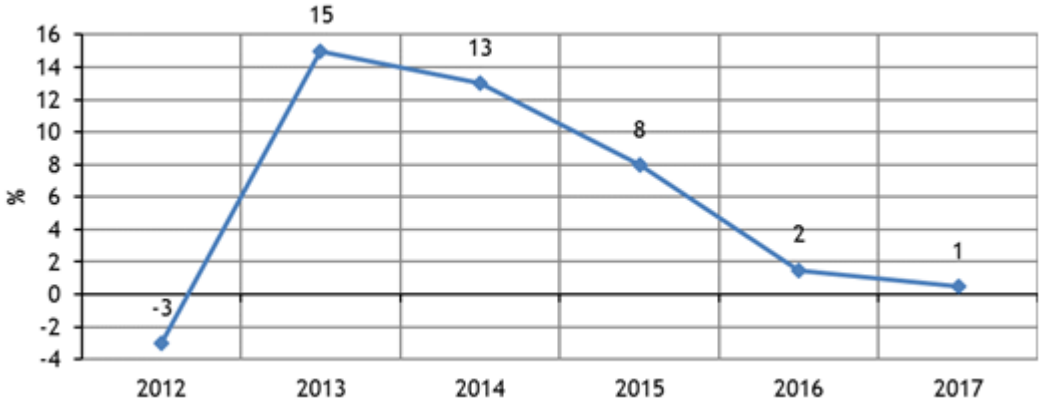


Figure 21. *Growth Rates in Haemodialysis at St George and Sutherland Dialysis Units*

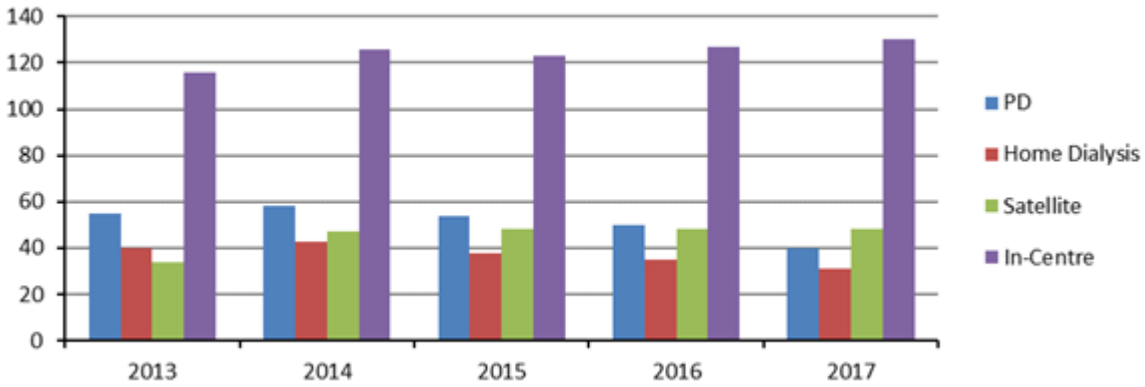


Figure 22. *Distributions of dialysis modalities for 2013 through to 2017*

	2013	2014	2015	2016	2017
In-centre haemodialysis patients at beginning of year	118	116	126	123	135
IN					
1. New Patients	36	36	27	29	24
2. Transfers from other units	1	1	11	2	11
3. Transfers from PD	10	14	7	10	13
4. Failed transplants	4	2	2	1	2
5. Transfers from Home Hdx/Satellite	7	1	4	5	8
6. Acute Kidney Injury*	19	29	27	24	22
7. Other			1	5	
Subtotal	***77***	***82***	***79***	***76***	***80***
OUT					
7. Transplants	4	3	8	4	6
8. Transfers to other units/overseas	2	2	2	5	3
9. Transfers to Home Hdx	4	3	6	3	2
10. Transfers to PD	4	5	5	2	5
11. Transfers to Satellite	15	10	15	6	14
12. Regain Function	15	26	18	13	16
13. Deaths (medical)	19	11	12	11	21
14. Deaths (withdrawal)	16	12	16	20	15
Subtotal	***79***	***72***	***82***	***64***	***82***
NET GAIN/ LOSS	-2	10	-3	12	-2
In-centre haemodialysis patients at end of year	116	126	123	135	133

Table 8. Patient Flow at St George Hospital from and to haemodialysis 2013- 2017

*Includes patients with acute kidney injury alone but also patients with co-existing chronic kidney disease whose renal failure worsened to the point of requiring temporary dialysis

	2013	2014	2015	2016	2017
Satellite haemodialysis patients at beginning of year	**34**	**39**	**47**	**48**	**48**
IN					
1. New Patients	1	1	2	0	0
2. Transfers from other units	0	1	1	1	0
3. Transfer from PD	0	1	0	0	1
4. Transfer from Incentre	8	10	12	7	14
Subtotal	***9***	***13***	***15***	***8***	***15***
OUT					
5. Transplants	1	0	2	1	0
6. Transfers to Home Hdx	1	2	1	1	2
7. Transfers to PD	2	0	0	1	1
8. Transfers to Incentre	3	0	5	3	8
9. Transfer to other units	0	1	1	1	1
10. Deaths (medical)	4	2	5	1	3
11. Deaths (withdrawal)	1	0	0	0	0
12. Regain Function	0	0	0	0	0
Subtotal	***12***	***5***	***14***	***8***	***15***
NET GAIN/ LOSS	**-3**	**8**	**1**	**0**	**0**
Satellite haemodialysis patients at end of year	**39**	**47**	**48**	**48**	**48**

Table 9. Patient Flow at The Sutherland Hospital from and to haemodialysis 2013- 2017

	2013	2014	2015	2016	2017
Home haemodialysis patients at beginning of year	**47**	**40**	**43**	**38**	**38**
IN					
1. New Patients	3	4	2	6	5
2. Transfer from PD	0	1	2	2	3
3. Transfers from other units	0	0	0	0	0
4. Transfer from Satellite	0	2	1	0	2
5. Failed transplants	0	0	0	0	2
6. Transfer from Incentre Hdx	4	3	0	2	2
Subtotal	***9***	***10***	***5***	***10***	***14***
OUT					
Transplants	10	4	7	5	4
Transfers to other units	1	0	1	0	0
Transfers to Incentre Hdx	2	1	2	3	0
Transfers to Satellite	0	1	0	0	3
Deaths	3	1	0	2	2
Subtotal	*16*	*7*	*10*	*10*	*9*
NET GAIN/ LOSS	-7	3	-5	0	-5
Home haemodialysis patients at end of year	**40**	**43**	**38**	**38**	**33**

Table 10. Flow to and from Home Haemodialysis from 2013 to 2017

Summary:

- Activity dropped marginally in 2017 with less need for night dialysis chairs.
- On the 31st December 2017, 48 (19%) St George and Sutherland patients were dialysing at the Satellite unit.
- Twenty nine percent (28%) of patients were dialysing on a home therapy (PD and HD) in line with national data of 27% and 52% of patients were dialysing in the hospital based facility.
- Respite dialysis for home patients remained a valuable service in 2017 and 85% of patients were retrained on new machine technology.
- Whilst activity across the two sites plateaued, (St George In Centre and Sutherland Satellite) and the need for night chairs reduced from 16 to 8 at the end of 2017, planning for a new stand-alone satellite haemodialysis unit for the St George area continued to manage future service demands and remains a short term priority

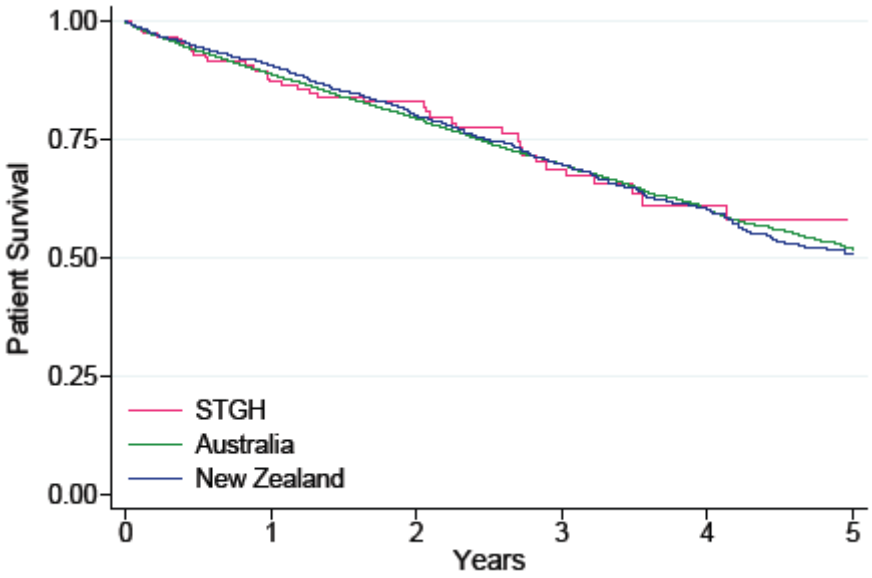


Figure 23. *Patient Survival –for HD patients on dialysis > 90 days*

Patient survival was at least as good as if not slightly better than the national average with one year survival of 87.3% and 5 year survival 58.3%. This is an excellent outcome for our cohort which is also slightly older than the national average

HD patient survival

	STGH		Australia		New Zealand	
Time	n	% Survival (95% CI)	n	% Survival (95% CI)	n	% Survival (95% CI)
0	169	100.0	9172	100.0	1597	100.0
3 months	153	97.0 (92.8-98.7)	8288	96.7 (96.3-97.0)	1443	96.8 (95.8-97.6)
6 months	138	93.0 (87.7-96.1)	7532	93.9 (93.4-94.4)	1346	94.8 (93.5-95.8)
1 year	119	87.3 (80.7-91.7)	6197	89.0 (88.3-89.6)	1152	90.8 (89.1-92.2)
2 years	79	83.2 (75.8-88.4)	4012	79.6 (78.6-80.5)	777	80.1 (77.8-82.3)
3 years	46	69.0 (58.6-77.2)	2402	69.9 (68.6-71.1)	457	69.8 (66.8-72.5)
4 years	22	61.2 (49.3-71.2)	1251	60.3 (58.8-61.8)	233	60.4 (56.8-63.8)
5 years	8	58.3 (45.6-69.1)	443	52.0 (50.0-53.9)	73	51.0 (46.4-55.5)

Haemodialysis Clinical, Biochemical and Dialysis Adequacy Evaluation

As part of the dialysis units ongoing evaluation to ensure adequate dialysis is achieved for the patients it remains standard practice to carry out routine monthly blood testing. Such protocols are standardised throughout Australia and the results are reported in the ANZDATA annual reports. It is our aim to achieve biochemical and haematological targets established by ANZDATA and through national consensus. To achieve these outcomes a specific 'dialysis dose' is prescribed and specialist renal medications are individualised for each dialysis patient. The goal is to achieve biochemical and haematological targets and an acceptable 'uraemic toxin' clearance. Clearance and dialysis adequacy are measured using specific tools such as the Kt/v and urea 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 and still 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 key performance indices (KPIs) serves as a measure of how our dialysis unit delivers an acceptable standard of healthcare for patients with end stage kidney failure (ESKD) on haemodialysis.

- 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 (n)	Sutherland Hospital (n)
< 4	0	1
4	39	22
4 – 4.75	29	12
5-6	42	11
7-7.5	2	-
8	6	-

Table 11. Dialysis duration per individual dialysis session at St George and Sutherland Hospitals

- Thirty seven percent (37%) of in centre or satellite haemodialysis achieved the KPI of >15 hours on dialysis per week.

Home Haemodialysis

Duration (hours)	Home haemo (n)	Frequency of dialysis
12 -14 hrs week	0	3 x week = 11
15-17 hrs week	11	Alternate days = 16
17.5-20 hrs week	10	4 x week = 2
21-22 hrs week	3	
22.5-28 hrs week	4	
30-33 hrs week	1	

Table 12. Home haemodialysis dose (hours on dialysis)

- Eighteen patients (62%) are dialysing >17.5 hours week

- Four patients (13%) are performing overnight dialysis
- Sixteen patients (55%) are dialysing on alternate days or more
- Twenty six patients (89%) are using an ESA.

Dialysis Adequacy assessed by Kt/v and URR

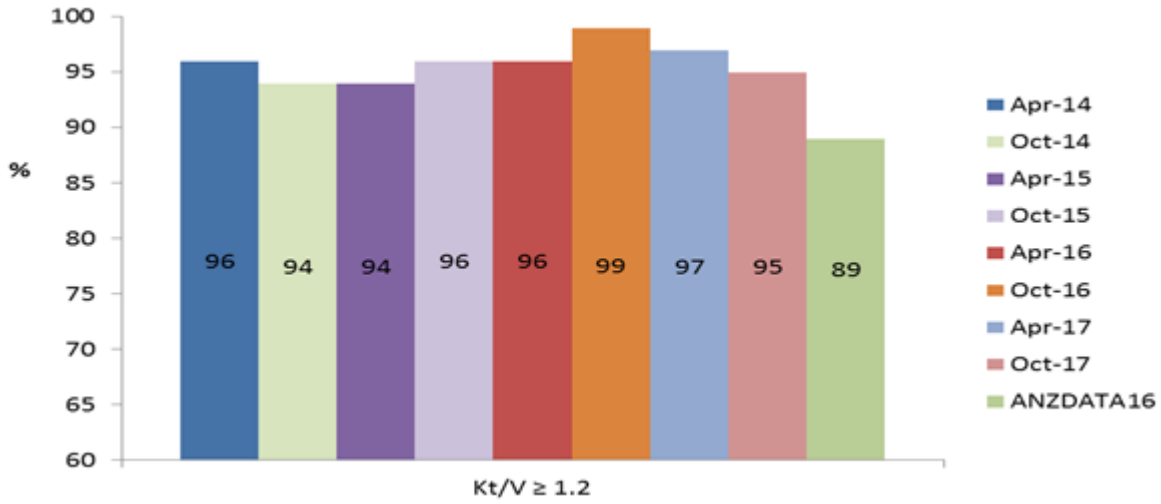
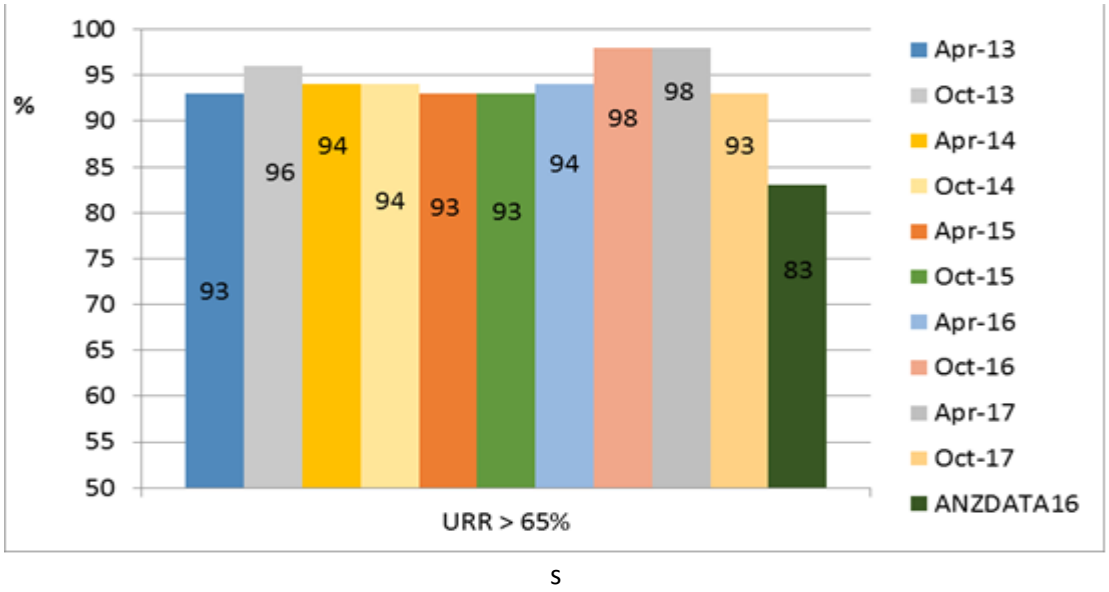


Figure 24. *Dialysis Adequacy assessed by Kt/v from 2013 to 2017*



s

Figure 25. *Urea Reduction Ratio (URR) >65% in patients on Haemodialysis by Year*

The St George and Sutherland dialysis unit 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) remains better compared to national data from ANZDATA, (which were 95% vs 89% and 93% vs 83% for Kt/v and URR respectively). This is a good achievement considering our patients older age and slightly higher co-morbidities.

Parameter	Target	Apr 15	Oct 15	Apr 16	Oct 16	Apr 17	Oct 17	ANZDATA 2016
Ca	2.25-2.58 mmol/L	62	62	67	71	63	69	
Corr Ca	2.1-2.4 mol/L	31	40	43	26	45	46	
PO4	0.8-1.6 mmol/L	58	49	48	48	46	50	**44**
$CaPO_4$ (Corrected Ca)	<4.0 mmol/L	61	58	50	53	57	52	
CaPO4	<4.0 mmol/L	64	64	57	57	61	59	**57**
Ferritin	200-800 ug/L	71	77	66	69	63	60	**75**
Fe Sats	20-40%	70	63	57	58	59	61	**66**
Albumin	33-48 g/L	58	71	72	61	23	49	-
PCR	<1.0	61	50	51	51	59	52	-
KT/V	≥ 1.2	94	95	96	99	99	95	**89**
URR	>65%	93	91	94	98	98	93	**83**

Table 13. Blood biochemical targets and percentage of patients achieving target levels at St George Haemodialysis.

Our serum phosphate targets are above the national targets achieved in ANZDATA. This is something that we are monitoring considering it is a major factor associated with morbidity and mortality. Target levels for phosphate in most guidelines are <1.8mmol/L and the target we use may be too stringent.

Haemoglobin Targets

The current haemoglobin (Hb) target range is 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 or morbidity. The range 100-120g/dL is that at which patients have lower morbidity and mortality and less symptoms. Hb levels >130 are associated with increased morbidity and mortality including blocking of the arteriovenous fistula. Levels below 100g/dL are associated with symptoms and reduced QOL.

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.

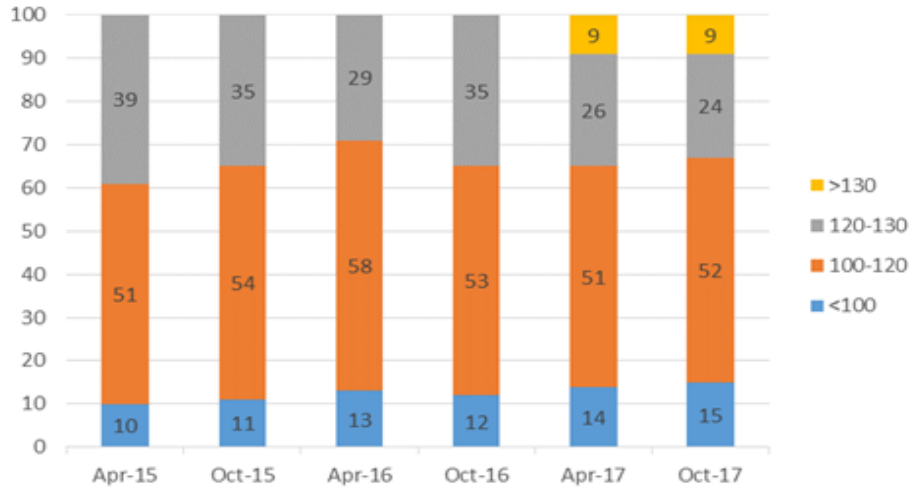


Figure 26. *Serum Haemoglobin levels by target level*

Overall we continue to keep the majority of our patients within the target range. Importantly very few (15%) are at levels below 100mg/dL. The Australian CARI 2011 guideline target 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 >130g/L. The real concern is when Hb is above 130g/dL. For our patients the percent above 130 was 9%. Importantly there are not large variations in our yearly data and between April and October testing. High swings of Hb are associated with worse outcomes.

The proportion of patients in St George and Sutherland with an Hb 100-129 was 58%, this is above the national average of 43% (ANZDATA 2016).

Anaemia Management Erythropoietin Use and Serum Iron Studies

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 been successful. We continue to achieve targets above the national ANZDATA targets.

More recently we have noted that the fluctuation in target Hb may be too high in some individual patients. In order to reduce this effect, as it has clinical implications, we have changed our erythropoietin dosing practice.

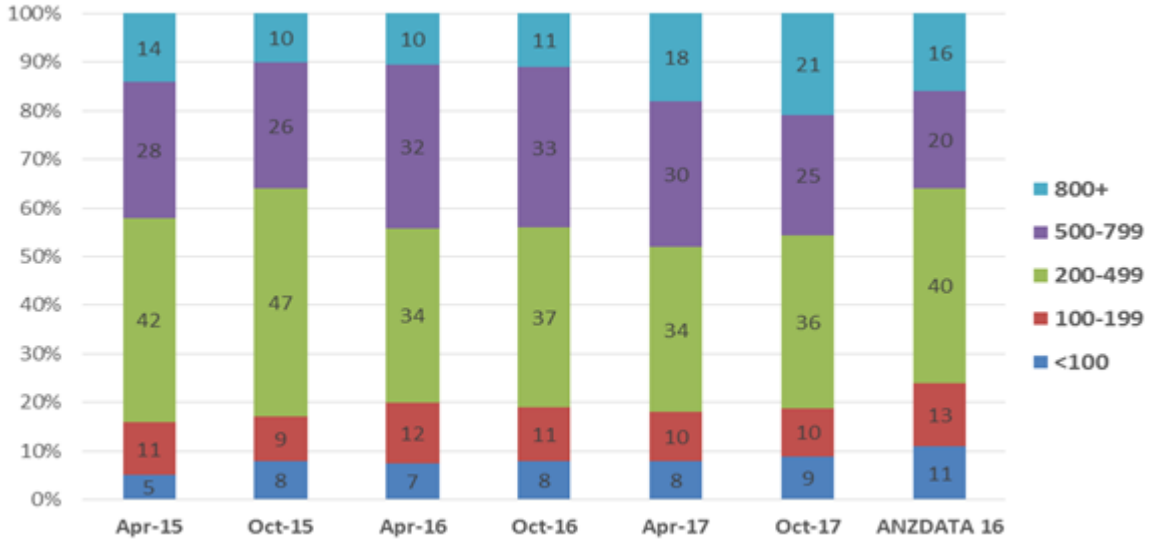


Figure 27. *Serum Ferritin levels by target level*

In Australia and New Zealand ANZDATA 2016 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 36% which was slightly lower when compared with 40% from the ANZDATA 2016 report. Target levels for serum ferritin are

from 200-400% with safe levels being levels being <800% with some ESA/iron trials aiming for levels below 1000%. 21% 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 2016 serum transferrin saturation levels between this range were in 55% of the dialysis population. At St George and Sutherland hospital we had 61%.

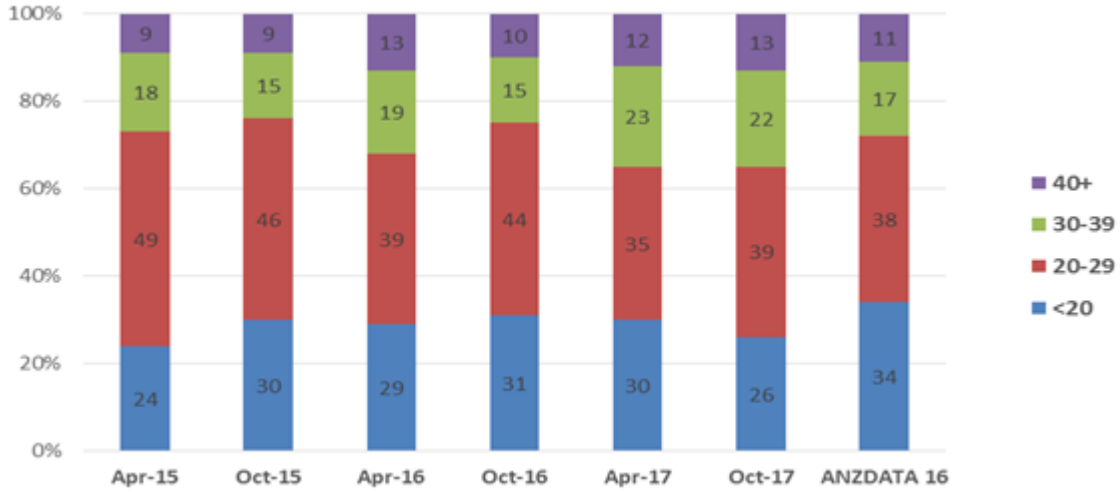


Figure 28. *Serum Iron Transferrin Saturation by target Level*

The St George and Sutherland haemodialysis results continue to achieve levels at or slightly better than the national ANZDATA averages for dialysis patients. This we believe is related to our 'primary haemodialysis nurse' policy which includes highly specialised nurses having more autonomy to control iron use and withdraw of erythropoietin.

Renal Bone and Mineral Disorder (MBD) Metabolism Management

Patients on dialysis commonly have abnormalities of parathyroid hormone (PTH) secretion, due to the development of secondary hyperparathyroidism. This arises as the kidney cannot excrete phosphate or create active vitamin D3 and control serum calcium and phosphate levels. The result is the development of mineral and bone disorder (MBD) which has an impact on a dialysis patients' bones and vasculature.

On dialysis we monitor the laboratory 'mineral' levels which can impact on dialysis patient's bones and vessels. Dialysis is a critical component of their management which assists with the regulation of the serum phosphate, calcium and PTH levels. In turn patients also require a diet restricted in phosphate and calcium and medication which reduces the absorption of phosphate (phosphate binders). The Phosphate, calcium levels and dialysis patient's dialysis dose, adherence to their dialysis diet and medications will all influence the PTH levels and MBD. In light of this our patients on dialysis have regular calcium, phosphate and PTH measurements to assess this dynamic process.

For PTH monitoring to provide the maximum benefit to patients, therapeutic targets are necessary. Higher levels of serum calcium, phosphate and the calcium x phosphate product have been associated with coronary artery and other artery calcification. Calcified vessels are associated with an increased morbidity and mortality. Acceptable PTH targets on dialysis for patients are 5-9x the normal laboratory level. Levels which are too low are also associated with morbidity e.g. bone fractures.

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 16% >52-95pmol/L or 8% < 3.5 pmol/L. It was noted that a large number (38%) continue to have iPTH levels <20pmol/L. Parathyroid hormone levels are not reported in ANZDATA.

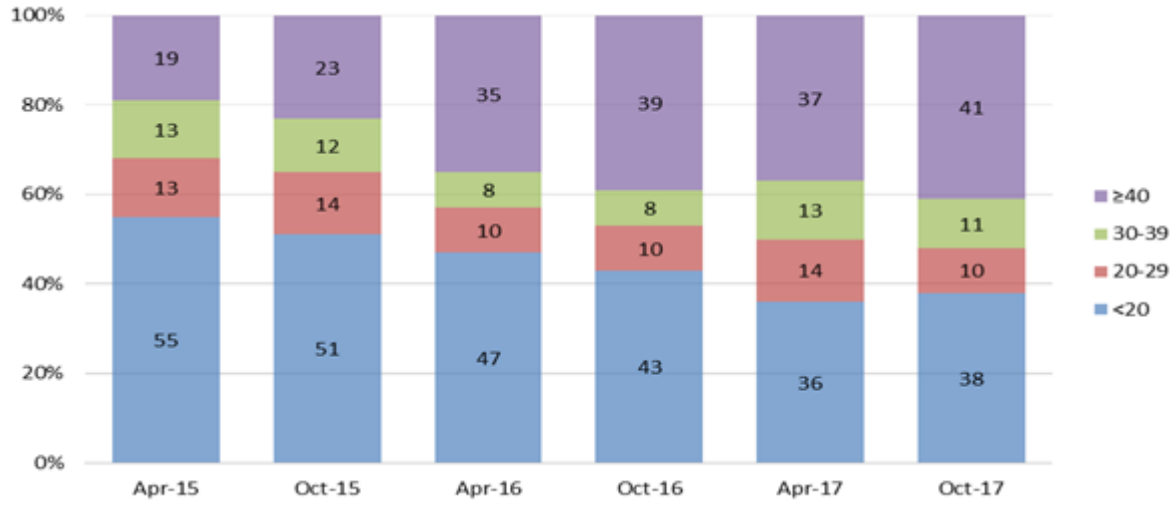


Figure 29. *Serum PTH for Haemodialysis patients from 2015 to 2017*

Serum Calcium (Uncorrected)

Compared with ANZDATA 2016 we had a larger number of patients within the target calcium level 2.2-2.5mmol/L, i.e. 73% versus 58%. 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 assisting us in achieving this were the high number of patients completing >4 hours of dialysis each dialysis session.

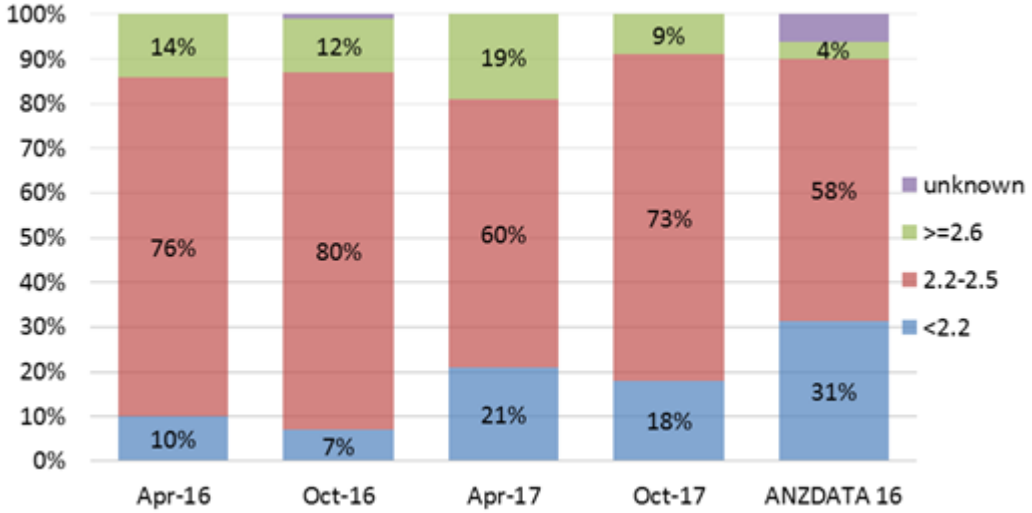


Figure 30. *Serum Calcium (uncorrected) target levels 2016 to 2017 versus ANZDATA 2016*

Serum Phosphate and Calcium Phosphate product targets

Target serum phosphate and serum calcium phosphate product levels remain similar to ANZDATA.

St George Hospital had a higher proportion of patients within the Serum Phosphate target range of 1.6-1.7mmol/L (21% vs. 15%) compared to ANZDATA 2016. The proportion of patients with levels

>1.8mmol/L were also higher than ANZDATA 2016 (41% vs 34%). Higher levels make patients at higher risk for morbidity and mortality.

Calcium phosphate product figures were similar to ANZDATA 2016. We had similar proportions with a target <4.4 (74% vs. 68%) and <4.0 (56% vs. 57%), which are the old and new targets respectively. This is something which needs our attention. As our phosphate targets are better, it is clearly our high calcium levels which are driving this result.

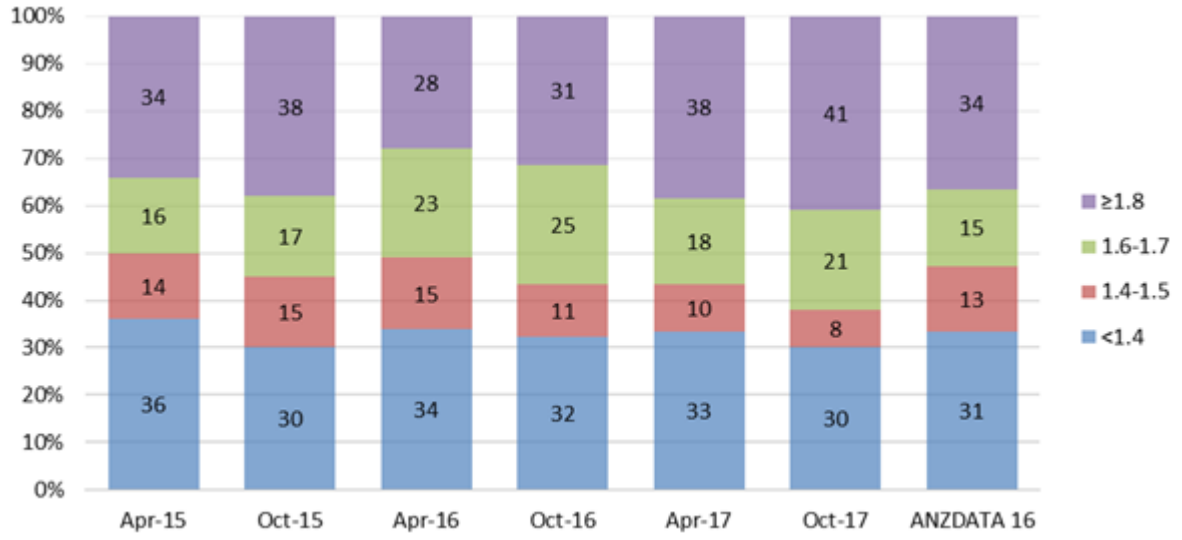


Figure 31. *Serum Phosphate target levels from 2015 to 2017 versus ANZDATA 2016*

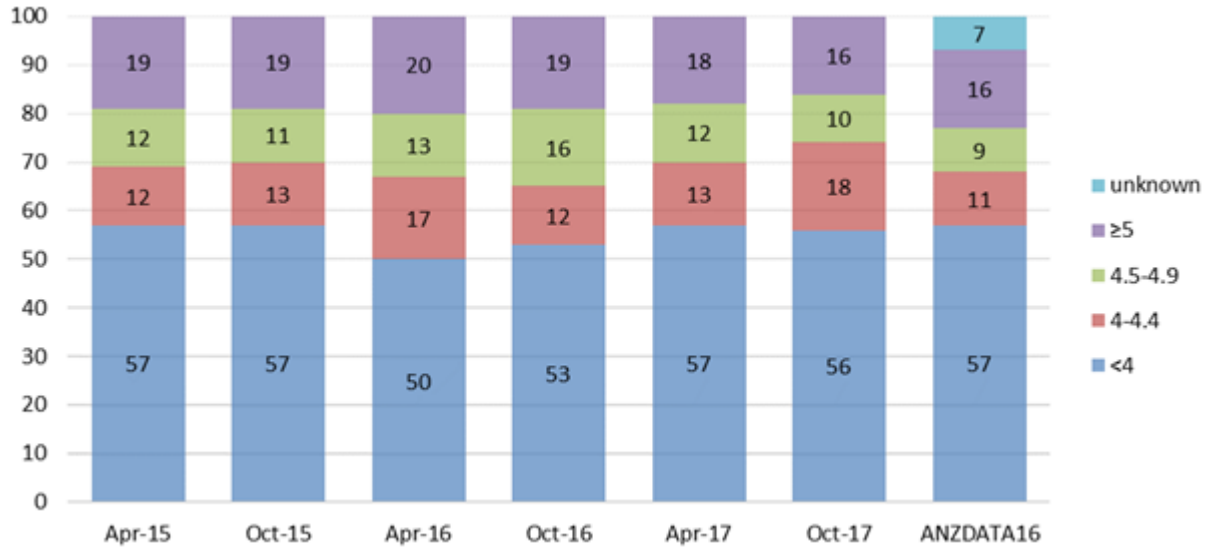


Figure 32. *Calcium Phosphate Product by year versus ANZDATA 2016.*

It is important to recognise and this 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 Australian patients. These home patients in turn 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.

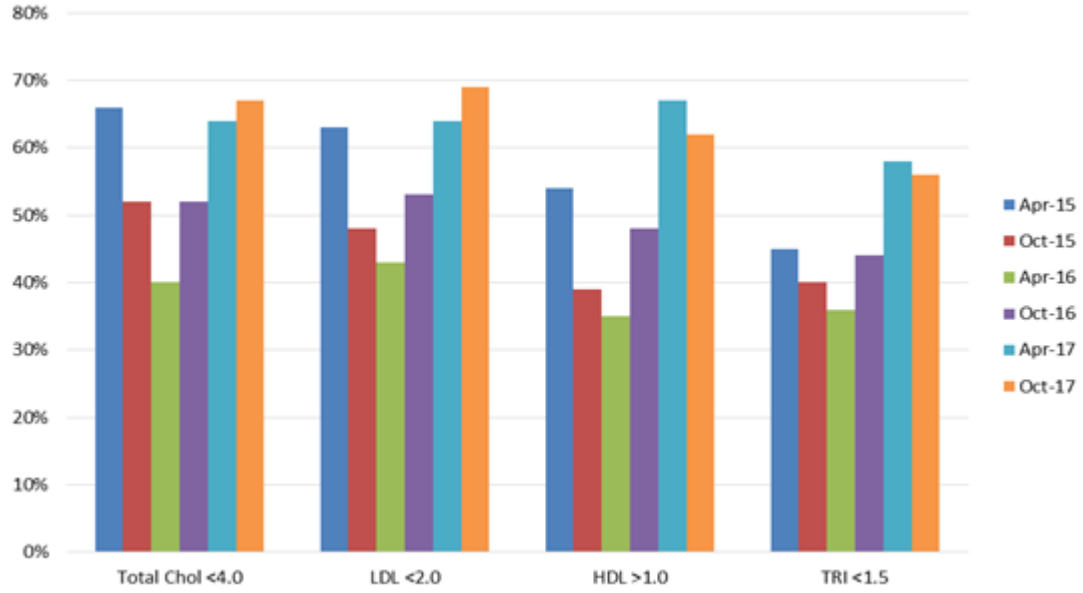


Figure 33. *Lipid levels for high risk Haemodialysis patients*

Diabetes Control measured by HbA1c

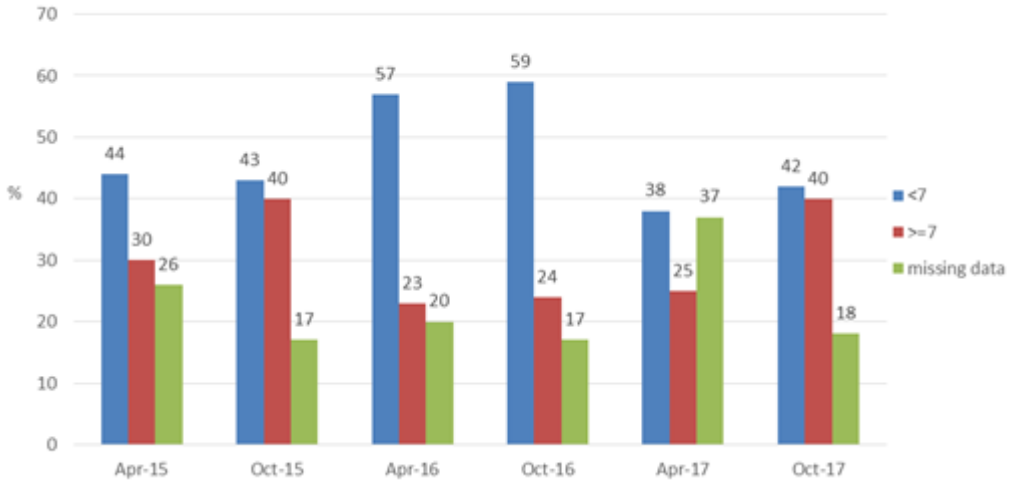


Figure 34. *HbA1c for Diabetes patients on Haemodialysis*

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 or if fructosamine measurements are used. We do not routinely measure HbA1c, although the clinicians do. Researchers have suggested that conventional glucose control monitoring methods may not be as meaningful in diabetes patients with end-stage renal disease. Patients on dialysis will likely show a lower HbA1c than they actually have as they have chronic anaemia. Another test, the glycated albumin or GA assay, appears to be far more effective in this setting. We do not routinely do this test nor fructosamine testing.
ANZDATA does not record HbA1c levels on dialysis patients.

8. Peritoneal Dialysis

Claire Cuesta and Franziska Pettit

Activity

Peritoneal dialysis was used to treat 16.4% of all dialysis patients in St George compared to 20% reported in the 39th Annual ANZDATA report (2016).

A total of 69 patients were on PD in 2017 compared to 73 in 2016. In December 2017, the proportion of patients receiving automated peritoneal dialysis (APD) was 93% and 7% for continuous ambulatory peritoneal dialysis (CAPD). Our APD population continues to be above the proportion reported by ANZDATA of 67%.

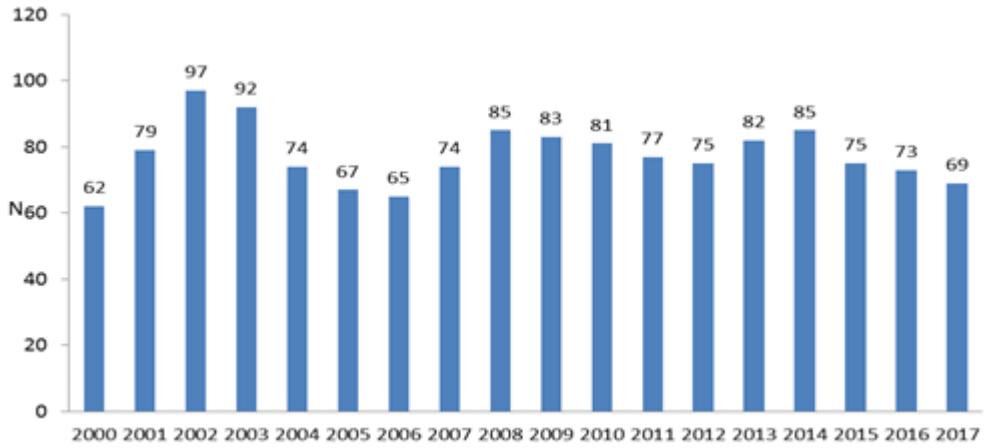


Figure 35. *Total persons (prevalent and incident) on peritoneal dialysis*

APD	*ANZDATA 67% (1676/2514)*	*St George 93% (37/40)*
CAPD	*ANZDATA 33% (838/2514)*	*St George 7% (3/40)*

PD patient flow

	PD patients December 31st 2016		**51**
In	New Patients	13	
	Transfer from another hospital	1	
	Returns from HD	5	
	On hospital IPD	0	
	Returns from dialysis break	1	
	In Subtotal		**20**
Out	Transplants	4	
	Transfer to other units/overseas	1	
	Transfer to Home Haemodialysis	2	
	Temporary Transfers to Haemodialysis	2	
	Permanent Transfers to Haemodialysis	11	
	Return of renal function	1	
	Withdrawal from dialysis	7	
	Deaths on PD	3	
	Out Subtotal		**31**
	Net loss	**11**	
	PD patients December 31st 2016		**40**

Table 14. 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 15	Oct 15	Apr 16	Oct 16	Apr 17	Oct 17	ANZDATA 16
Corr Ca	2.1-2.4 mmol/L	56%	49%	53%	46%	29%	42%	-
PO4	0.8-1.6 mmol/L	43%	46%	63%	50%	53%	46%	38%
CaPO4	<4.0 mmol/L	46%	43%	51%	42%	42%	44%	
Uncorrected CaPO4	<4.0 mmol/L	60%	42%	63%	56%	60%	52%	55%
Albumin	33-48 g/L	35%	35%	29%	36%	31%	24%	-
PTH	7-45 mmol/L	69%	74%	67%	69%	63%	63%	-

Table 15. Biochemical targets

- Serum Calcium
  - 42% of patients achieved the target for serum corrected calcium in October 2017. The ANZDATA benchmark is for uncorrected calcium only.
  - 76% of patients have serum Ca level 2.2-2.4 in October 2017, an improvement from 69% last year. The mean calcium result is 2.3 (SD 0.17) and our profile for serum Ca is better than ANZDATA 2016.

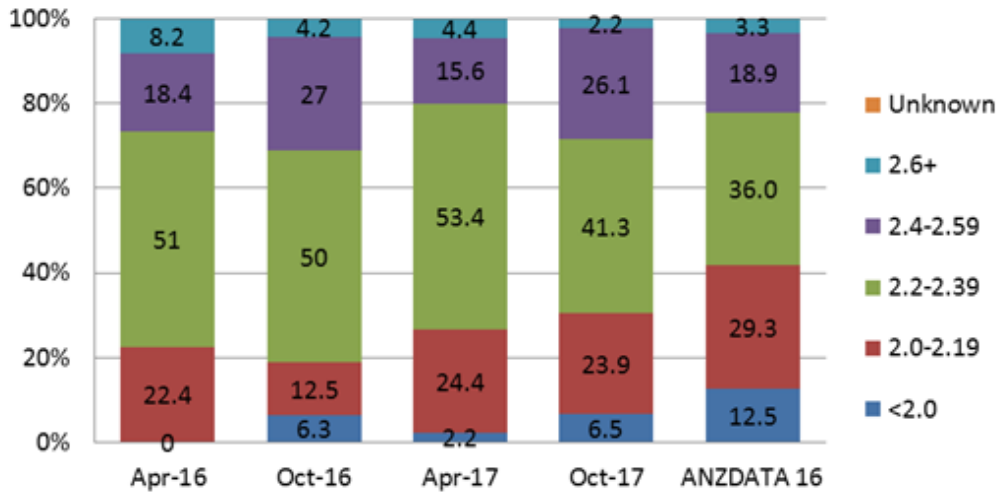


Figure 36. *Serum Calcium (mmol/L)*

- Phosphate
  - In October 2017, 46% of patients were within the target for serum phosphate of 0.8-1.6 mmol/L, better result than ANZDATA 2016 at 38%. Our profile for serum phosphate is comparable to the national data. The median phosphate result was 1.78 mmol/L (CI 1.7,1.9).

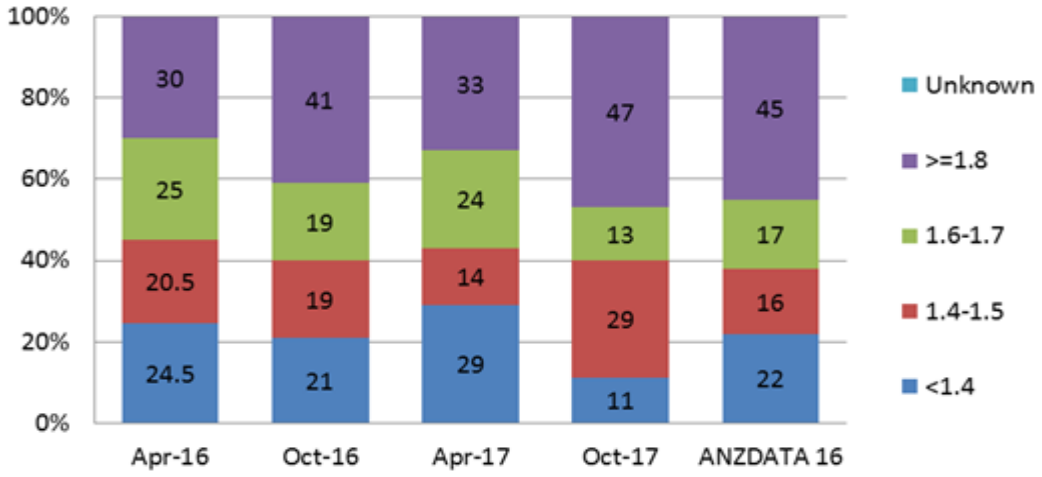


Figure 37. *Serum Phosphate (mmol/L)*

- Calcium Phosphate Product
  - ANZDATA calculated the calcium phosphate product with uncorrected calcium. Our profile for uncorrected calcium x phosphate product in October 2017 did not match the national data. There are more patients with high uncorrected calcium x phosphate (≥ 5) in 2017, the median uncorrected calcium x phosphate product is 3.96 (CI 3.875, 4.463)
  - We also calculate Calcium phosphate product with corrected calcium, the median for our corrected Calcium phosphate product is 4.415 (CI 4.24, 4.89)

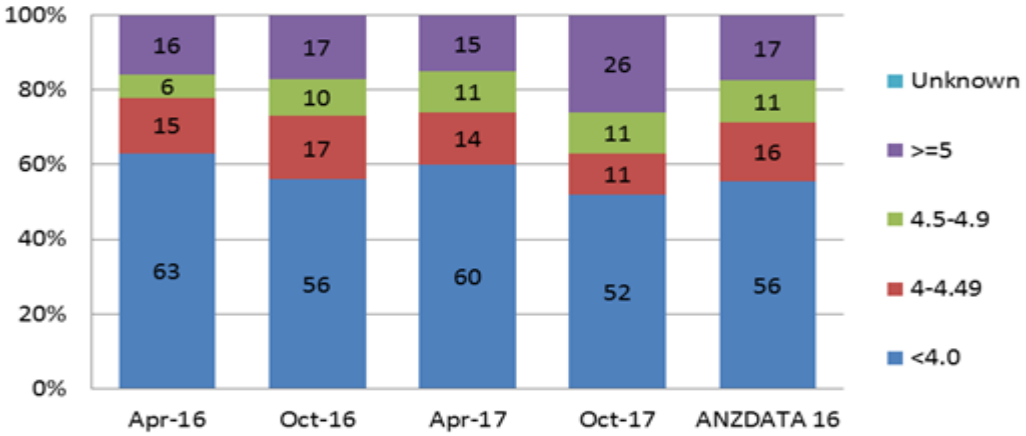


Figure 38. *Uncorrected Calcium x Phosphate Product*

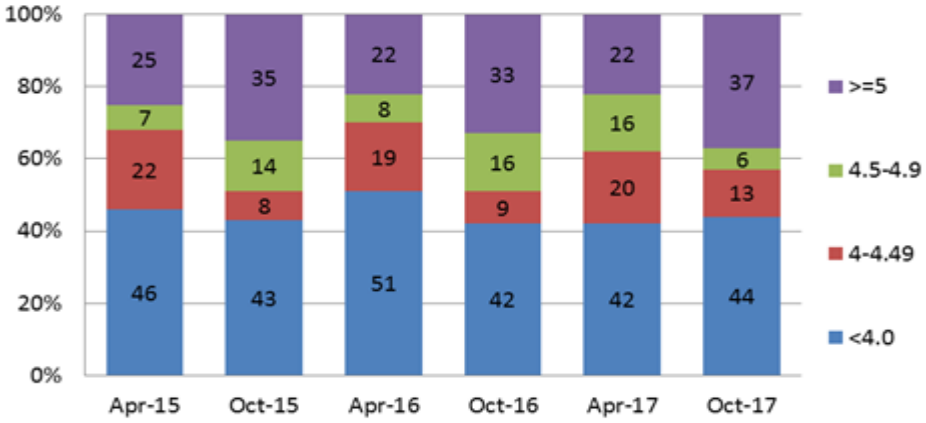


Figure 39. *Corrected Calcium x Phosphate Product*

- Albumin
  - Only 24% of PD patients had albumin level within 33-48 g/L in 2017, last year was better at 36%. 24% of PD patients had albumin level 30-32 g/L and mean albumin level was 29.37 g/L (SD 4.649).

- PTH
  - In October 2017, 61% of PD patients had PTH 7-45 mmol/L. The median PTH result in 2017 was 39.9 mmol/L (CI 34, 56.5). More patients have higher PTH in 2017 compared to last year.

2. **Haematological targets**

- Haemoglobin
  - 42% achieved our target of 100-120 g/L in October 2017. The median Hb result was 106 g/L (CI 102.7, 111.44, min 83, max 140). ANZDATA 2016 have better results.
  - In October 2017, 71% of PD patients with Hb <100 were receiving erythropoiesis stimulating agents (ESA). 50% of the patients with high Hb (>120) were also receiving ESA. These patients had reduced ESA dose or frequency. 12% 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%). These patients received iron infusion

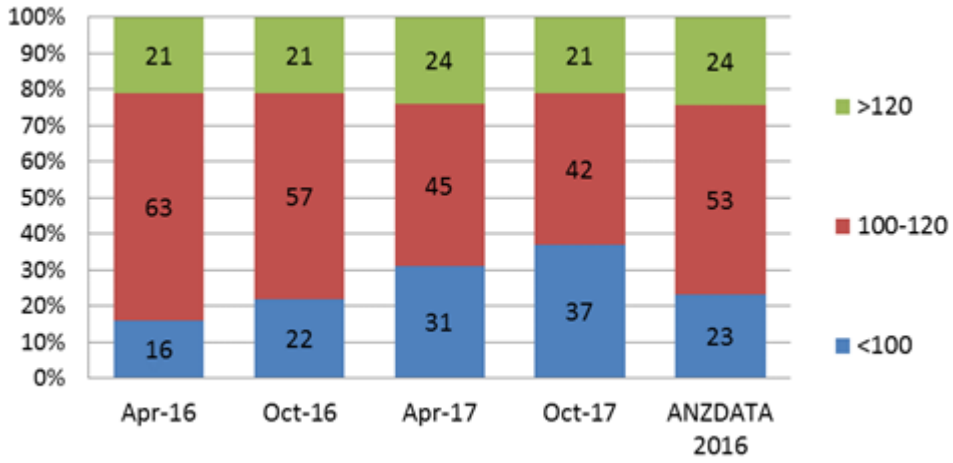


Figure 40. *Haemoglobin in Peritoneal Dialysis patients*

- HbA1c (Glycosylated Haemoglobin)
  - 52% of peritoneal dialysis patients had diabetes in October 2017.
  - HbA1C screening improved from 68% last year to 100% diabetics were screened for HbA1C in October 2017. The mean HbA1C result is 7.9% (SD 1.6868, minimum 4.1%, maximum 11.6%). Only 23% of screened diabetic patients had results below 7.
  - Adjusting the HbA1c target to the ISPD recommendation of ≤7% for diabetic PD patients and up to 8.5% for our older PD patients with diabetes (presumably >70 years as age group for elderly was not defined by ISPD), 41% of screened diabetic patients are within ISPD target in 2017.

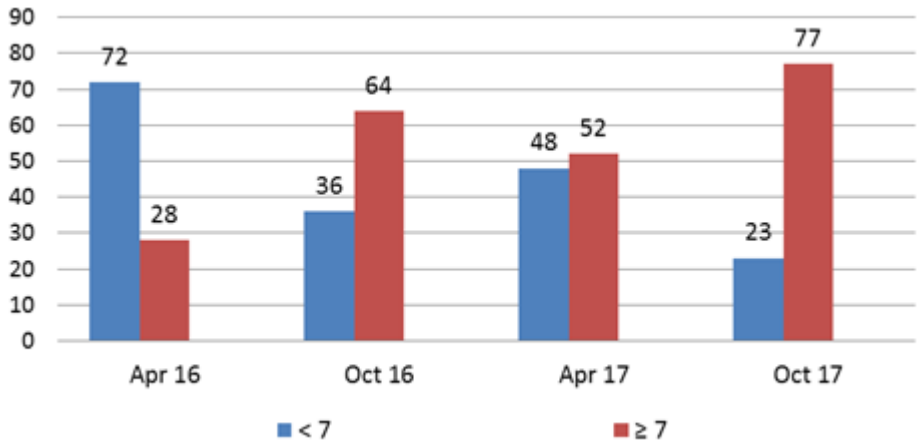


Figure 41. *HbA1c results in PD patients*

- Lipids
  - 74% of PD patients (N=34) in October 2017 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 94% of high-risk PD patient and last year's results were better.

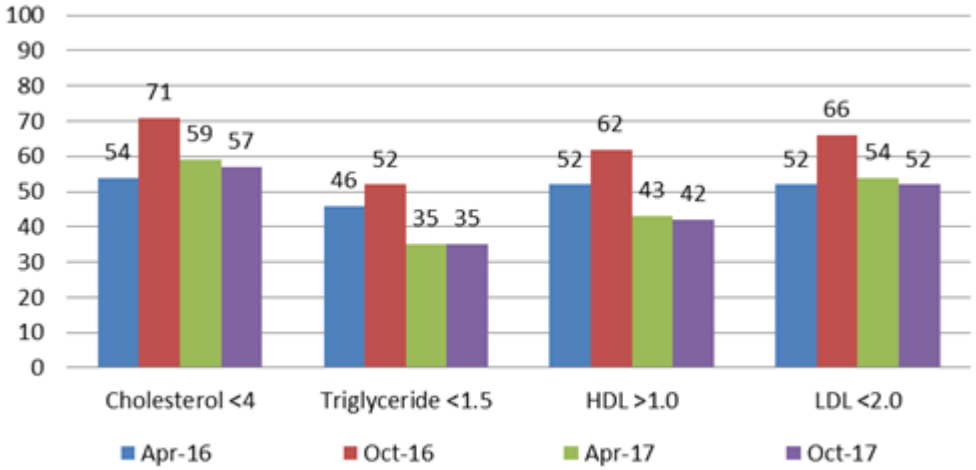


Figure 42. *Lipids within normal limits in high risk patients only*

- Iron
  - Iron replete refers to ferritin levels between 200-800ng/mL as well as iron saturation between 20-50%. 44% of PD patients were iron replete in October 2017 and median ferritin was 357 ug/L (CI 331, 508.60), mean transferrin was 23.82% (SD 8.5). Our iron studies profile in 2017 is better than the national data (ANZDATA 2016).

Parameter	Target	Apr 15	Oct 15	Apr 16	Oct 16	Apr 17	Oct 17	ANZDATA 16
Ferritin	200-800 ug/L	61	52	63	62	61	69	51
Transferrin	20-50%	75	73	80	64	67	69	62

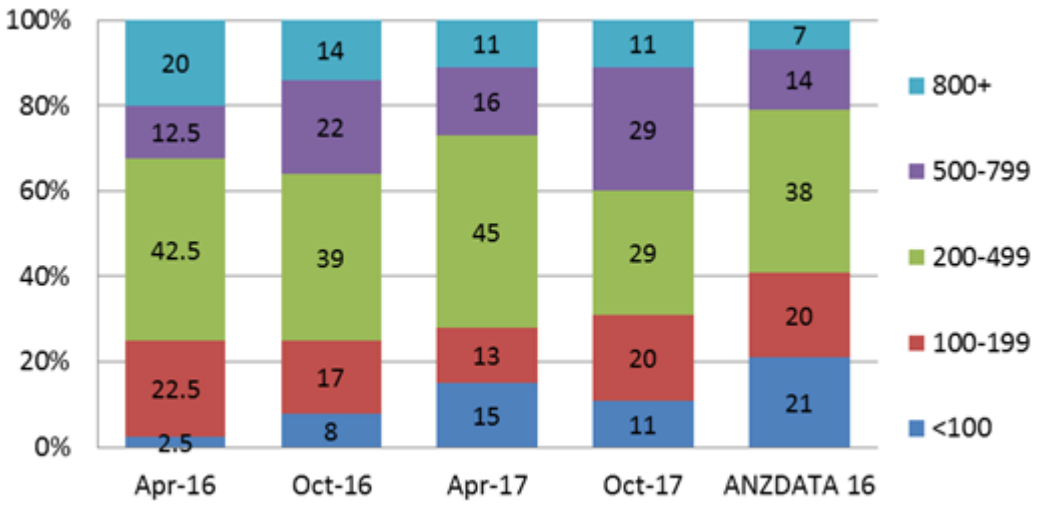


Figure 43. *Ferritin*

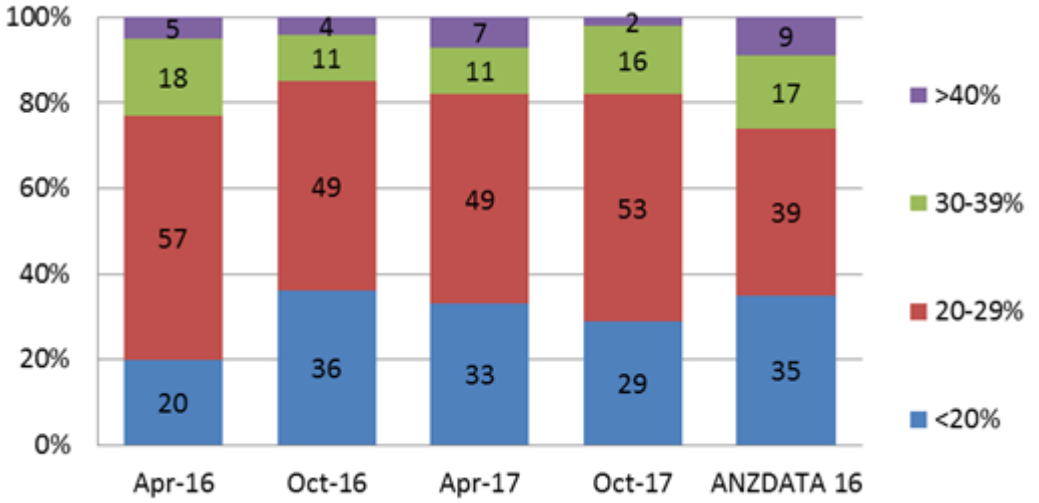


Figure 44. *Iron Saturation (Transferrin)*

3. **Dialysis Adequacy**

- Peritoneal dialysis adequacy is determined using solute clearance measurements:
  - Kt/V – Benchmarked against the KDOQI and ISPD target of at least 1.7 per week. In October 2017, the median Kt/V was 2.0 (CI 1.995, 2.398, min 1.2, max 3.73)
  - Creatinine clearance – Benchmarked against the CARI target of 60 L/week/1.73 m2 in high and high-average peritoneal transporters and 50 L/week/1.73 m2 in low-average and low peritoneal transporters. In October 2017, mean creatinine clearance was 77 L/week/1. 73 m2 (SD 30.88, min 19.7, max 158.3) and 84% of APD patients had creatinine clearance of 45 L/week/1.73m2 (ISPD target for patients on APD).

Parameter	Target	Apr 15	Oct 15	Apr 16	Oct 16	Apr 17	Oct 17
KT/V	≥ 1.7	85	84	74	82	77	80
CCL	>50L (L & LA) or >60L (H & HA)	77	70	72	77	72	75
CCL (ISPD)	>45L (for APD patients)	79	73	80	85	84	84

Table 16. Dialysis adequacy

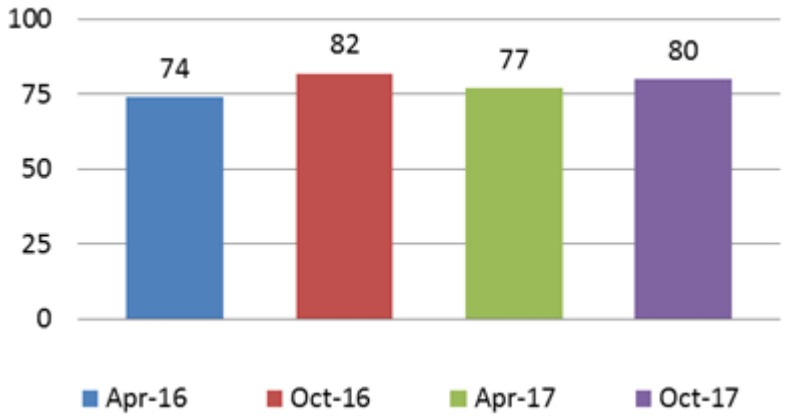


Figure 45. *Kt/V ≥1.7*

4. **Patient and Technique Survival**

The 5-year PD patient and technique survival data from 2011-2016 were provided by the ANZDATA registry. The 5-year patient survival rates of those on PD for more than a year were significantly better than the national rates for both Australia and New Zealand.

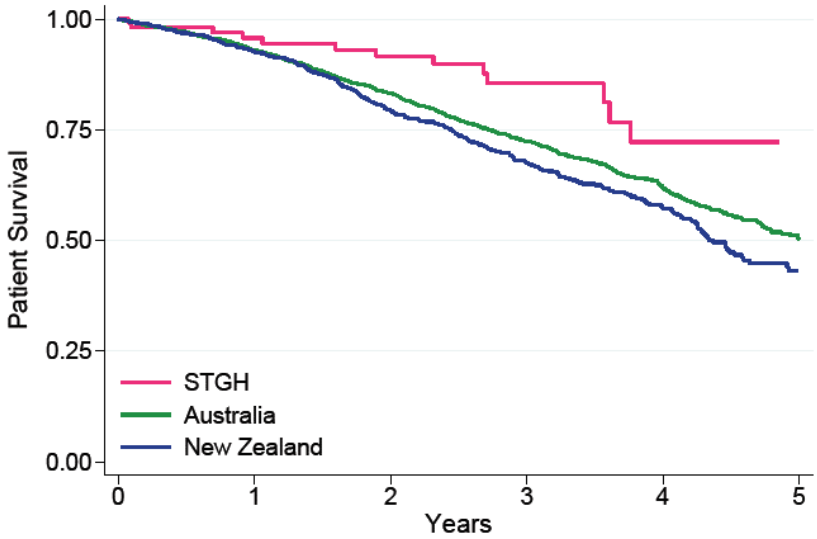


Figure 46. *Patient survival –for PD patients on dialysis > 90 days*

Table 23: PD patient survival

	STGH		Australia		New Zealand	
Time	n	% Survival (95% CI)	n	% Survival (95% CI)	n	% Survival (95% CI)
0	105	100.0	4203	100.0	1216	100.0
3 months	94	98.1 (92.5-99.5)	3828	98.4 (98.0-98.8)	1137	98.5 (97.6-99.0)
6 months	87	98.1 (92.5-99.5)	3455	97.1 (96.5-97.5)	1045	96.9 (95.7-97.7)
1 year	80	95.7 (88.9-98.4)	2794	93.1 (92.2-93.9)	868	92.7 (91.0-94.1)
2 years	58	91.5 (82.8-95.9)	1694	83.3 (81.9-84.6)	538	79.4 (76.6-82.0)
3 years	35	85.6 (74.1-92.2)	940	72.4 (70.4-74.2)	299	67.5 (63.8-70.9)
4 years	13	72.2 (53.0-84.6)	453	61.9 (59.3-64.4)	147	57.3 (52.8-61.6)
5 years	6	72.2 (53.0-84.6)	125	50.4 (46.8-53.9)	45	43.1 (37.2-48.9)

Table 17. PD Patient survival –for PD patients on dialysis > 90 days. ANZDATA individual hospital report 2011-2016

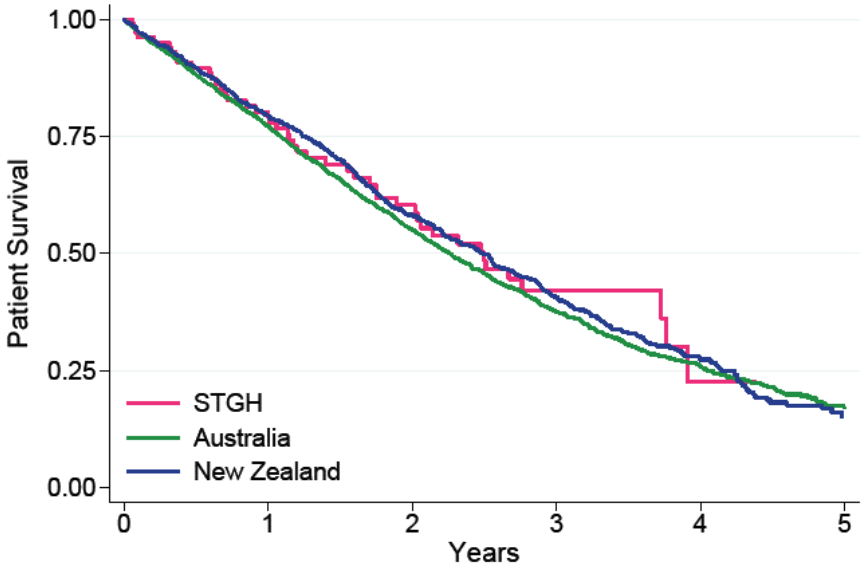


Figure 47. *Technique survival – for PD patients on dialysis > 90 days*

Table 19: PD technique survival

	STGH		Australia		New Zealand	
Time	n	% Survival (95% CI)	n	% Survival (95% CI)	n	% Survival (95% CI)
0	105	100.0	4203	100.0	1216	100.0
3 months	91	95.1 (88.7-97.9)	3651	93.9 (93.1-94.6)	1092	94.5 (93.1-95.7)
6 months	79	89.7 (81.7-94.3)	3142	88.2 (87.2-89.2)	967	89.7 (87.8-91.3)
1 year	67	80.3 (70.4-87.1)	2315	77.2 (75.8-78.6)	746	79.4 (76.9-81.7)
2 years	38	60.3 (48.7-70.1)	1113	55.0 (53.2-56.9)	399	58.1 (54.8-61.3)
3 years	16	42.2 (29.9-53.9)	494	37.6 (35.4-39.7)	186	40.6 (36.8-44.3)
4 years	3	22.6 (8.0-41.7)	185	25.8 (23.6-28.2)	71	27.3 (23.4-31.5)
5 years	2	22.6 (8.0-41.7)	41	17.1 (14.5-20.0)	16	15.1 (10.9-19.9)

Table 18. PD Technique Survival – for PD patients on dialysis > 90 days .
ANZDATA individual hospital report 2011-2016)

5. **Technique Failure**

- ANZDATA reported the commonest primary cause of technique failure (ceasing peritoneal dialysis apart from deaths and transplant) was "total dialysis/technical failure" at 34%, followed by infection at 33% in 2016. At St George Hospital, the primary cause of technique failure in 2017 was similar to ANZDATA (2016) with "total dialysis/technical failure" being the main cause at 65%. These were due to abdominal and cardiac surgery, blocked catheter, catheter trauma and inadequate solute clearance due to peritoneal membrane failure.
- Thirteen patients were transferred to haemodialysis permanently in 2017. Two of these patients transferred due to poor compliance to PD and carer stress. Mean age of patients at time of transfer to haemodialysis was 58 years (min 21, max 76) and mean time on PD at time of transfer to haemodialysis was 27.5 months (min 5.3, max 67.4).

Primary reason for technique failure	2012 n=9	2013 n=12	2014 n=17	2015 n=9	2016 n=14	2017 n=13	ANZDATA 2016
Infective	22%	30%	23%	0%	18%	21%	33%
Total Dialysis/Technical Failure (catheter block, hernia, inadequate dialysis, leaks, surgery)	78%	60%	60%	89%	64%	65%	34%
Social (poor compliance to PD)	0%	10%	17%	11%	18%	14%	13%
Other causes or unreported cases	0%	0%	0%	0%	0%	0%	20%

Table 19. Primary reason for technique failure

6. PD-related Infection rates

- Peritonitis episodes and rates
  - 2017 peritonitis rate results continue to surpass the national benchmark and is similar to 2016 results. The St George peritonitis rate over a 3 year period from 2015–2017 is 1/77 months.
  - 95% (38/40) of patients on peritoneal dialysis in 2017 were peritonitis-free, an improvement from last year at 82%.
  - The average time on dialysis for current patients who have had peritonitis was 65.5 months, and for those who are peritonitis free was 22.2 months indicating that the longer patients stay on PD, the higher the risk of developing peritonitis.
  - In 2017, none of our patients developed peritonitis in the first 12 months compared to 46% 11 years ago.
  - The number of episodes of peritonitis and the number of patients who had peritonitis in 2017 slightly reduced from last year. The proportion of peritoneal dialysis patients who were 3 years peritonitis-free in 2017 was 80%, a slight improvement from last year of 77% and better than ANZDATA 2016 at 43%.

Table 20: Rates of peritonitis (per patient-year)

	STGH			Australia		
Year	Episodes	Years	Rate (95% CI)	Episodes	Years	Rate(95% CI)
2011	13	55.75	0.23 (0.12-0.40)	789	1948.38	0.40 (0.38-0.43)
2012	6	58.39	0.10 (0.04-0.22)	769	2057.04	0.37 (0.35-0.40)
2013	10	56.76	0.18 (0.08-0.32)	820	2149.26	0.38 (0.36-0.41)
2014	8	64.32	0.12 (0.05-0.25)	835	2268.09	0.37 (0.34-0.39)
2015	5	55.20	0.09 (0.03-0.21)	891	2379.19	0.37 (0.35-0.40)
2016	10	52.39	0.19 (0.09-0.35)	799	2368.96	0.34 (0.31-0.36)
Overall	52	342.80	0.15 (0.11-0.20)	4903	13170.93	0.37 (0.36-0.38)

Table 20. Rates of peritonitis (per patient-year) ANZDATA Individual Hospital Report 2011-2016

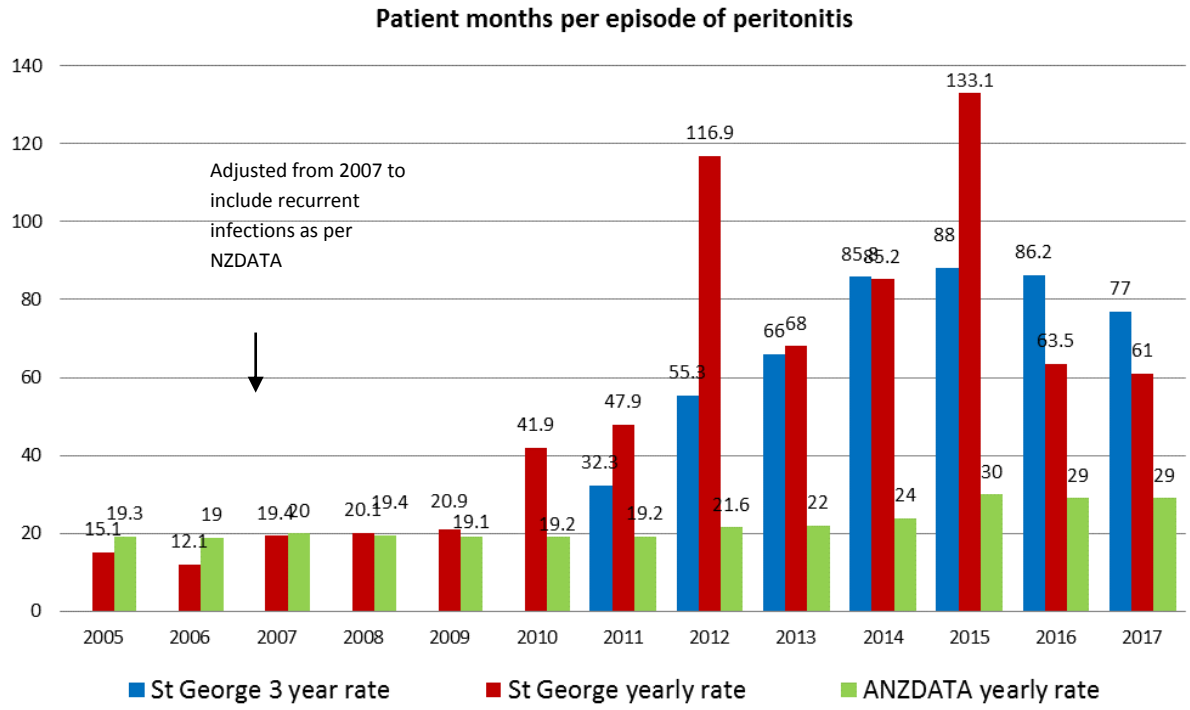


Figure 48. *Patient months per episode of peritonitis*

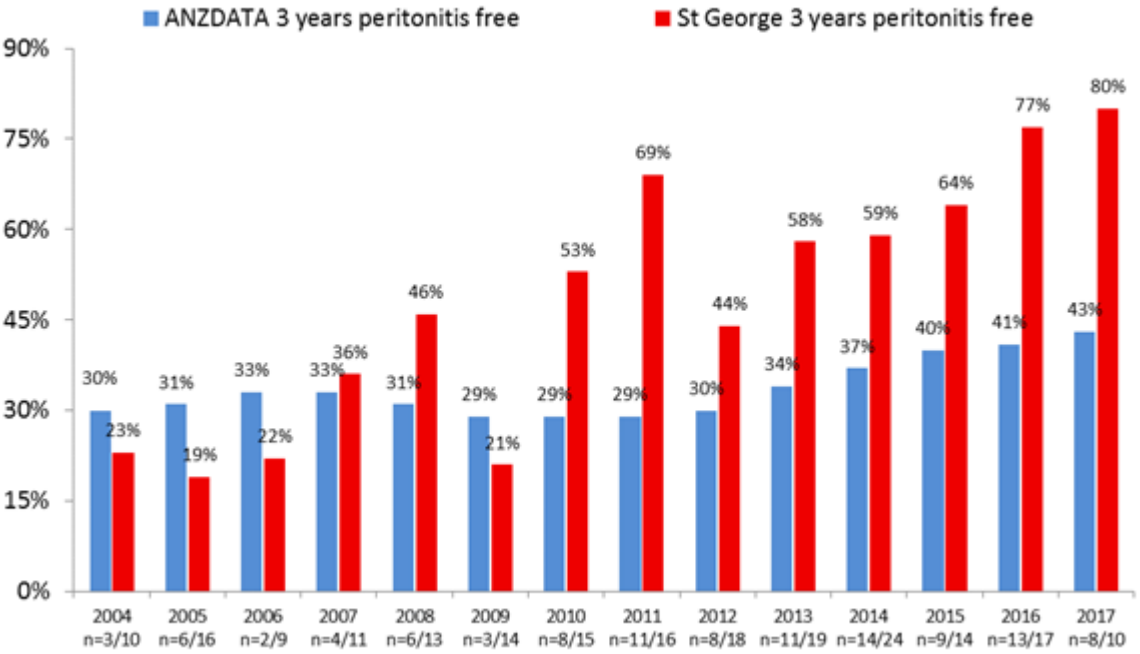


Figure 49. *Proportion of patients 3 years peritonitis free*

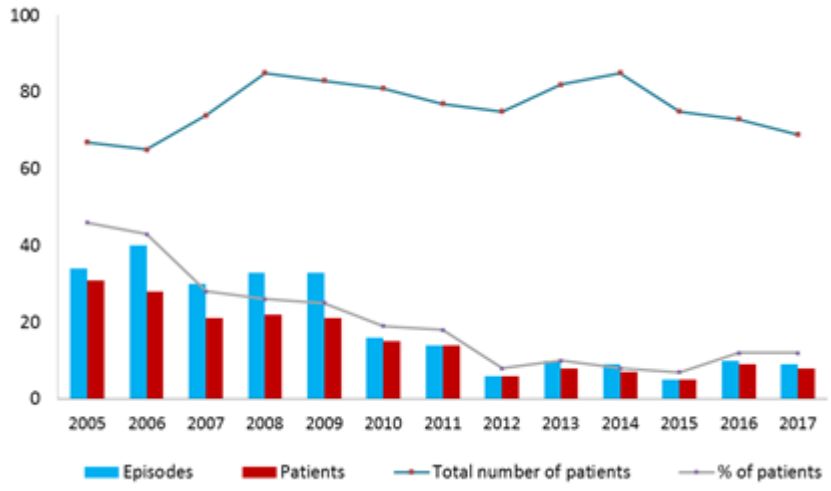


Figure 50. Peritonitis Episodes

	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
Total patients	65	74	85	83	81	77	75	82	85	75	73	69
Peritonitis episodes	40	30	33	33	16	14	6	10	9	5	10	9
Patients with at least 1 episode of peritonitis	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%	n=9 12%	n=8 12%
Patients with at least 1 episode of Exit site infection	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%	n=4 5%	n=5 7%

Table 21. 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. 4 patients were transferred permanently to haemodialysis as a result of peritonitis in 2017.

Change in treatment as a direct result of peritonitis (%)	**2008**	**2009***	**2010***	**2011***	**2012***	**2013***	**2014***	**2015**	**2016**	**2017**
Interim Haemodialysis	6	0	6	0	0	0	0	0	0	0
Permanent Haemodialysis	18	15 (5/33)	24 (4/17)	14 (2/14)	16 (1/6)	30 (3/10)	33 (3/9)	0	10 (1/10)	44 (4/9)
Catheter removed	24	15 (5/33)	41 (7/17)	14 (2/14)	16 (1/6)	30 (3/10)	33 (3/9)	0	10 (1/10)	44 (4/9)

Table 22. Change of treatment as a result of peritonitis

- Gram negative organisms was the commonest organism of peritonitis episodes in 2017.
  - There were no MRSA or fungal peritonitis infections since 2014.

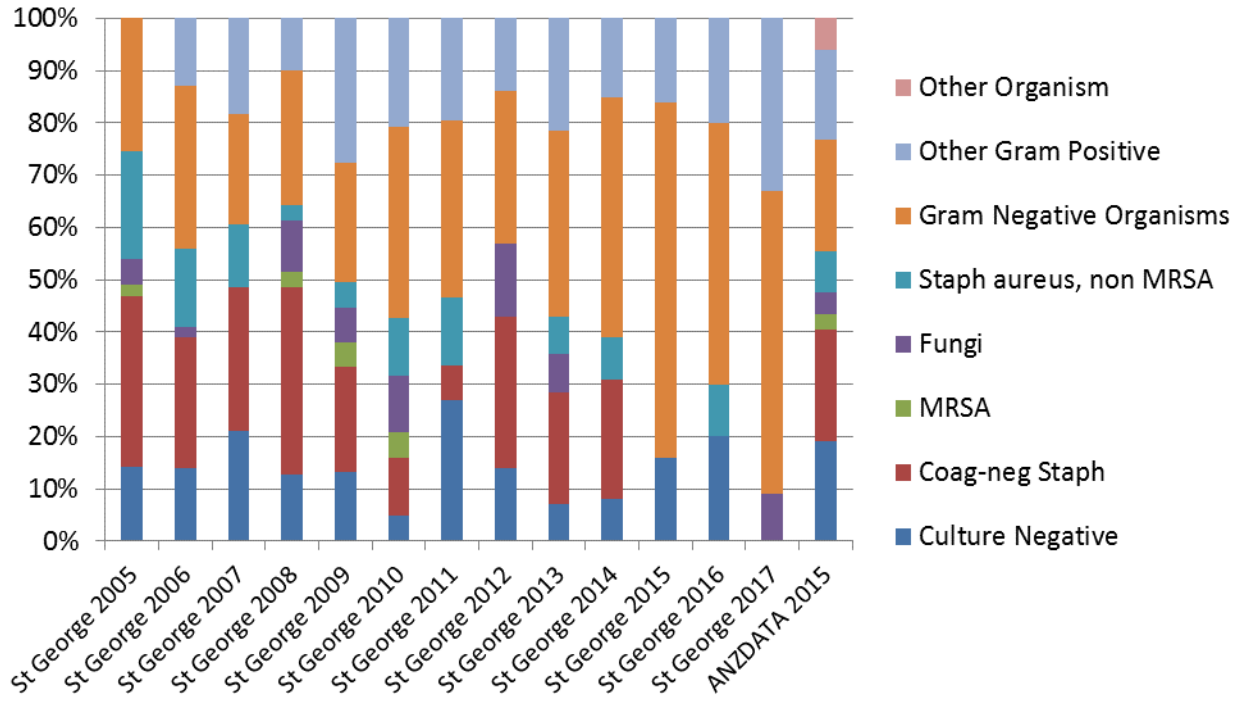


Figure 51. *Peritonitis Causative Organism*

- Exit Site Infections (ESI)
  - ANZDATA does not collect data on exit site infections, we can only compare to previous year's result.
  - 2017 exit site infection rate is 1/68.4 months. Exit site infection rate over a 3 year period from 2015–2017 is 1/102.6 months. Last year's results were better.
  - There were no culture negative exit site infection since 2015.
  - 7% of PD patients had exit site infection in 2017, slightly higher than last year.

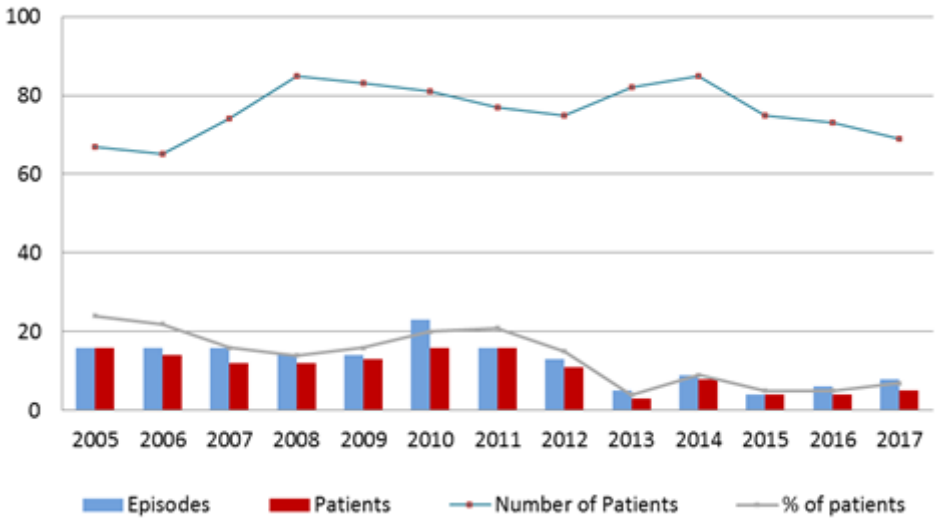


Figure 52. *Exit Site Infection Episodes*

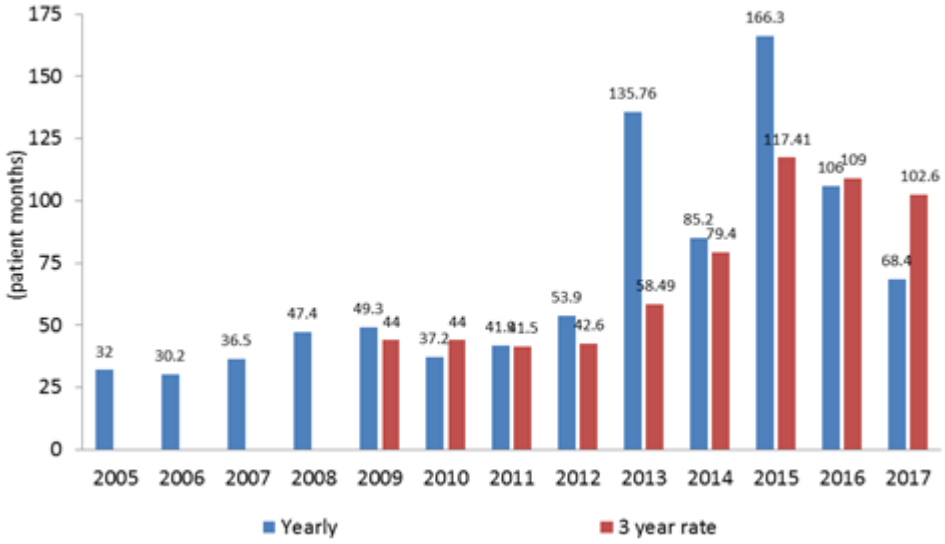


Figure 53. *Exit site infection rate per patient months*

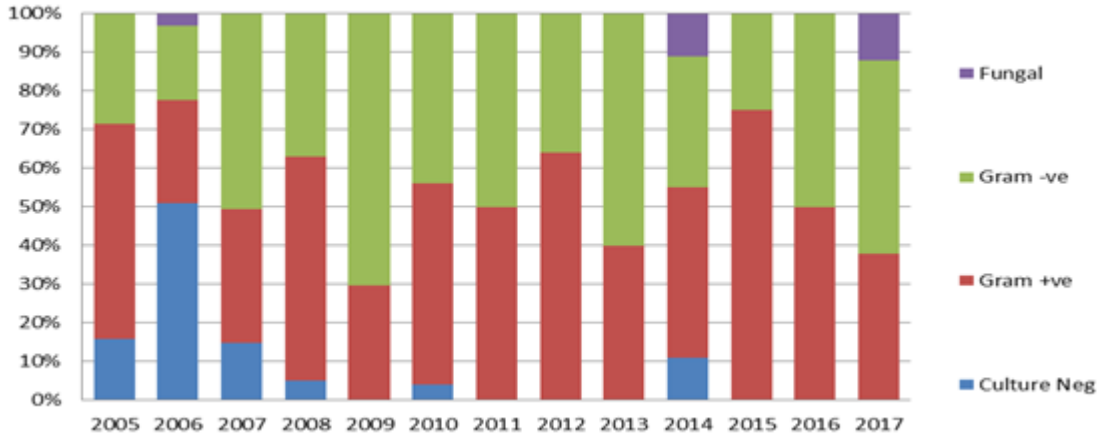


Figure 54. *Exit site infection causative organisms*

7. Change of Modality and Deaths

- We have fewer transplants, more deaths and changed to haemodialysis than the national average. The percentage of death and changed to haemodialysis is twice that of the national average. Mean age of our patients at time of death was 80 years (min 71, max 91) and mean time on PD at time of death was 51.1 months (min 16.8, max 94.5).

	St George 2012 (%)	St George 2013 (%)	St George 2014 (%)	St George 2015 (%)	St George 2016 (%)	St George 2017 (%)	ANZDATA 2016 (%)
Transplants	5	4	11	17	4	10	11
Changed to haemodialysis	16	15	26	17	19	40	20
Deaths	9	8	5	4	12	25	12

Table 23. Change of Modality and deaths

Note: The rates are calculated using the total number of patients on peritoneal dialysis at 31.12.2017 (n=40), 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 remains the preferred PD therapy.
3. Some improvements with calcium and iron management in 2017 though HbA1c may be running too high.
4. More patients were above the target for phosphate (0.8-1.6 mmol/L) and PTH (7-45 mmol/L) and more patients have poor albumin (<33 g/L) and haemoglobin (<100 g/L) results in 2017.
5. Patient survival and peritonitis rates are better than the national outcomes.
6. The percentage of patients who are peritonitis-free at 3 years was 80% in 2017. This is higher than the ANZDATA result at 43%. Almost all (95%) patients on peritoneal dialysis at the end of 2017 were peritonitis-free.
7. There is a gradual decline in our total patient numbers and combined peritonitis and exit site infection rates from 2015 to 2017. Despite this, our combined peritonitis and exit site infection rates in 2017 remained better since data collection in 2005.
8. Changed to haemodialysis and death rate in 2017 is twice than that of the national rate.
9. Similar to national data is "total dialysis and technical failure" as the primary reason for PD technique failure in 2017.

Research activities

- St George PD unit participated in PDOPPS (Peritoneal Dialysis Outcomes and Practice Pattern Study) from 2014 to 2017, an international study to identify practice patterns that lead to better care and improved clinical outcomes for PD patients. The close out date for this study was the end of 2017, St George PD unit consent rate is 78.5% (51 PD patients) and is in top 5 Australia-wide. Data entry and recruitment was completed by close out date.

- The "Transition from PD" project is to support a planned patient transition to haemodialysis or conservative care from peritoneal dialysis. A protocol with a structured risk assessment and management pathway for all PD patients is completed in 2016, approved and embedded into practice from 2017, helped 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.

Management: Clinical and QA activities

- HbA1c screening remarkably improved for patients with diabetes in 2017 through pre-filled blood request forms with reminders that were mailed out to PD patients every 6 months from 2017.
- Patient compliance for blood testing also improved through SMS reminders from 2017.
- Anaemia, phosphate, PTH and nutrition management remain challenging despite the ad hoc flagging of patients with poor biochemistry and haematology results through renal clinic, 2-monthly multi-disciplinary team (MDT) patient review and electronic communication to their nephrologists. In 2018, we will also flag patients with poor biochemistry and haematology results through electronic communication to the dietitian for a more frequent nutritional review.
- We will continue to collaborate closely with the dietitian to improve patient nutrition i.e. 6-monthly dietitian review referrals for high-risk PD patients, regular clinical meetings and shared patient tracking database.
- After the methodical review and root-cause analysis of all peritonitis and exit site infection episodes in 2016 to mid – 2017, the possible reasons for the worsening peritonitis rates were ascertained and divided into 2 categories:

- Modifiable reasons are: first is our lower PD uptake which can be resolved by extending our PD selection criteria and ensuring predialysis patients chosen to do PD will stay in the PD pathway through the revised prePD assessment and education program; second is our PD practices and policies which were reviewed and updated regularly to keep in line with the ISPD guidelines; third is the PD training and retraining program which will include additional scheduled retraining at 18 months and every 18 months thereafter for high risk patients from 2018.
- Non modifiable reasons are the PD patient's age, gender and time on PD as the result of the review showed PD patients who were getting peritonitis in 2016 were newer to PD, older demographic, mostly male and had their peritonitis episodes sooner. Whereas, the review in 2017 showed PD patients who were getting peritonitis were again, older demographic and mostly male but were on PD longer before developing peritonitis.
- To provide ongoing support to predialysis patients choosing PD and to retain them on the PD pathway, the prePD assessment and education program was successfully restructured to 3 face to face sessions plus a coloured patient brochure from 2016, positively received by predialysis patients in 2017 and will continue throughout 2018.
- All effective initiatives and projects will continue i.e. clinic review checklist project, nurse-facilitated iron management, bi-annual patient newsletters, monthly MDT patient review, 1:1 comprehensive training and retraining program and outpatient follow-up and support.
- Given the increasing need for nursing home placements and assisted PD for our elderly PD patients, the structured PD support and training program tailored to nursing home nurses developed in 2016 aimed to streamline the uptake of PD patients into aged care facilities will continue throughout 2018. There are already 8 nursing homes within the SGH catchment area trained on PD and willing to accommodate PD patients pending bed availability.
- Continue the 3-yearly review of PD policies to keep in line with national (CARI) and international (ISPD) clinical practice guidelines.

9. Transplantation

Tania Burns

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 renal transplant recipients, currently listed on the National Organ Matching Service (NOMS) transplant waiting list and renal donors.

2017 Overview

- A total of 227 kidney transplant recipients and 63 living kidney donors were under the care of the St George team during 2017.
- Twenty three people received a kidney transplant: twelve from live donors and eleven from deceased donors.
- Eleven people donated a kidney.
- Eight of the live donor transplants were pre-emptive.
- Two live donor pairs were transplanted through the paired kidney exchange.
- Five live donor transplants were blood group incompatible.
- Five transplant recipients died with functioning grafts.
- Four transplant recipients had graft failure and returned to dialysis.
- Five transplant recipients transferred out and two transferred in.
- A total of 61 people were reviewed at the SGH transplant assessment clinic by a nephrologist from Prince of Wales hospital, the transplanting unit.
- At 31/12/17 25 SGH dialysis patients were listed with NOMS.

Transplant patient flow

1/1/17 SGH transplant patients registered with ANZDATA	**202**
In	
Transplanted	23
Transferred care in	2
In Subtotal	**25**
Out	
Transferred care out	5
Died	5
Graft failure transferred back to dialysis	4
Out Subtotal	**-14**
Net Gain	**11**
31/12/17 SGH transplant patients	**213**

Post-transplant follow up

Of the 227 kidney transplant recipients cared for at SGH in 2017:

- 211 are primary grafts, 14 are second grafts and 1 is a third graft
- 68 of these patients received grafts from live donors
- 26 were pre-emptive transplants

Benchmarks to 12 months post-transplant:

- Rates of biopsy proven acute rejection in first 6 months <25%in the first 6 months post-transplant and <5% between 6 and 12 months or after 12 months
- Rates of new onset diabetes after transplant (NODAT) <15%
- Rates of BK nephropathy <5%
- Rates of BK viraemia <15% (where BK viraemia defined as >850copies per ml)
- Rates of CMV viraemia <30% (CMV viraemia defined as PCR CMV measurement > 500 copies/mL)
- Rates of CMV infection <30%
- Rates of post-transplant surgical complications < 5% (urological, vascular and wound)

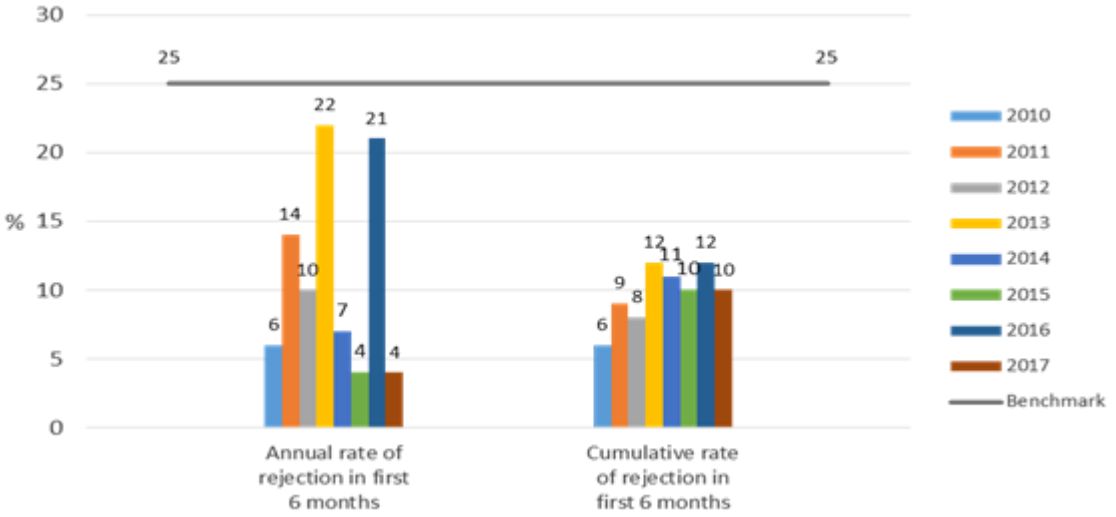


Figure 55. *Rate of biopsy proven acute rejection in first 6 months*

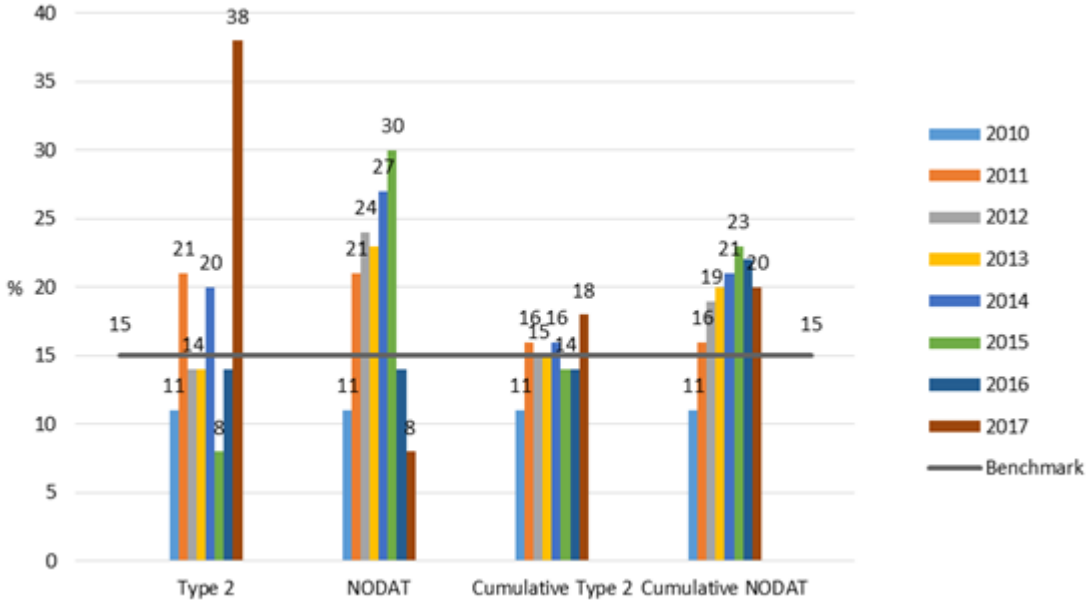


Figure 56. *Rate of diabetes in first 12 months*

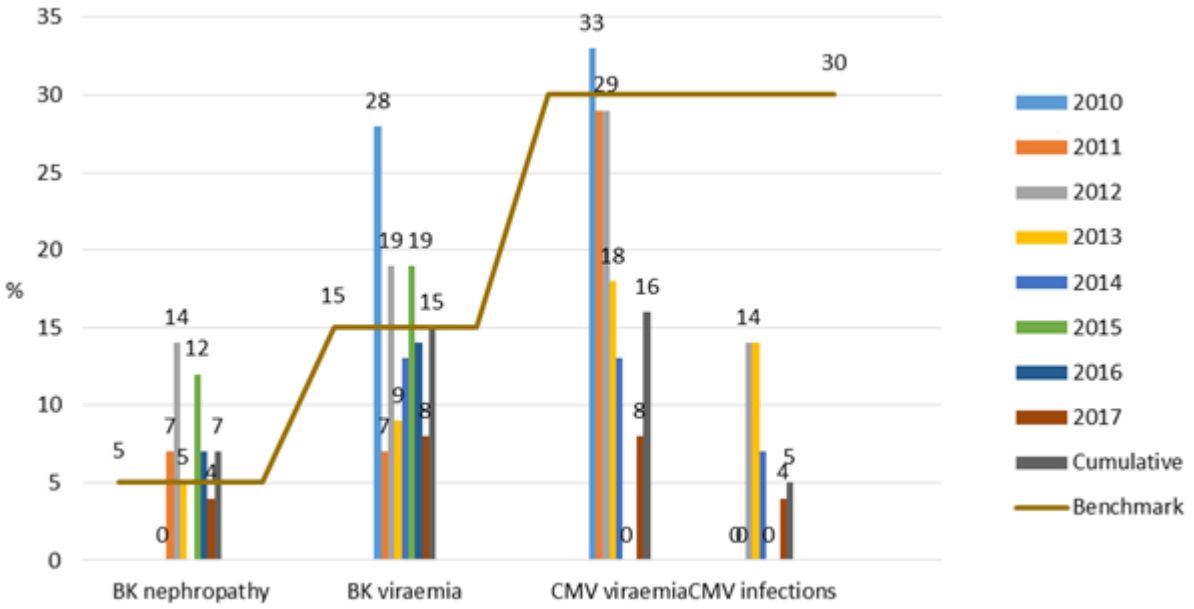


Figure 57. *Infection in first 12 months*

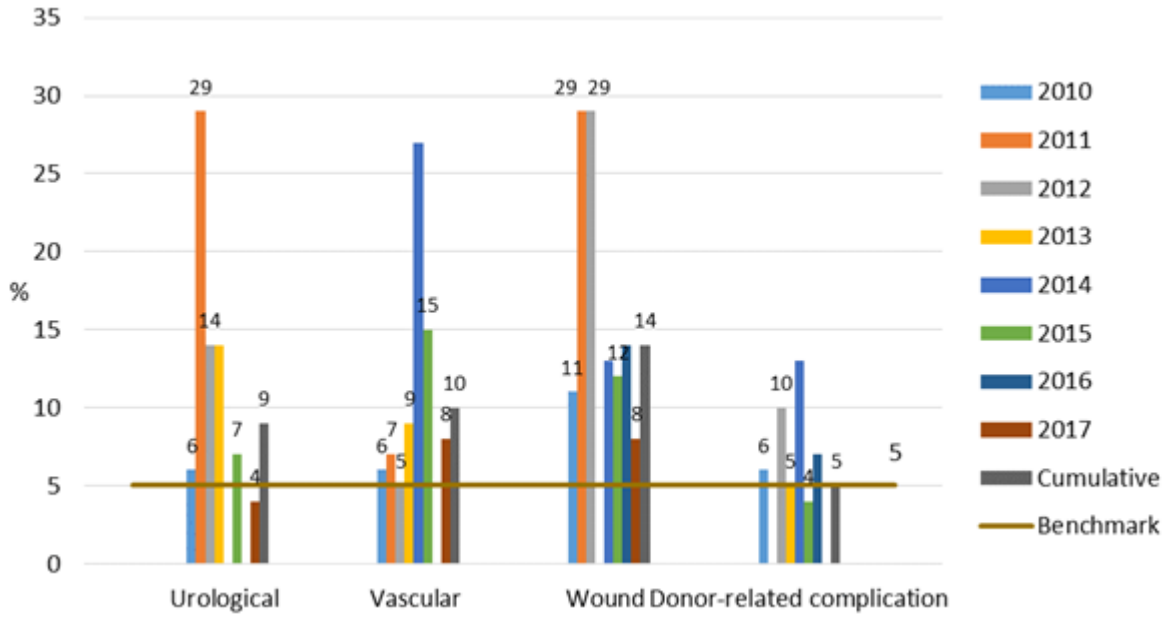


Figure 58. *Surgical Complications*

Graft and Patient Survival ANZDATA report for transplants 2010-2016; n=104

Benchmarks are against the national average

1. **Deceased Donors**

- Compared with national data:
  - Recipients are of similar ages, sex (2/3 male), primary diagnosis (15% diabetes), diabetes (23%) primary grafts (87%); more Asian recipients (31 vs. 13%); longer time on dialysis (90 vs. 71%)
  - Donor factors: more over age 60 (31 vs. 28%); more CVA (59 vs. 46%); similar HLA mismatch, ischemic time, peak PRA

	STGH		Australia		New Zealand	
Time	n	% Survival (95% CI)	n	% Survival (95% CI)	n	% Survival (95% CI)
0	70	100.0	3029	100.0	337	100.0
3 months	67	98.6 (90.2-99.8)	2825	98.9 (98.5-99.3)	318	99.4 (97.6-99.9)
6 months	64	98.6 (90.2-99.8)	2646	98.4 (97.8-98.8)	292	99.1 (97.2-99.7)
1 year	59	95.4 (86.3-98.5)	2334	97.5 (96.8-98.0)	259	98.0 (95.6-99.1)
2 years	39	95.4 (86.3-98.5)	1792	95.9 (95.0-96.6)	197	96.7 (93.7-98.3)
3 years	30	90.3 (77.5-96.0)	1300	93.8 (92.7-94.8)	137	93.3 (89.0-96.0)
4 years	15	90.3 (77.5-96.0)	827	92.2 (90.8-93.3)	85	91.7 (86.6-94.9)
5 years	5	90.3 (77.5-96.0)	385	89.6 (87.7-91.3)	47	91.7 (86.6-94.9)

Table 24. Patient survival for primary deceased donor grafts (ANZDATA Individual Hospital Report 2010-2016 (Table 11))

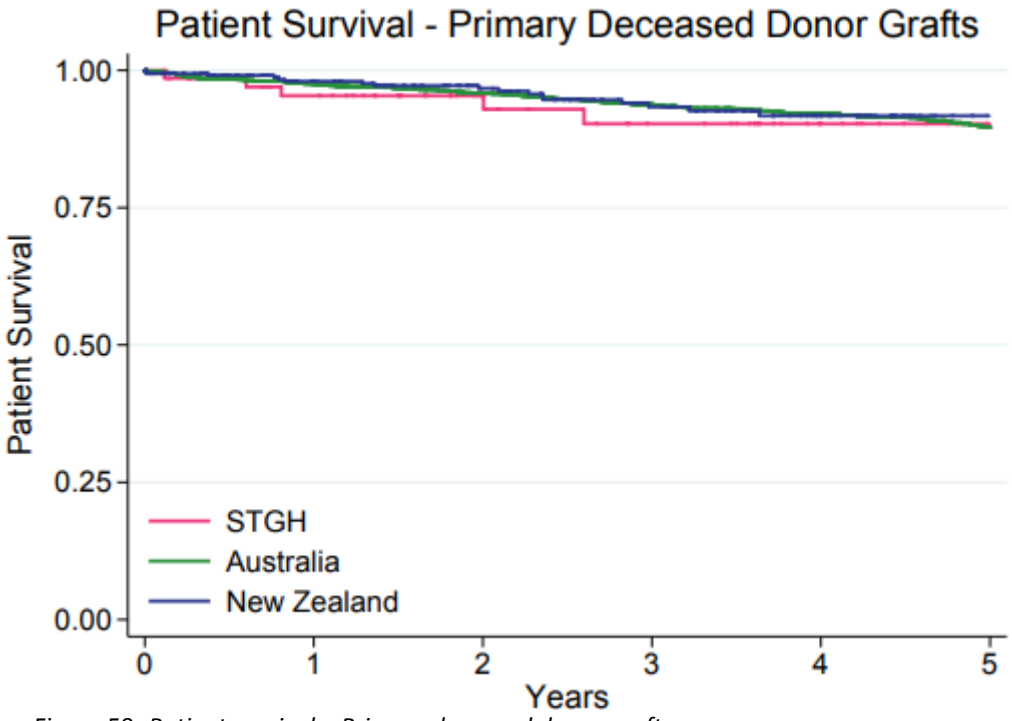


Figure 59. *Patient survival – Primary deceased donor grafts*

Patient survival slightly lower at 12 months than national average, 95.4 vs 97.5%; equivalent patient survival at 5 years, 90.3 vs. 89.6%

	STGH		Australia		New Zealand	
Time	n	% Survival (95% CI)	n	% Survival (95% CI)	n	% Survival (95% CI)
0	80	100.0	3479	100.0	371	100.0
3 months	74	94.9 (87.1-98.1)	3180	97.3 (96.7-97.8)	340	97.0 (94.7-98.3)
6 months	70	93.6 (85.3-97.3)	2957	96.1 (95.4-96.7)	312	96.7 (94.3-98.1)
1 year	64	90.8 (81.6-95.5)	2566	94.3 (93.4-95.1)	276	95.4 (92.6-97.2)
2 years	45	90.8 (81.6-95.5)	1960	92.4 (91.3-93.3)	206	92.8 (89.3-95.2)
3 years	34	84.1 (71.8-91.4)	1395	89.1 (87.8-90.2)	144	89.3 (84.8-92.5)
4 years	18	84.1 (71.8-91.4)	872	85.8 (84.1-87.2)	85	85.0 (79.3-89.3)
5 years	8	78.1 (59.5-88.9)	392	82.2 (80.1-84.2)	46	82.6 (75.8-87.6)

Table 25. Graft survival for deceased donor grafts (ANZDATA Individual Hospital Report 2010-2016 (Table 17))

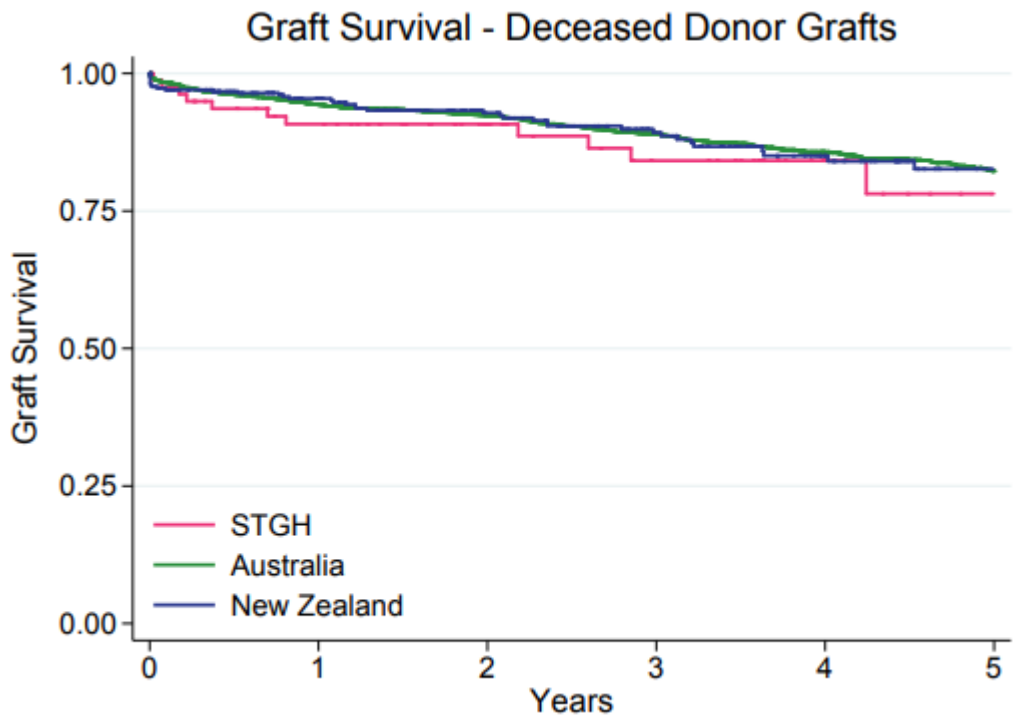


Figure 60. *Graft survival – deceased donor grafts*

DD graft survival is slightly lower than expected at 12 months (90.8 vs 94.3%) and this difference can carry over in subsequent years. There were several early graft losses that influenced these results. A number of new initiatives to be launched during 2018 should reduce unexpected graft losses.

2. Live Donors

	STGH		Australia		New Zealand	
Time	n	% Survival (95% CI)	n	% Survival (95% CI)	n	% Survival (95% CI)
0	23	100.0	1176	100.0	340	100.0
3 months	19	100.0	1101	99.7 (99.2-99.9)	321	99.4 (97.7-99.9)
6 months	19	100.0	1057	99.6 (99.1-99.9)	302	99.4 (97.7-99.9)
1 year	19	100.0	948	99.6 (99.1-99.9)	265	98.3 (96.0-99.3)
2 years	17	100.0	762	98.9 (98.0-99.4)	201	96.7 (93.6-98.3)
3 years	13	100.0	552	97.9 (96.6-98.7)	136	95.4 (91.7-97.5)
4 years	8	100.0	364	97.1 (95.5-98.1)	84	95.4 (91.7-97.5)
5 years	3	100.0	196	96.3 (94.1-97.6)	44	95.4 (91.7-97.5)

Table 26. Patient survival for primary living donor grafts (ANZDATA Individual Hospital Report 2010-2016 (Table 12))

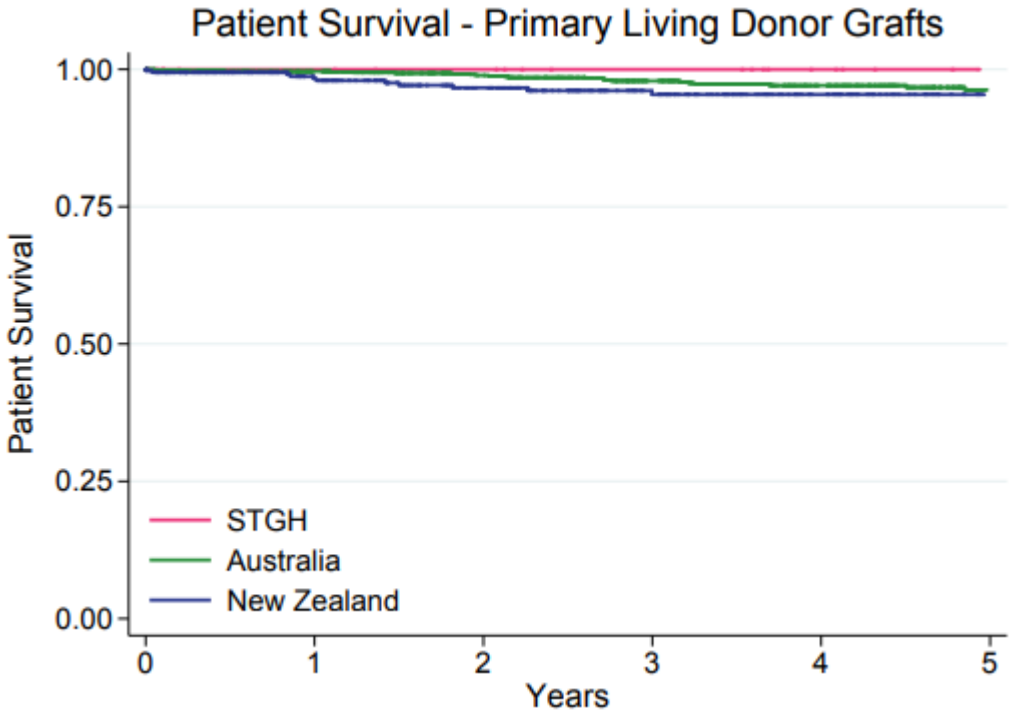


Figure 61. *Patient survival - primary living donor grafts*

	STGH		Australia		New Zealand	
Time	n	% Survival (95% CI)	n	% Survival (95% CI)	n	% Survival (95% CI)
0	25	100.0	1325	100.0	370	100.0
3 months	20	100.0	1223	98.5 (97.7-99.1)	343	98.4 (96.4-99.3)
6 months	20	100.0	1176	98.5 (97.6-99.0)	321	98.1 (96.0-99.1)
1 year	19	100.0	1053	98.2 (97.3-98.8)	282	96.8 (94.2-98.2)
2 years	16	94.1 (65.0-99.1)	837	97.0 (95.9-97.9)	211	94.4 (91.0-96.5)
3 years	13	94.1 (65.0-99.1)	596	94.9 (93.3-96.2)	142	93.8 (90.3-96.1)
4 years	8	94.1 (65.0-99.1)	390	93.6 (91.6-95.1)	88	91.6 (86.9-94.6)
5 years	3	94.1 (65.0-99.1)	209	90.3 (87.4-92.6)	44	90.5 (85.3-94.0)

Table 27. Graft survival for living donor grafts (ANZDATA Individual Hospital Report 2010-2016 (Table 18))

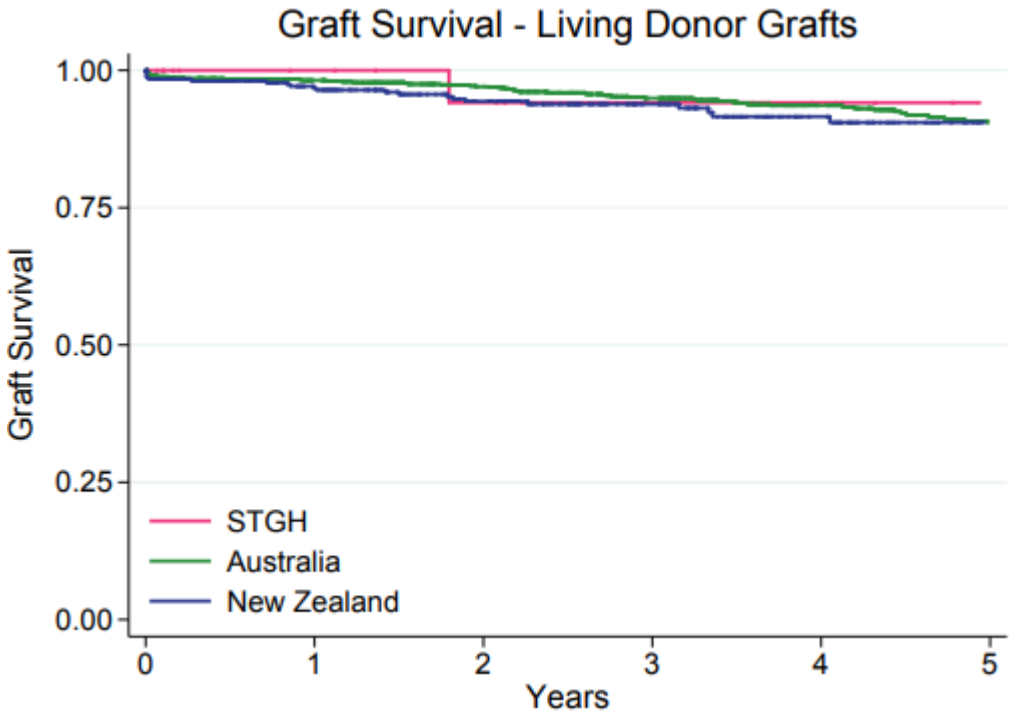


Figure 62. *Graft survival for living donor grafts*

Patient and graft 1 year survival is 100%, and 5year survival is 100% and 94% respectively.

3. Waiting list data

A full review of all SGH patients on dialysis and aged 69 years and under is carried out biannually.

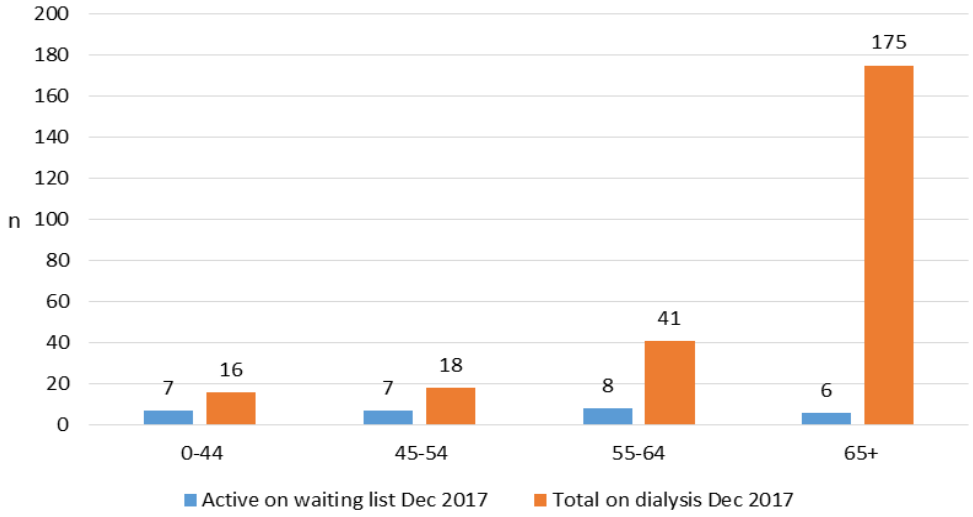


Figure 63. *Number of people on dialysis and on the transplant waiting list 31/12/17*

Although the numbers are small, the percentage of patients listed for transplant in each age group compares favourably with ANZDATA in the 0-44year group. Reasons for dialysis patients not being listed with NOMS include comorbidities such as coronary artery disease, peripheral vascular disease chronic infection or malignancy. Some patients have also expressed their preference to remain on dialysis and not pursue a transplant.

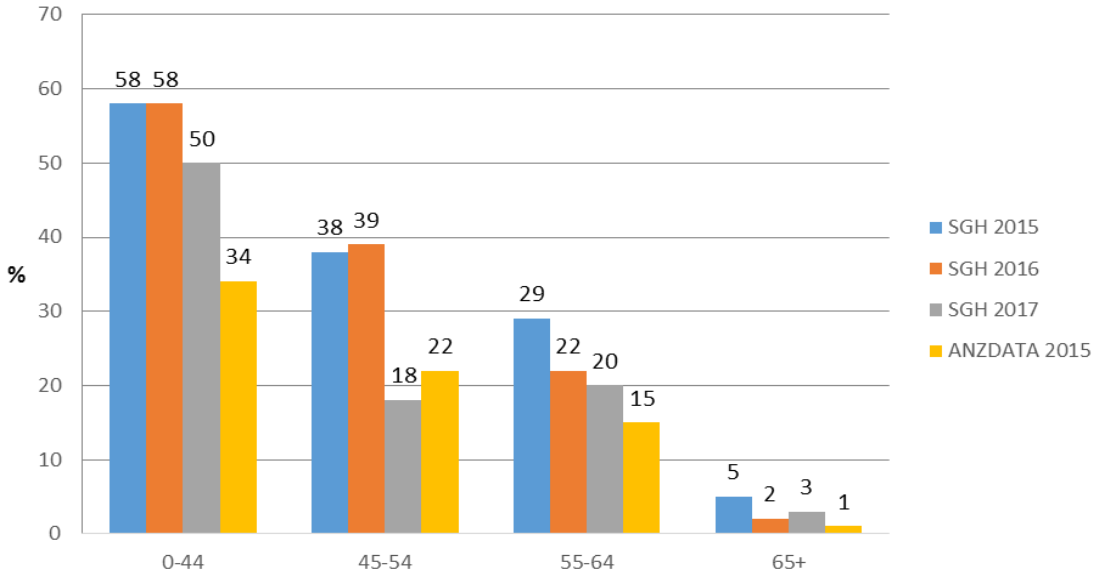


Figure 64. *Percentage of SGH dialysis patients listed for transplant compared to ANZDATA 2015*

The length of time it takes for a person to complete work up and be activated on the waiting list has been reviewed. For the 25 people currently listed it took an average on 40 weeks from the date they started dialysis until activation on the list with workup ranging from 0-210 weeks. Some patients who were referred to transplant work up well before they started dialysis were able to be activated on the list as soon as dialysis commenced. Extended periods of time to activation were associated with patients having multiple comorbidities including recovery from malignancy.

4. Donor Data

At 31/12/17 there were 63 living kidney donors under the care of SGH nephrologists.

- During 2017 56 donors attended for an annual review with the remaining 7 followed up by letter.
- Among the donors there were no deaths and no one on dialysis.
- Creatinine ranged from 62-160umol/L, eGFR from 40-90mL/min/1.73m^2 and albumin creatinine ratio from <0.2 – 12.8.
- Thirteen SGH renal donors have CKD stage 3A (GFR 45-59) and 5 have CKD stage 3B (GFR 30-44).
- Ten donors had hypertension requiring treatment, with nine requiring one agent and one requiring two.

Renal Donor patient flow

1/1/17 SGH renal donors registered with ANZDATA	**53**
In	
Donated	11
Transferred care in	0
In Subtotal	**11**
Out	
Transferred care out	1
Died	0
Out Subtotal	**-1**
Net Gain	**10**
31/12/17 SGH renal donors	**63**

Eleven people under the care of SGH proceeded to donate a kidney during 2017. The medical process of donor work up, measured as the time from the first appointment with the SGH nephrologist until approval to donate by the transplanting unit, ranged from 12-52 weeks and took 32 weeks on average. The whole process from referral to the coordinator to kidney donation ranged from 39 – 119 weeks and took 65 weeks on average. Two donors experienced extended delays of 99 and 119 weeks which was due to the donor being worked up well before the recipient needed a transplant and to the waiting for allocation of theatre time at the transplanting unit.

Eighteen new donors presented to SGH for work up during 2017. Nine did not proceed, five due to medical or psychosocial contraindications and four because another donor went ahead for the same recipient. One was transferred to a renal unit closer to home. At 31/12/17 a total of 11 people remain in assessment at SGH for suitability for renal donation.

5. Summary

- In the first 12 months post-transplant SGH renal transplant recipients demonstrate rates of acute rejection, BK viraemia, CMV viraemia and CMV infection below the benchmarks, while rates of NODAT, type II diabetes, BK nephropathy and surgical complications are above benchmark.
- Compared to ANZDATA there are more SGH dialysis patients listed for transplant in every age group except for 45-54year olds. Those people who are not listed for transplant have an established medical contraindication to transplantation.
- 89% of living donors attended an annual review in 2017.

10. Renal Supportive Care Service

Elizabeth Josland, Alison Smyth, Jessica Stevenson, Hannah Burgess 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 provided at St George and Sutherland Hospitals.

Overview

The renal department has been working closely since 2009 to integrate a palliative care chronic disease model of care to benefit our end stage renal disease patients.

Renal Supportive Care Team

Nephrology	Professor Mark Brown and Dr Kelly Li
Palliative Care	Dr Frank Brennan
RSC CNCs	Elizabeth Josland and Alison Smyth
Social Worker	Hannah Burgess
Dietitian	Jessica Stevenson
Clinical Manager	Anna Hoffman

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, Dr Kelly Li, renal Advance Trainee, RSC CNCs, dietitian, social worker and clinical manager.
2. The 8th Renal Supportive Care Symposium was held in August 2017. Doctors, nurses and allied health attended from around Australia, New Zealand and Internationally.
3. A 'Psychosocial Dimensions of End-Stage Kidney Disease' was held on the 10th August2017. There were over 120 attendees.
4. The NSW Agency for Clinical Innovation (ACI) developed a state-wide RSC service model in 2015. As one of the three Hub training hospitals in NSW, we have conducted a Hub education day, multiple site visits and mentored a number of visitors. We also provide regular ongoing mentoring and education support on an as needs basis within our network and with national and overseas interested parties.
5. RSC is one of the MOH's Leading Better Value Healthcare (LBVH) Clinical Initiatives. This program focusses on delivering better care for patients using a patient experience and health outcomes approach.
6. Details of current research, guidelines, patient information, education /presentations, and a discussion forum, can all be found on the Renal Supportive Care section of the Renal Department website. https://stgrenal.org.au/renal-supportive-care.

The seventh annual Renal Memorial Service was held on May 10th 2017 and was attended by approximately 30 people, consistent with previous years' attendances. This service aims to provide families and friends of past renal patients with a supportive environment to commemorate their loved ones and is a unique service in NSW that is coordinated by the RSC social worker.

Patient Demographics and Outcomes

There are 3 main categories of patients who use the services of the RSC clinic:

1. Conservative care support (patients who are not for dialysis)
2. Dialysis (or pre dialysis) and transplant patients for symptom support
3. Support for those who may be withdrawing from dialysis following a major sentinel event or by choice.

Demographics of patients seen by the renal supportive care service (at their first visit/ consult) are tabled below. The age of newly referred patients ranges from 25-99 years for patients that have attended clinic, and 23-97 for those seen as inpatients only. A similar average age of 77 and 78 years in both groups. Conservatively managed patients are on average older (82 and 85yrs for clinic and inpatient respectively) than the other patients seen by the service.

Clinic Patients	**Conservative**	**Dialysis**	**Transplant**	**Pre-Dialysis/ undecided**	**Total**
No. of patients (count)	298	168	16	34	516
Age (average, years)	82	71	62	74	77
Age (range, years)	30-99	25-90	47-76	53-85	25-99
eGFR (average)	17		43	32	17
IHD (%)	44	47	25	24	43
Dementia (%)	10	7	0	0	8
2 or more co-morbidities* (%)	84	86	56	74	83
Current or former smokers (%)	22	35	6	21	25
Inpatient consults only	**Conservative**	**Dialysis**	**Transplant**	**Pre-Dialysis/ undecided**	**Total**
No. of patients (count)	94	100	4	25	223
Age (average, years)	85	73	53	74	78
Age (range, years)	60-97	23-90	33-69	41-90	23-97
eGFR (average)	13		30	23	14
IHD (%)	50	43	0	40	45
Dementia (%)	6	7	0	4	6
2 or more co-morbidities* (%)	91	78	75	84	84
Current or former smokers (%)	12	25	0	16	18

Table 28. Patient demographics on first clinic visit 2009-2017
**Using co-morbidities included in the Charlson –morbidity Score*

Occasions of service for both inpatients and outpatients since the commencement of the service is shown in Table 29. While outpatient clinic services have generally remained steady over the last 5 years, there has been an increasing demand in acute inpatient services for people with ESKD requiring pain and symptom management and end of life care.

	St George Clinic OOS	Sutherland Clinic OOS	TOTAL Outpatient OOS	Inpatient OOS	Home Visits	Phone consults	Dialysis consults
Mar - Dec 09	110		**110**	N/A	0	0	
2010	218		**218**	30*	0	0	
2011	403		**403**	351	0	15	
2012	498		**498**	322	2	64	102
2013	378		**378**	511	14	69	207
2014	300	109	**409**	415	54	131	225
2015	264	81	**345**	692	49	136	405
2016	308	137	**445**	1002	27	250	344
2017	276	139	**505****	951	65	243	190

Table 29. Occasions of Service (OOS)* *data collection commenced Nov 2010, ** Includes all other OOS (case management, family meetings etc)*

Inpatient services

- Inpatients are predominantly seen by the CNCs. The majority of new inpatient referrals continue to be for pain and symptom management.
- Inpatient consultations decreased by 5% from 2016 with an average of 79 inpatient consultations per month in 2017 and an average of 7.2 new inpatient referrals per month (up from 2016, 5.9 and 2015, 5.4 new referrals per month).
- There was an average of 16 consults per month for patients on dialysis, reduced from 2016 where there were 28 consults per month. This reduction is likely due to the death of some high acuity patients during that time and continued control of symptoms.

Outpatient services

- Outpatient clinic occasions of service decreased at St George and remained steady at Sutherland hospital. The reduction in activity was due to clinician unavailability during the year.
- There were 243 phone consultations in 2017. Telephone consultations commenced in 2012 to assist patients who are too frail to physically attend the clinic and to manage patients who require frequent follow up.
- Home visits by the RSC CNC commenced December, 2012. The CNCs attended 65 home visits in 2017. This is double the number from the previous year due to an escalation in nursing home patients. Nursing home patients may be those already known to the service who are now unable to come to clinic, or new patients being referred to us directly from the aged care team due to a renal failure diagnosis.

Palliative Care Outcome Scale Clinic outcome

Symptom surveys are conducted at each RSC Clinic visit. The most prevalent symptoms reported as severe/ overwhelming were lack of energy, poor mobility, difficulty sleeping, pain and itch. Of all patients that have been seen in the RSC Clinic since 2009, 62% had a reduction in total symptom score by the 3rd clinic visit, while the proportion of patients reporting each of these symptoms as severe or overwhelming decreased. 23% of patients reported severe/ overwhelming itch at their first visit, compared to only 13% at visit 3.

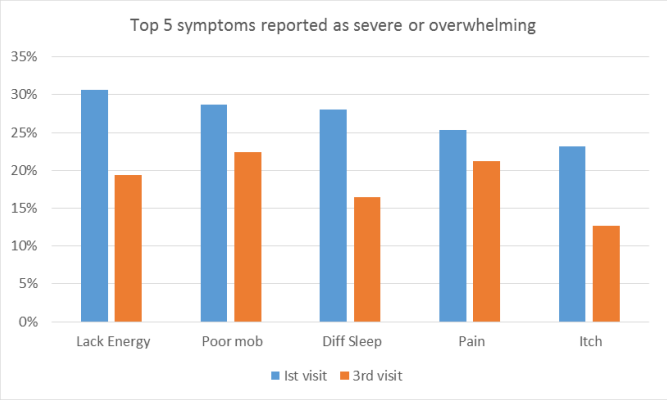


Figure 65. *Top 5 Symptoms reported as Severe to Overwhelming (POS 3 or 4) at first and third RSC Clinic Visit 2009-2017*

Advance Care Plans

Advance care plans are standard practice within the clinic, this includes yearly reviews. The chart below shows figures for patients as of Dec 2017.

- 82% of non-dialysis patients attending the RSC clinic, that are competent have an advance care plan

Active Conservative Clinic Patients	**82**
With ACP	31
Without ACP	**64**
Dementia/ Incompetent	6
Nursing home patients	6
Lost to Follow-up -Not seen >2yrs	11
New Patient - Less than 3 visits	21
Without ACP but Suitable for one	7
Discussed	4
For Follow-up	3

% Completed	82%

Research, Publications, Teaching and Presentations

Research

- Health Literacy (HREC 16/015 LNR/16/POW/33). Measuring the rate of health literacy of both RSC patients and their self-identified surrogate decision maker.
- Predictive tool for conservative patients. This project aims to design a prognostic tool for ESKD patients on a non-dialysis pathway.
- Dialysis/transplant symptoms: investigate and compare the symptom burden of dialysis and transplant patients
- Retrospective chart review to evaluate and compare the quality of death of patients with renal failure dying in the acute hospital setting between a nephrology unit with an established renal supportive care service and a standard nephrology unit

- A prospective randomised, trial of the efficacy and side effect profile of gabapentin in the management of uraemic pruritus in haemodialysis patients and patients managed conservatively
- Assess patients' understanding of prognosis from ESKD, and potential factors influencing the decision-making process in the initiation and withdrawal of dialysis.
- Assess the predictive value of the Surprise questions
- Frailty: to determine whether there is a decline over time in a non-dialysis CKD renal supportive care population
- Quality of Life: To determine the QOL of RRT patients and to determine if there is a relationship between QOL, specific biochemical markers, dialysis adequacy, age and diabetic status.
- Dialysis Symptoms: Determine if there is improved symptom scores in ESKD patients on dialysis after attendance at RSC clinic
- Audit of ESA use in conservative patients: Determine if there is a relationship between Hb and fatigue scores in the conservatively managed patients
- Audit of Taste Changes in patients with end stage kidney disease

Publications

- **Brennan F**, Stewart C, Burgess H, Davison SN, Moss AH, Murtagh FEM, Germain M, Tranter S, **Brown MA**. *Time to Improve Informed Consent for Dialysis: An International Perspective.* Clinical Journal of the American Society of Nephrology . 2017 ; (6) 1001-1009
- Taching T, **Brennan F**, **Brown MA** *Impact of Dialysis on Symptom Burden and Functional State in the Elderly* Renal Society of Australasia Journal. 2017; 13:22-30.
- **Stevenson J**, Meade A, Randall AM, Notaras S, Heaney S, Chan M, Smyth A, Josland E, Brennan F, Brown MA. Nutrition in Renal Supportive Care: Patient-driven and flexible. Nephrology 2017 Oct;22(10):739-74
- **Hoffman A**, Tranter S, Josland E, Brennan F, Brown M. *Renal Supportive Care in conservatively managed patients with advanced CKD: experiences of patients and their carers/families.* Renal Society of Australasia Journal. 2017;13(3):100-106
- Meade, A., **Stevenson, J**., and Notaras, S. (2017) *Nutrition in renal supportive care: Is it time to bend the rules?* Nephrology, 22: 341–342. doi: 10.1111/nep.12966.

Education Days and Teaching

- The 8th Renal Supportive Care Symposium took place on 10-11 August 2017 with sponsorship provided by Amgen, CKD Queensland and Roche.
- One formal RSC Education Day was held on November 29th 2017 to support other RSC clinicians across the St George Hub catchment.

Presentations

Prof Brown gave multiple presentations on RSC at the RSC Symposium, and Hub mentoring sessions, including an invited talk at the American Society of Nephrology:.

- *Informed consent for dialysis*
  Dept. Renal Medicine, Orange Base hospital. NSW. May 26th 2017.
- *HOPE : Helping Older People with End-stage kidney disease*
  SESLHD Improvement and Innovation Forum, POW Hospital. June 20th 2017.
- *New developments in Renal Supportive Care*
  8th Renal Supportive Care symposium, St. George hospital. Sydney. Aug 11th 2017.
- *Renal Supportive Care*
  Kidney School for Nephrology trainees, Royal Australasian College of Physicians. Sydney. Nov 21st 2017.

- *Panel discussant: Ethics and decision making for patients with ESKD*
  Renal Society of Australasia Annual Conference, Sydney. June 21st 2017.
- *Supportive Care in Chronic Kidney Disease*
  ANZSN teaching program: Unravelling the Secrets of Kidneys Sydney. July 9th 2017.
- *Comprehensive Conservative non-dialytic care*
  American Society of Nephrology Kidney Week, Nov 4th 2017, New Orleans. USA

- Dr Frank Brennan gave 54 presentations in 2017, including national and international conferences, lectures, panel discussions, teaching sessions and education days.
- Dr Brennan gave a series of half-hour tutorials on all aspects of RSC 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 RSC four times during the year to each new group of junior doctors at Calvary Hospital, Kogarah.
- Elizabeth Josland and Alison Smyth participated in 18 presentations, throughout 2017 including conferences, mentored multiple visitors and were part of the coordinating committee for the RSC symposium 2017.
- Anna Hoffman presented at the 2017 Patient Experience Symposium.
- Hannah Burgess facilitated the renal memorial service, educated and mentored multiple visitors. Two presentations were given on RSC to the St Vincent's Hospital Social Work department, as well as education and mentoring to RSC SW across the STG Hub.
- Jessica Stevenson presented at the St George RSC Symposium and education days for Hub members, as well as providing education and mentoring to the RSC dietitians across NSW.

Networks

- All team members continue to be involved in local and state-wide network groups.

Achievements for 2017

- Hosted doctors, nurses and allied health from across Australia, New Zealand and overseas visiting our clinic throughout 2017.
- **SESLHD Improvement and Innovation Award. Translational Research Award for HOPE: Helping Older People with End-Stage Kidney Disease.**
- **Service line vision award for the 7th annual Nurses and Midwives Day 2017 to Elizabeth Josland.**
- Dr Brennan continues to revise our local symptom management guidelines using the latest evidence based literature, updates are uploaded to the renal website contemporaneously.
- Hannah Burgess coordinated another successful Renal Memorial Service.

Performance indicators and outcomes for 2017

1. **Symptom and functional state assessment in clinic**
   - 100% of patients had an IPOS (renal) symptom survey and Karnofsky performance scale measured in the RSC clinic on each visit. These assessments are used to identify individual issues and monitor change.
   - 53% of patients (conservative and dialysis) had an improvement in their functional status between first and most recent visit to the RSC clinic
   - 54% of conservative patients and 52% of dialysis patients had an improved or stable Functional Status between first and most recent assessment

2. **Symptom assessment in dialysis**.
    - All dialysis patients have an IPOS (renal) symptom survey and Karnofsky performance scale measured every 6 months.
    - These clinical tools are used twice a year for each patient to monitor progress and identify issues. From the April 2017 POS Snapshot survey:
        - There was a response rate of 53% (n=225)
        - 54 patients (24%) with severe/ overwhelming symptoms were invited to attend the RSC Clinic. Of the 36 patients (67%) that responded to the invite, 22 requested an appointment.

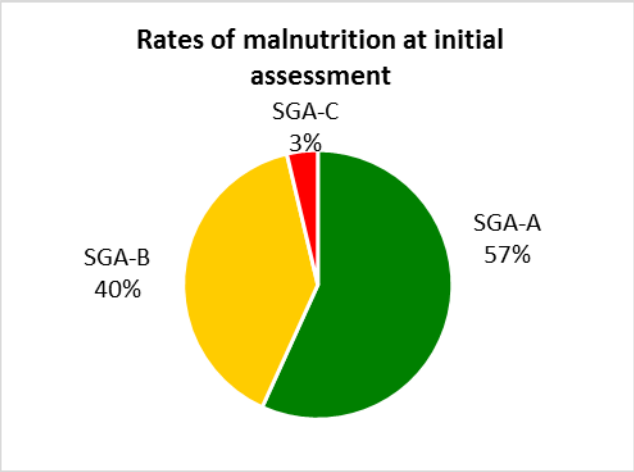
3. **Advance Care Plans**: 100% of competent and consenting ESKD patients who are not for dialysis and are seen in the RSC clinic, or those who are currently on dialysis but their treating physician has identified that they would "not be surprised if they died in the next 12 months", should have an advance care plan completed and reviewed every year.
    - 82% of competent NFD patients who are seen in the RSC clinic have an ACP. ACP discussions have been held with an additional 1% (4 patients) who are currently waiting or not keen to proceed.
    - 41% of dialysis patients identified as requiring an ACP in 2017 (n=45) had one completed. All nephrologists have been sent a list of their current dialysis patients (Dec 2017) to identify those requiring an ACP or a review of current ACPs for 2018.

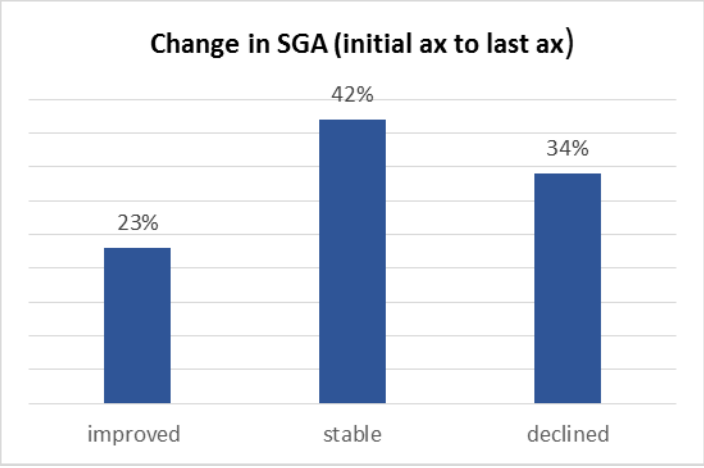
4. Nutritional assessment

<u>Percentage of patients reviewed by dietitian:</u>

- 62% of RSC dietetic consultations were for patients attending for conservative management, with 50% of conservative patients being reviewed one or more times in clinic
- 38% of RSC dietetic consultations were for patients attending for symptoms support (e.g. pre-dialysis, dialysis-dependent, transplant), with 31% of symptom support patients being reviewed one or more times in clinic

<u>Nutritional status:</u>





An improvement or decline in nutritional status was classified as:

- *An change in global SGA rating (e.g. SGA-B to SGA-A)*
- *An incremental change within a global SGA rating (e.g. SGA-B3 to SGA-B5)*

SGA-A (6-7) Well nourished: Patients present with stable weight, no or infrequent nutrition-impact symptoms, adequate dietary intake and adequate muscle and fat stores (relative to age).

SGA-B (3-5) Mild-moderately malnourished: Patients present with moderate (5-10%) weight loss over the past 6 months, often suffer from frequent nutrition-impact symptoms, suboptimal dietary intake and have mild-moderate muscle and fat wasting (relative to age).

SGA-C (1-2) Severely malnourished: Patients present with significant (>10%) weight loss over the past 6 months, suffer from multiple, frequent nutrition-impact symptoms, significantly suboptimal dietary intake and often an associated functional decline and have significant muscle and fat wasting (relative to age).

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

Summary

The RSC service offers a holistic service to mainly end stage renal failure patients and their families with an aim to reduce symptom burden, improve quality of life and provide support towards end of life care where required.

Measurements of symptom burden, quality of life and patient satisfaction are collected routinely with ethics approval to monitor clinic outcomes over time. 53% of patients attending the clinic had an improvement in their symptoms between their first and most recent appointment. This is a good outcome for ESKD patients who are known to have symptoms that are difficult to treat. 54% of conservative patients and 52% of renal replacement therapy patients had an improved or stable functional status between their first and most recent appointment. This is not surprising given the trajectory of ESKD. The RSC service is being well utilized by the renal patients and has an ever increasing role in inpatient management evident by the growth in occasions of service.

RSC is growing in Australasia, the UK, America and Canada and there is a growing demand for education noted by the increasing requests to visit the clinic or provide outside education.

11. Hypertension

George Mangos and Jennifer Beddoe

Twenty four hour BP monitoring

Once again 2017 was a busy year for the hypertension unit. Four hundred and Thirty Two 24 hour ABPM studies were performed (82 of these were for research purposes, 25 were on pregnant women) & 48 home monitor BP checks were attended.

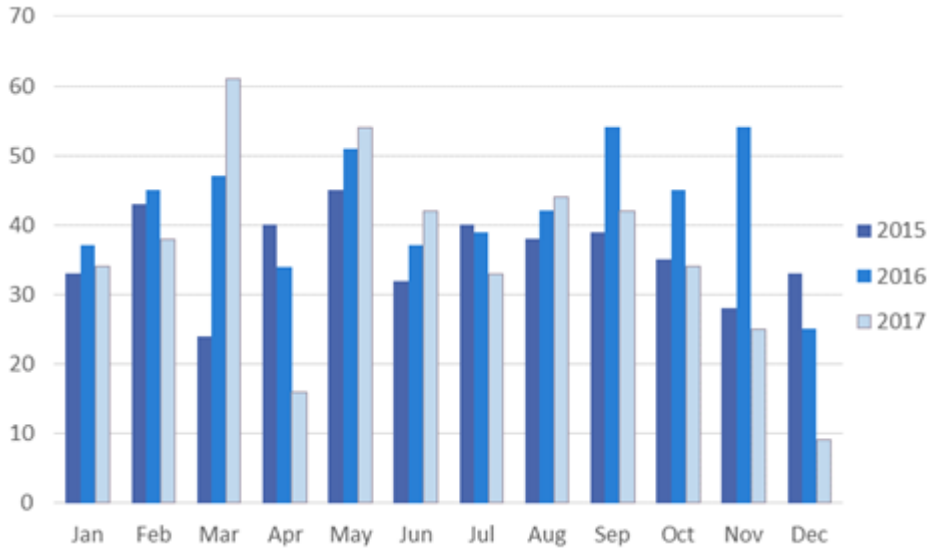


Figure 66. *ABPM Activity 2015-2017*

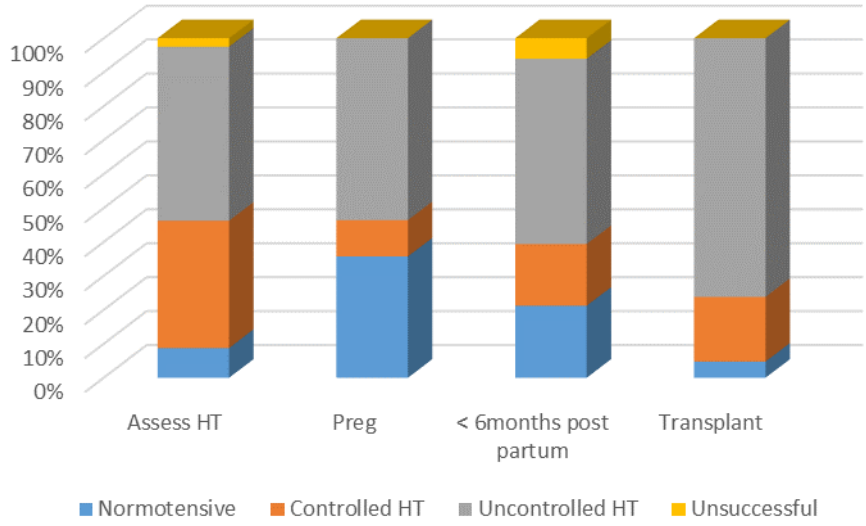


Figure 67. *Resistant Hypertension Outcomes*

Renal Denervation Program

This remains "dormant" until new studies demonstrate benefit. We continue to follow up the 13 patients denervated here at STGH in accordance with the International Registry.

12. 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 2017 there were 2435 pregnancies at St George Hospital down from 2544 in 2016. 215 (9%) of these were complicated by a hypertensive disorder. 8 of these were twin pregnancies & 4 were women who presented with a hypertensive disorder within 2 weeks of delivery, and were not included in this analysis.
- Of the 207 singleton pregnancies 178 (86%) were consulted to the renal team. The remaining 29 were managed by the obstetric team.
- 1 neonatal death occurred at 2weeks of age. The baby was born at 24 weeks gestation, from a singleton pregnancy, after spontaneous rupture of membranes (SROM) with probable chorioamnionitis . The mother was of advanced maternal age and had been consulted for Essential hypertension.
- There were no episodes of pulmonary oedema, dialysis or maternal deaths here at St George in 2017.
- Both the Day Assessment Unit (DAU) and Obstetric Medicine clinic (OMC) saw an increase in activity.

Figure 68. *Day Assessment Unit (DAU) and Obstetric Medicine clinic (OMC) activity 2016-17*

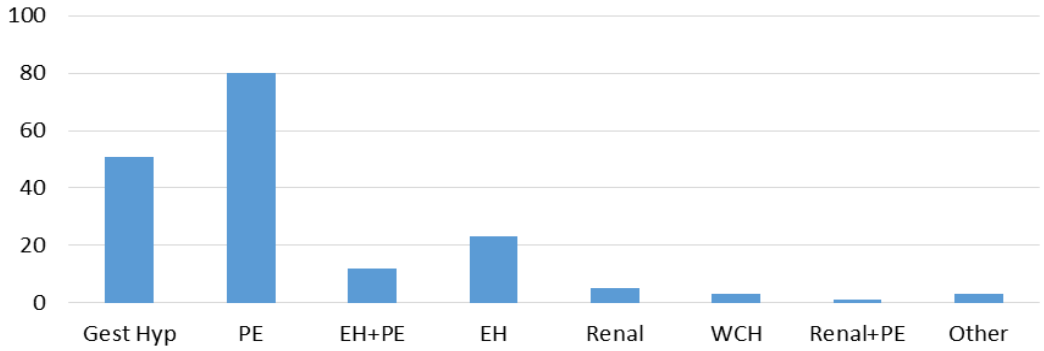


Figure 69. *2017 diagnosis of women with Singleton Pregnancies*

GH=Gestational hypertension; PE=Preeclampsia; EH+PE=Essential hypertension +Preeclampsia
EH= Essential hypertension; WC=White coat

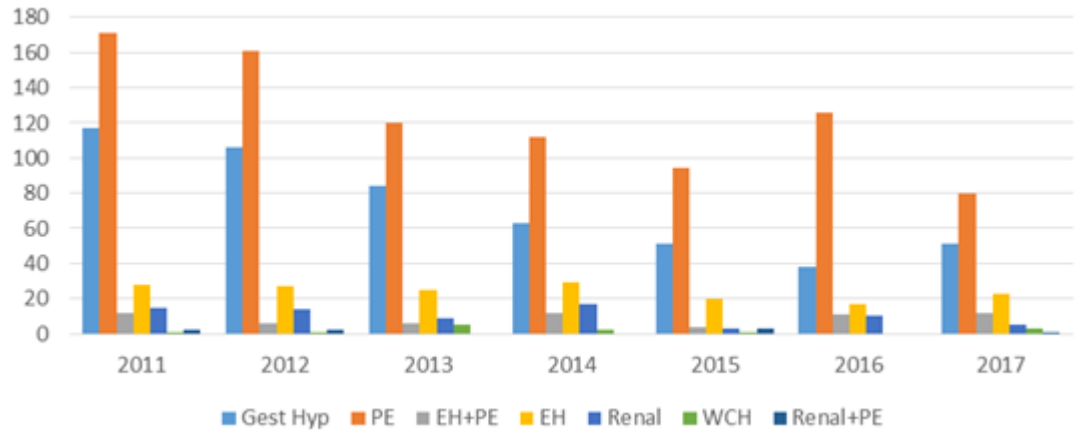


Figure 70. *Diagnosis of women with Singleton Pregnancies 2011-2017*

Outcomes

Singleton Pregnancies (n, (%))

	No	Severe HT	Neuro	AntiC	Eclampsia	Liver	Renal	Platelets	SGA<10	NICU	PNM	CS
						AST > 41	Creat> 90	< 150				
Gest Hyp	51	6 (12)	0	0	0	1 (2)	0	0	1 (2)	0	0	18 (35)
PE	80	26 (33)	14 (18)	11 (14)	1 (1)	32 (40)	8 (10)	20 (25)	5 (6)	0	0	32 (40)
EH+PE	12	9 (75)	3 (25)	2 (17)	0	0	0	3 (25)	2 (17)	0	0	7 (58)
EH	23	3 (13)	3 (13)	0	0	0	3 (13)	0	3 (13)	0	1 (4)	11 (48)
Renal	5	0	0	0	0	0	0	1 (20)	0	0	0	2 (40)
At Risk	18	0	0	0	0	1 (6)	0	0	2 (11)	0	0	7 (39)
Gest Prot	4	0	0	0	0	0	0	0	0	0	0	2 (50)
TGH	2	0	0	0	0	0	0	0	0	0	0	1 (50)
WCH	3	0	0	0	0	0	0	0	0	0	0	1 (33)
Renal&PE	1	1 (100)	0	0	0	0	1 (100)	0	0	0	0	0
Other	4	1 (25)	0	1 (25)	0	0	0	0	0	0	0	3 (75)
Grand Tota	**203**	46 (23)	20 (10)	14 (7)	1 (0)	34 (17)	12 (6)	24 (12)	13 (6)	0	1 (0)	84 (41)

Table 30. Breakdown by diagnosis/symptoms & outcomes in Singleton pregnancies in 2017 at St George Hospital
Gest Hyp=Gestational hypertension, PE=Preeclampsia, EH+PE=Essential hypertension +Preeclampsia, EH= Essential hypertension,

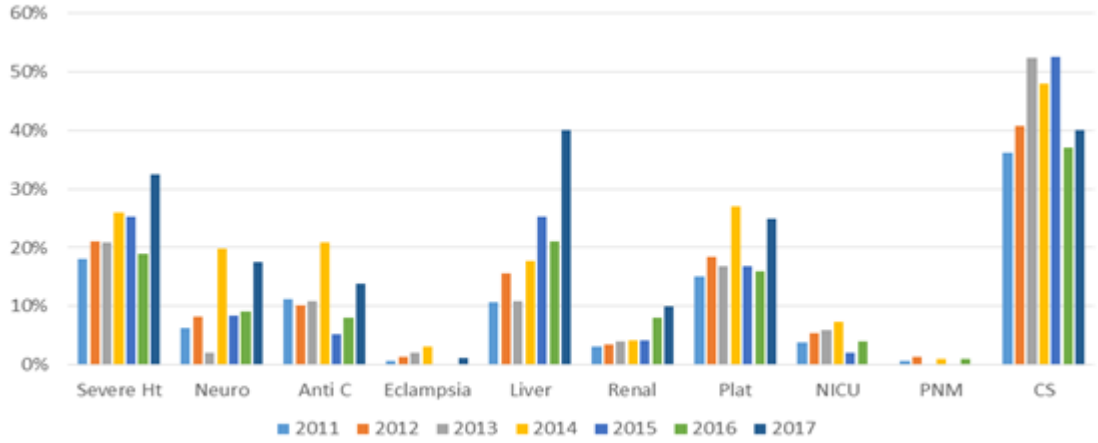


Figure 71. *Outcomes of PE for singleton pregnancies 2011-2016*

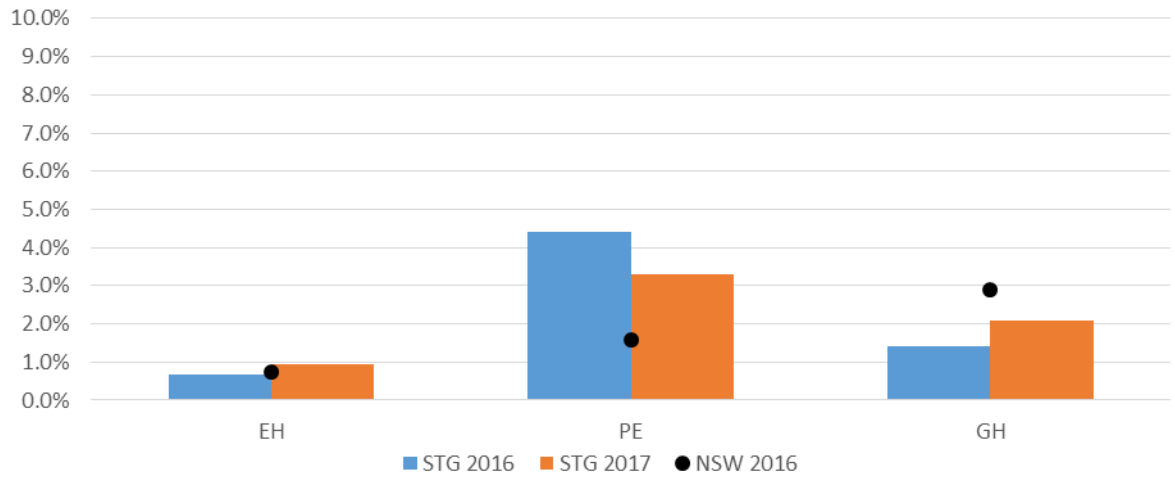


Figure 72. *Comparison of all pregnancies at St George Hospital, 2017 complicated by PE, GH or EH against NSW Health data, 2016*

Conclusions

- Fewer women were consulted to the renal team in 2017 but there were more DAU and OMC appointments than 2016.
- Although there was a further small decline in the number of births at St George, 9% of these were complicated by a hypertensive disorder of pregnancy, up from 8% in 2016.

13. St George Renal Biopsy Review – Audit of Complications

Partha Shanmugasundaram

	Total	Transplant biopsies
Number	126	37
Total complications	9 (7.1%)	1 (2.7%)
Macroscopic haematuria	3 (2.3%)	1 (2.7%)
Symptomatic Perinephric haematoma	4 (3.2%)	None
Transfusion	None	None

Table 31. Data for the year 2017

	2010	2011	2012	2013	2014	2015	2016	2017
Total Number	85	109	86	118	123	98	134	126
Complication rate	9.4%	10%	7.2%	5.1%	6.5%	12.2%	5.2%	7.1

Table 32. Comparison of total complication rates from previous years

Year N	2013 N=118	2014 N=123	2015 N=98	2016 N=134	2017 N=126	Last 5 years N=559
Total complications % (n)	5.1(6)	6.5(8)	12.2(12)	5.2(7)	7.1(9)	7(42)
Macroscopic Haematuria, %(n)	3.3(4)	6.5(8)	9.2(9)	3(4)	2.3(3)	4.7(28)
Perinephric Haematoma, %(n)	1.7(2)	0.8(1)	3.1(3)	1.5(2)	3.2(4)	2(12)
Perinephric bleed – angioembolisation, %(n)	0(0)	0(0)	0(0)	0(0)	0(0)	0(0)
Required blood transfusion	0.8(1)	0(0)	6.1(5)	0(0)	0(0)	1(6)

Table 33. 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% - met
- Blood transfusion 1%- met
- Angio-embolisation 0.6%- met

The rate of complications over the last 5 years was 7%. All three parameters above met the accepted benchmark in 2017 similar to 2016.

14. Nutrition Services

Maria Chan, Su Bahceci and Paris Owen (TSH), Renal Dietitians
Jessica Stevenson– see report under RSC

Dietitian activity in patient care (SGH)

2017	Inpatients (ward and day-stay HDx 4W)		Outpatients	
Occasion of service	Total	New	Total	New
	772	224	413	117

2017		Non-dialysis dependent CKD	RRT				total	Current Staffing (FTE)
			Home HD	In-centre HD	PD	TP		
Outpatient/day-stay patient	*New	99 =79 (ROC) + ~20 (direct referral to Renal nutrition Clinic, Dept. of Nutrition & Dietetics)	10	72	18	24	226	1.0
	** Total number of patients who require regular long term follow-up	~160	30	135	47	228	600	
	Short term & *ad hoc* intervention (e.g. early CKD, stones, HT)	~15					15	
Inpatient							~165 ‡	0.6

Table 34. Dietitian Activity

Remark: this denotes the total number of patients who should be reviewed regularly and for long term follow-up as per best practice guidelines

‡ inpatients admission appeared much lower compared with previous years as expected short admissions were not counted/seen.

Current dietitian: patient ratio – 1:600 (MC) or ~ 1.6 FTE at SGH for the estimated clinical load of 4.5 FTE dietitian according to the Dietitians Association Renal Dietitians Workforce Recommendation: \\sesahs\chn\STG\Medicine and Emergency\Renal\RISCDOC\Nutrition and Dietetics\Guidelines & Protocols\Renal Dietitians Workforce Recommendations 2016.pdf

Comments: Dietitian staffing level continues to be severely inadequate to implement best practice

Chronic Kidney Disease (non-dialysis dependent)

- ***Renal Option clinic (ROC)***

Parameter	2017
Number	n=69/79 *(new), 87.3 % Seen by dietitian
Malnutrition, SGA B &C (%)	54.4 (including 4.3%, n-3 severely malnourished)

Table 35. Nutrition characteristics of patient attending the ROC:

* ~94 patients were referred to CKD CNC. ~79 patients were counted as required for dietitian assessment. 15/94 patients were not counted due patients did not attend clinic, was an inpatients or expecting to start dialysis within a month.

Summary of nutritional characteristics since the inception of the clinic in 2002

Parameters (baseline)	Time period				
	Apr 2002 to Mar 2007	Apr 2007 to Mar 2012	2015	2016	2017
Number	176	324	49	56	**69**
Age (yr)	65.2±13.8	66.4±15.2	66.8±15.9	65.7±14.5	**66.0±13.3**
GFR (ml/min/1.73m^2)	13.2±4.5	17.2±5.5	16.5±3.7	18.3±2.5	**14.6±3.6**
Malnutrition, SGA B &C (%)	39.7	42.0	36.5	35.7	**49.3**

Table 36. Summary of nutritional characteristics since the inception of the clinic in 2002

Comments:

- > 95% of patients did not receive nutrition intervention for CKD prior to the clinic
- Prevalence of malnutrition was high 49.3%
- Data of the above table indicated patients were referred at lower eGFR with higher prevalence of malnutrition.

Recommendation:

- Early referral to dietitians is recommended, preferably prior to needing to attend ROC to prevent malnutrition and to treatment other risk factors/comorbidities.

Haemodialysis

- ***Six monthly routine nutrition assessment***

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

2017	SGH		TSH	
	April	October	April	October
Total number of patient in the unit during review period	118	113	50	44
No. of patient assessed n & (% compliance)	105* (89.0%)	102* (92.6%)	48‡ (96%)	37‡ (84%)
Prevalence of Malnutrition % (SGA score B and C)	39.0	35.4	21	27
Nutrition support required + oral nutrition supplements, % total	40	32.8	27.0	24.3

Table 37. 6 monthly Nutrition review for HD

Remark: reasons for patients didn't receive routine 6 monthly nutrition assessment are:
*SGH: hospital admission, on night shift, on holiday and/or patient not interested in assessment (1)
‡TSH: hospital admission

Comments:
• Majority of malnourished patients responded to nutritional support and improved in a similar pattern as documented in the 2015 report. However, the prevalence of malnutrition remained high due to new patients starting dialysis in malnourished state or newly acquired malnutrition in existing patients due to hospitalisation and illnesses.

Recommendations:
• Structured care to be provided in pre-dialysis stage to minimise malnutrition at the start dialysis or after starting dialysis.

• ***Revisiting Intradialytic Parenteral Nutrition (IDPN):***

- Intra-dialytic Parenteral Nutrition (IDPN) is a form of intravenous nutrition support provided to haemodialysis patients when enteral nutrition support alone is unable to meet nutritional requirements of malnourished patients.
- SGH was one of the first renal units in Australia to use IPDN with many success stories since
- ~ year 2000. However, such use was ceased due to perceived high cost about 3 years ago.
- We revisited and reintroduced the use of IDPN in 2017. A literature search was conducted, and protocol was evaluated.

- Two malnourished patients received IDPN and their 3-month progress is detailed in table 6 below.

Name/Time Parameters	**N.T.**		**P.Z.**	
	Pre-IDPN (T0 mth)	**IDPN (T3 mth)**	**Pre-IDPN (T0 mth)**	**IDPN (T3 mth)**
Nutrition intake (meeting protein and energy requirements)				
Oral intake (Diet+supplement)	40%	60%	40%	60%
IDPN	0%	40%	0%	30%
Total nutrition	**<50%**	**100%**	**<50%**	**90%**
Nutritional and clinical parameters				
Dry weight (kg)	48.5	55	58.5	58.5
BMI (kg/m^2)	18	21	20	20
Albumin (g/L)	22	36	25	30
Hand grip strength (kgN)	14.4	16.7	15.6	19.4
Clinical signs and symptoms	Poor appetite and early satiety+++	Improved appetite	Poor appetite, early satiety, intermittent N+V, abdo pain	Improved appetite, GI symptoms fluctuating
Nutritional status (SGA)	**Severely malnourished C2**	**Mildly malnourished B5**	**Moderately malnourished B3**	**Mildly malnourished B5**
QOL	Lethargic+++	More energy, can take down curtains and iron them, can hang bed sheets on clothes line	Lethargic+++, GI symptoms	More energy for gardening
Comments		**improved**		**improved**

Comments: These cases therefore justify the usefulness and effectiveness of IDPN
Recommendation:

- to finalise and establish protocols for use of IDPN at SGH.
- to commence IDPN in another 8 cases for case series report.

Peritoneal dialysis (PD)

- 18 patients commenced dialysis, all received initial nutrition assessment and education (100%)

Transplant:

- 92% (22/24) newly transplanted renal patients received nutrition intervention at the acute transplant clinic. However, <60% received structured follow-up care within 3 months compared to protocols. Structured follow-up of chronic transplant patient is minimal, < 5 *ad hoc* referral received.

Inpatients:

- Dialysis patients accounted for ~60% of caseload of inpatient dietitian, and 100% of these required follow-up after discharge from hospital. Main reasons for review were nutritional support and electrolyte imbalance.

Miscellaneous:

Research:

- Dietary Approaches to Manage Progressive and End stage Renal disease (DAMPER) study: CKD nutrition intervention on progression and outcomes after initiation of dialysis.
- Development of eHealth using SKYPE to improve follow-up.

Publications and invited lectures:

- Please see Research Report for details. These included 3 invited lectures, two peer reviewed publications and 2 conference abstracts –oral presentations.

Visiting dietitian/shadowing:

- Five renal dietitians received stipend from Hong Kong Hospital Authority to up-skill their renal nutrition practice for two weeks in 2017.

Education/consultation (provision of):

- Maria continues to be a steering committee member on the Council of Renal Nutrition, NKF USA to develop international renal specialist dietitians training –GRICD (*Global Renal Internet Course for Dietitians*).
- Organised Renal nutrition education day on 2/5/2017 with open invitation to all NSW renal unit staff.

Multidisciplinary team (MDT) case conference:

- Benefits of having MDT case conference have previously been discussed (see 2016 report), in summary, it provides:
  - Structured care by the MDT and case discussion
  - Opportunity for Medicare remuneration
  - Less clinic attendance burden to patients to attend many appointments to various healthcare professionals (one stop shop).

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 (ongoing):

- To work with the team to implement MDT case conference and Medicare remuneration.
- To review dietitian staffing level.
- To develop and implement eHealth using SKPYE.
- To liaise with team to implement better referral and follow-up strategies to achieve structured care for all pathways.