Department of Renal Medicine
St George & Sutherland Hospitals

2018

Annual Report

and

Quality Indicators

Health
South Eastern Sydney
Local Health District

Introduction

It gives me great pleasure to present the 2018 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

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Appendix 2 - Vascular Access ..... **Error! Bookmark not defined.**

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1. ANZDATA Activity Overview

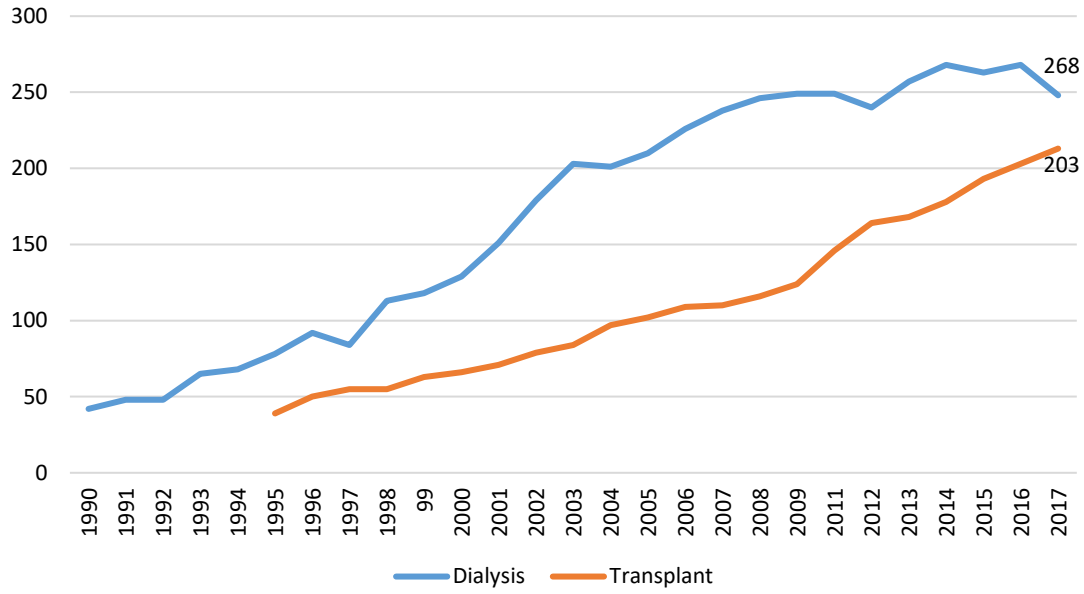


Figure 1. *All Dialysis & transplant patients St George hospital 1990-2017 (ANZDATA 31/12/17)*

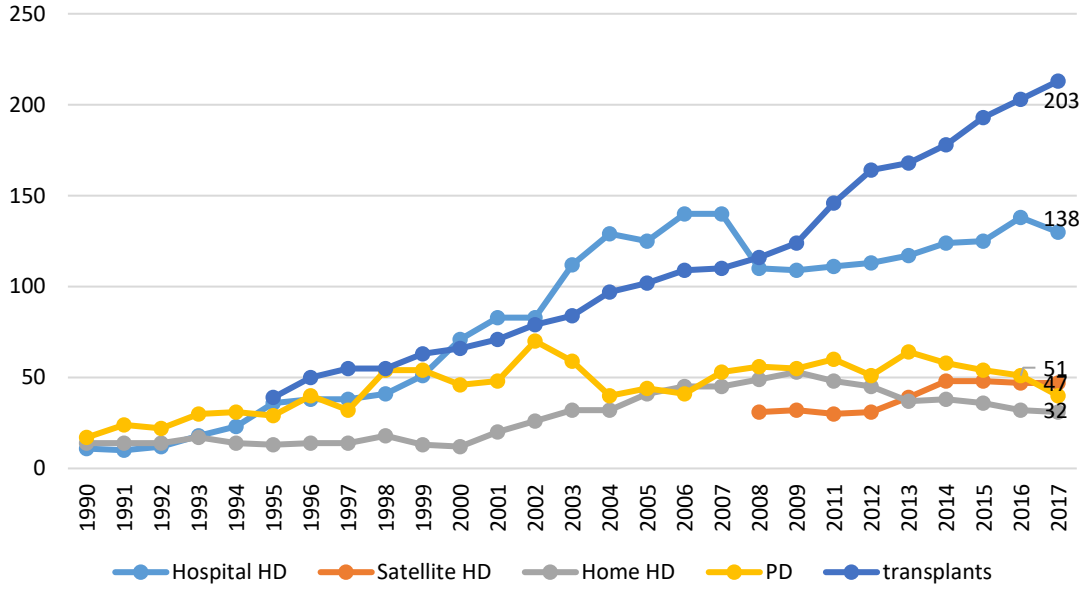


Figure 2. *Dialysis & transplant patients St George hospital 1990-2017 (ANZDATA 31/12/17)*
NB. Sutherland Satellite unit opened in 2008

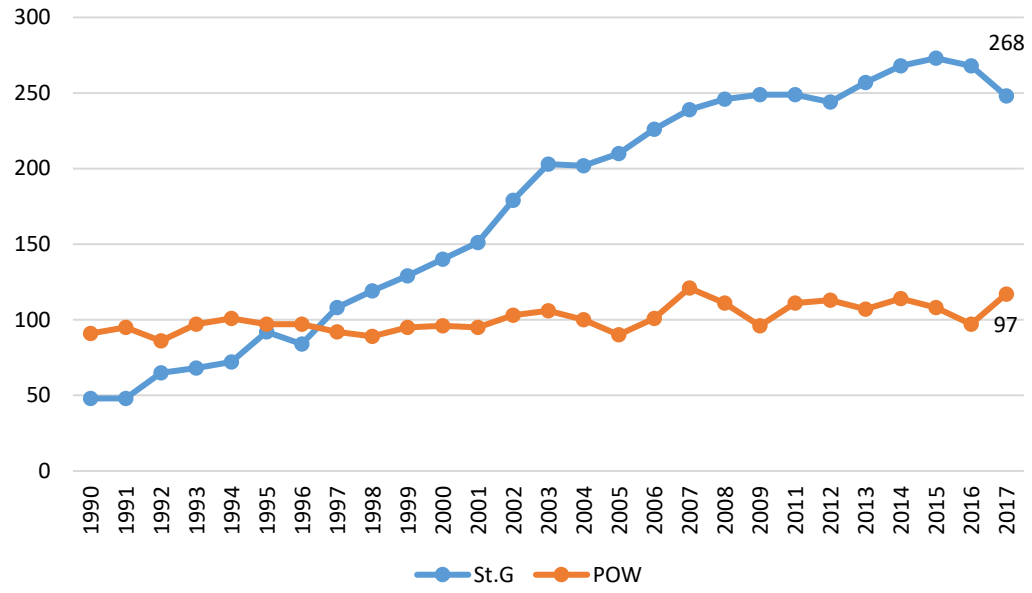


Figure 3. *Dialysis patients South East Sydney LHD (ANZDATA 31/12/17)*

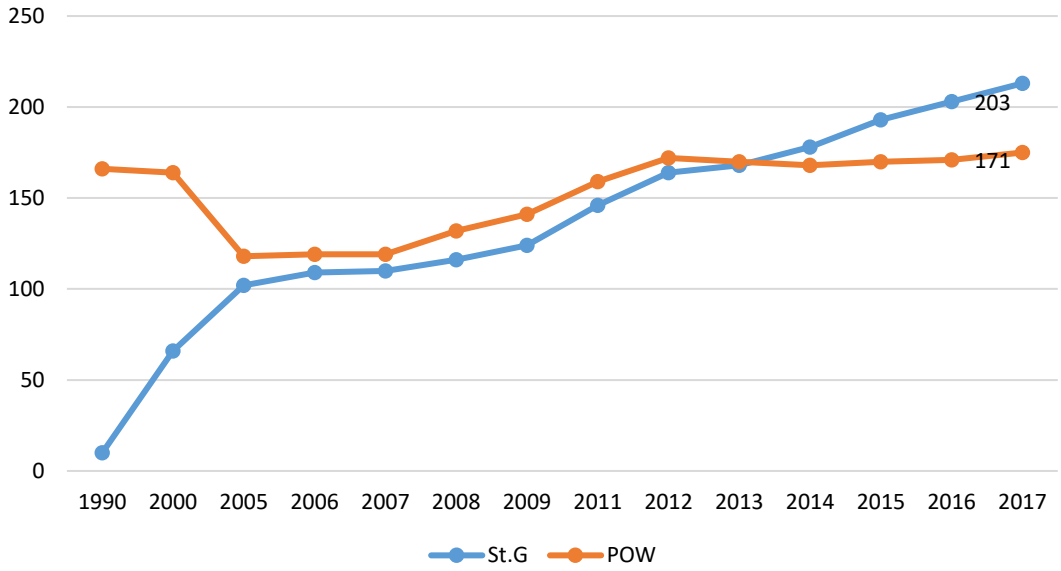


Figure 4. *Functioning Transplants South East Sydney LHD (ANZDATA 31/12/17)*

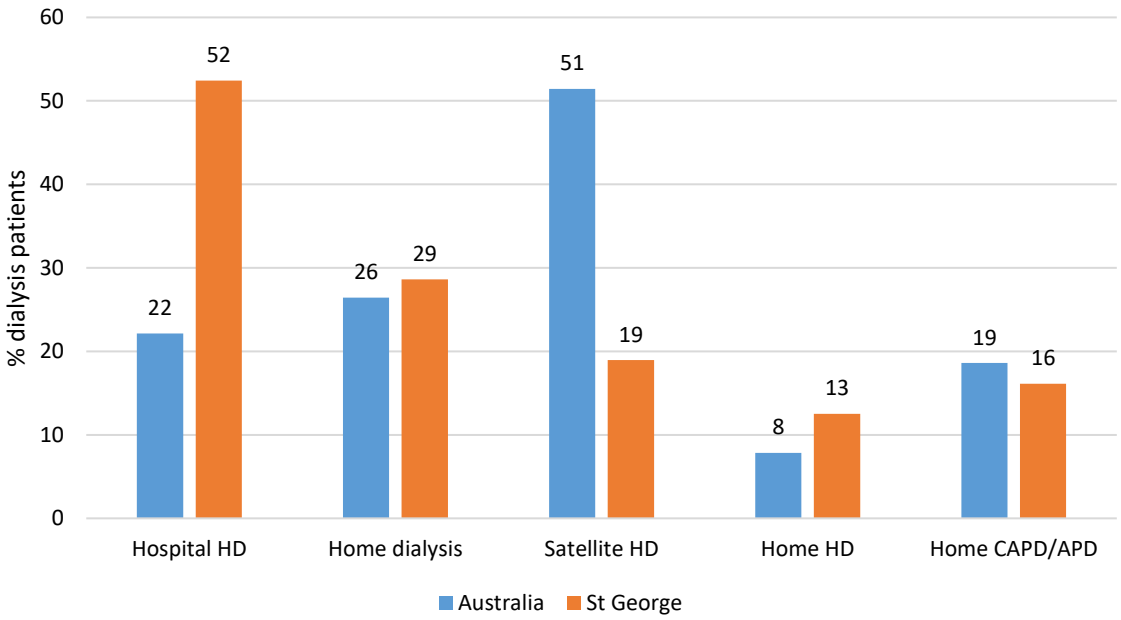


Figure 5. Mode of dialysis Australia & St George 2017 (ANZDATA 31/12/17)

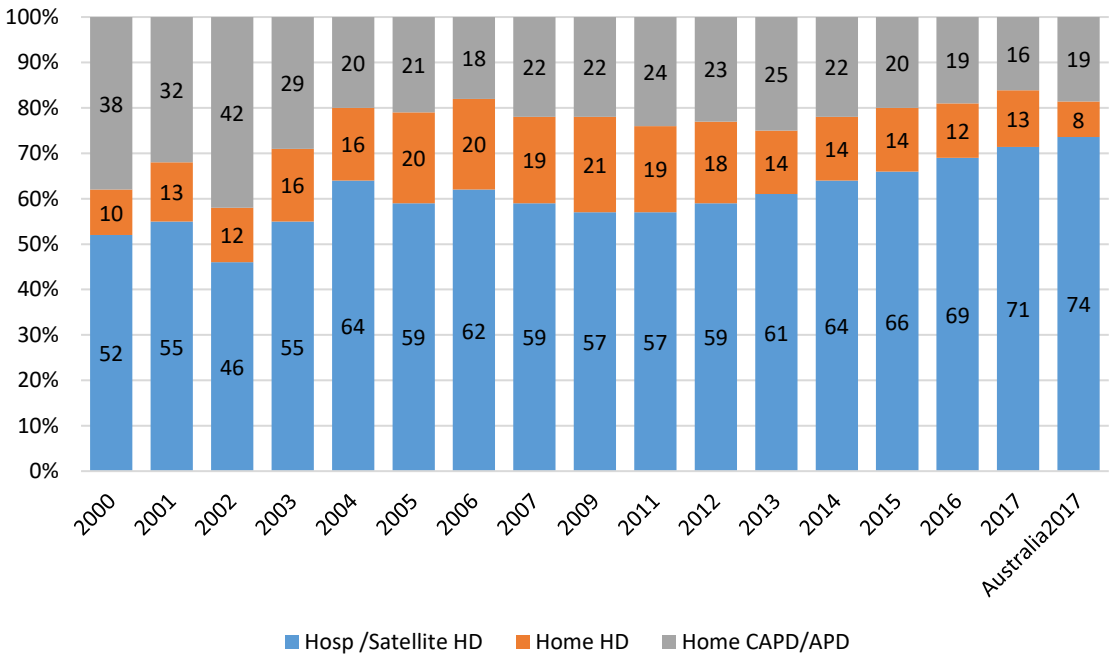


Figure 6. Mode of dialysis Australia & St George 2017 (ANZDATA 31/12/17)

2. Chronic Kidney Disease

Kylie Turner, Saiyini Pirabhahar, Ivor Katz

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 2018. Collecting these data has helped us understand the type of patients being referred and how we can improve management and referrals in the future. With these data we aimed to set CKD KPIs for our unit which we have begun to do from this year. Data for this period were captured from the all new CKD or uncontrolled hypertension patients seen in the St George Hospital outpatient clinics.

New referral numbers to Public Outpatient Clinics

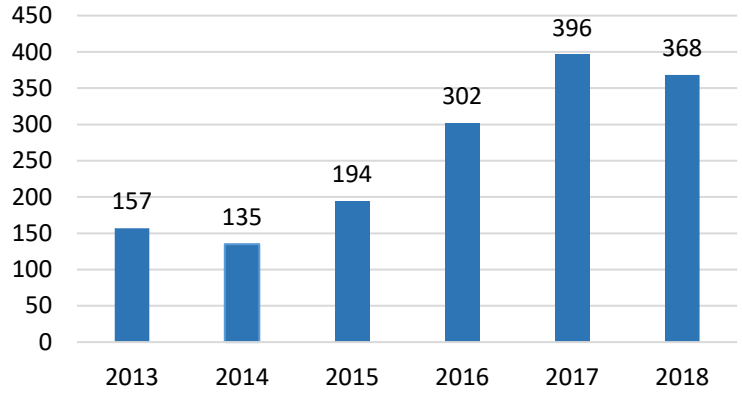


Figure 7. Total number of new outpatient referrals to St George Hospital Renal Dept

There has been a steady increase in referrals since 2013. Since the commencement of the Virtual Medical Consultation (VMC) program in 2017 GPs are being educated around appropriate referrals. There has been a focus on appropriate referrals to the clinic. In 2019 we will triage patients in accordance with existing guidelines and the recently developed Kidney Failure Risk Equation Score (KFRE) www.kidneyfailurerisk.com. We aim to follow this up with more GP education around the triage criteria being used. Referral patterns are in Figure 8.

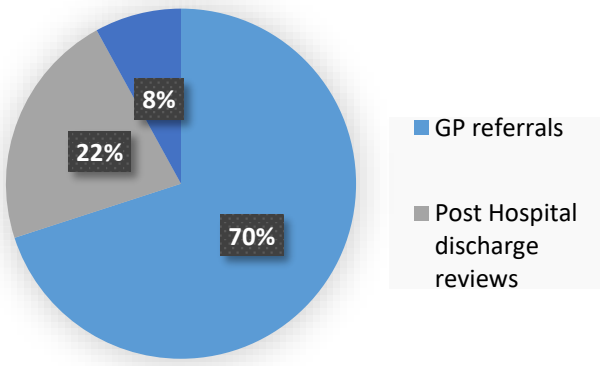


Figure 8. Origin of CKD referrals to CKD Outpatient

Most patients being referred still have a better eGFR than that recommended by Kidney Health Australia, that is below an eGFR stage 4 (eGFR<30ml/min/1.73m^2). (Figure 3). We suspect this is due

to GPs not being confident managing patients with declining eGFR. We have begun to focus more closely on improving referrals and understanding the reasons for such early referral.

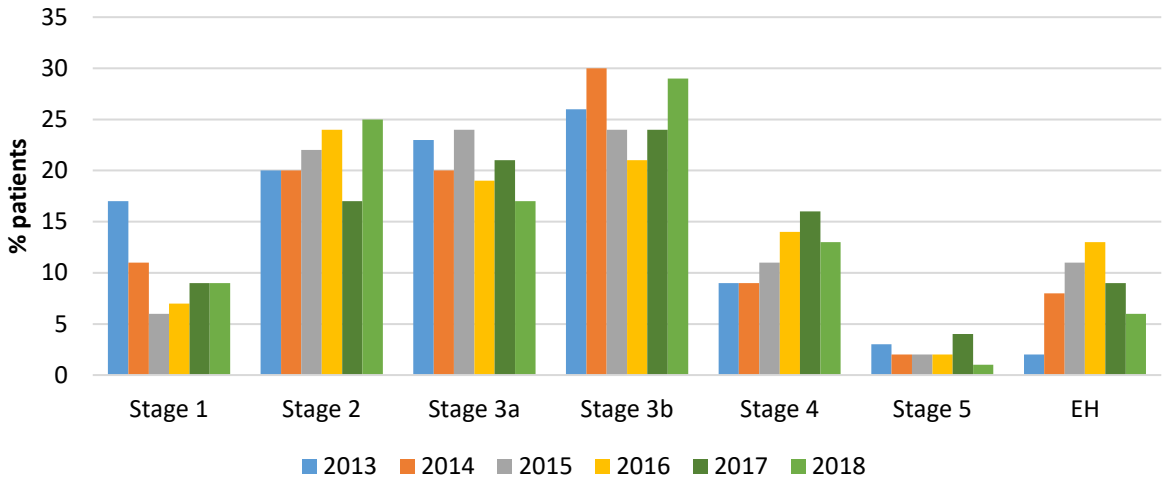


Figure 9. Referral by stage and year.

Only 14% of patients referred actually meet the recommended guideline for eGFR as per the KHA algorithm. This is slightly higher for albuminuria at 70% (Table 1).

Kidney function stage	GFR (ml/min/1.73m²)	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=33)	28% #	26% *	18%	28%
2	60-89 (n=93)				
3a	45-59 (n=61)	34% *	23%	21%	22%
3b	30-44 (n=109)	62%		17%	21%
4	15-29 (n=48)	14%			20%
5	<15 (n=2)				

Table 1. Percentage of Patients referred by stage and Missing Urine Protein measurements at baseline

Figure 10 shows a third of our patients are referred back to their GP within a year of being seen.

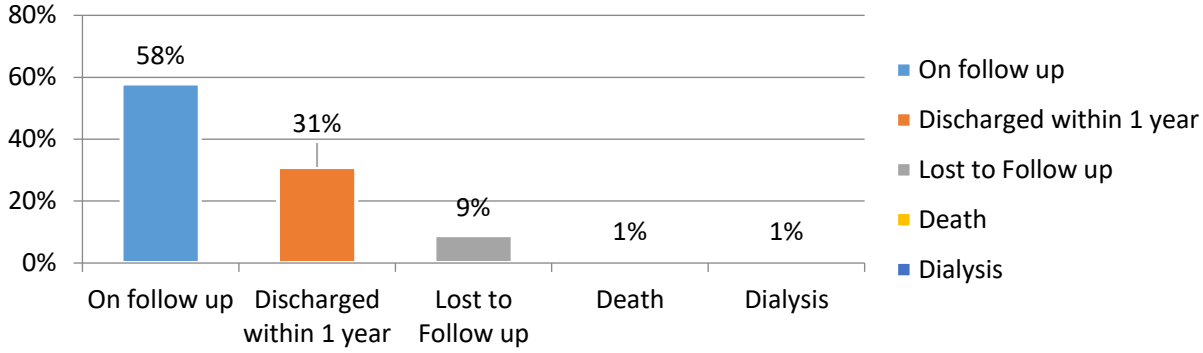


Figure 10. Follow up status at 1 year

A total of 368 referrals were made to the department in 2018. 58% (n=212) were appropriate referrals based on KHA GP guidelines for referral to a nephrologist (having hypertension, significant albuminuria or an eGFR less than 30ml/min) (Figure 11). 156 patients (42%) did not meet any of the three criteria.

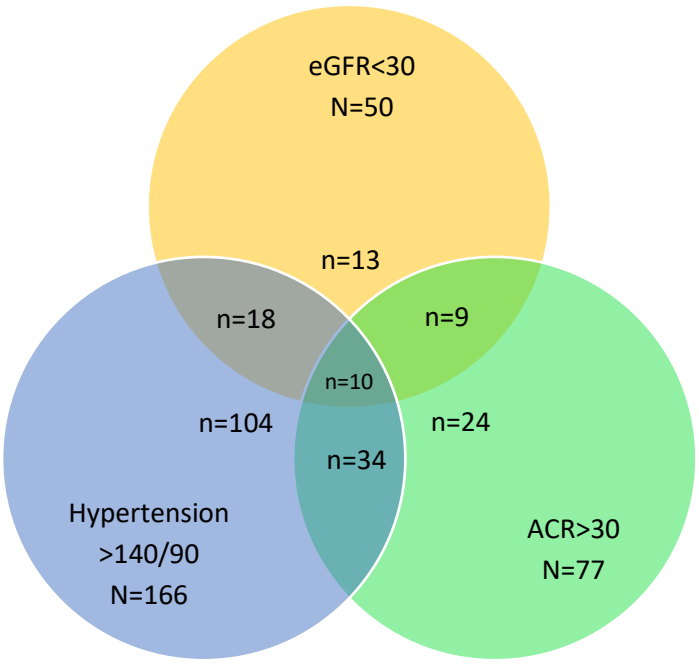


Figure 11. Patients Meeting the Referral Criteria (n=212; 58%)

We currently do not have adequate data to evaluate CKD progression and whether we are achieving targets for reducing decline in CKD. We are also currently evaluating risk of progression and appropriate referral to CKD services which will be presented in the next report.

Proposed CKD-KPIs

The principles of KPIs' being targeted are to firstly ensure appropriate referral of patients with Chronic Kidney Disease (CKD) to the St George Hospital Renal Outpatient clinics. Secondly we wish to ensure that we are achieving the evidence based targets which slow renal decline e.g. Blood Pressure control or reduction in albuminuria. Lastly, to measure that those who we follow have a slower decline in renal function or determine we have achieved remission of decline in renal function.

Key Performance Indices in CKD:

1. An eGFR of < 30ml/min/m2 or
2. Macroalbuminuria irrespective of eGFR (uACR ≥30mg/mmol)
3. CKD with uncontrolled hypertension despite treatment with 3 anti-hypertensive agents.
4. Reducing the risk of progression
    a. Change in eGFR
    b. Change in UACR
    c. Change in KFRE at 2 years and 5 years
    d. Change in HbA1c

New referral numbers to Public Outpatient Clinics

Referral numbers have increased to our service up to 2017 until now they appear to have begun to plateau. Over the last 2 years greater scrutiny with triage has occurred with referrals but we are not sure if this has yet impacted on referrals. Our Virtual Medical Consultation (VMC) program has been running for a couple of years and many referring GPs are being educated around appropriate referrals through this program and likely also in consultant letters to GPs. There has been a focus on appropriate referral.

From 2019 we have begun to triage patients in accordance with existing guidelines and the recently developed Kidney Failure Risk Equation Score (KFRE) www.kidneyfailurerisk.com
We aim to follow this up with more GP education around the triage criteria being used.
Looking at our referral patterns. Most referrals still come from GPs, followed by patients seen in hospital and then by those referred by other specialists (Figure 2.).

Most patients being referred still have a better eGFR than that recommended by Kidney Health Australia. It is recommended to only refer when at or below an eGFR stage 4 (eGFR<30ml/min/1.73m^2) (Figure 3.). The percentage of patients being referred in the early stages 1 - 3a remains unchanged (Figure 3).

We suspect it is because GPs are not confident and or concerned to track patients with an eGFR which has recently declined. This despite the ongoing education being provided by Kidney Health Australia (KHA).
We have begun to focus more closely on improving referrals and understanding the reasons for such early referral.
These data should also be evaluated in the context that we are referring back a third of patients to their GP within a year of being seen (Figure 4).

Only 14% of patients referred actually meet the recommended guideline for eGFR as per the KHA algorithm. This is slightly higher for albuminuria at 70% (Table 1).

A total of 368 referrals were made to the department in 2018. In the figure above we are able to demonstrate that 58% (n=212) of patients referred were appropriate based on having hypertension, significant albuminuria or an eGFR less than 30ml/min. There were 156 patients (42%) who therefore did not meet either of the three criteria according to KHA GP guidelines for referral to a nephrologist.

We currently do not have adequate data to evaluate CKD progression and whether we are achieving targets for reducing decline in CKD. We are also currently evaluating risk of progression and appropriate referral to CKD services which will be presented in the next report.

3. Advanced Kidney Disease and Pre Dialysis Education Clinic

Kylie Turner / A/Prof Ivor Katz

Activity summary

The Renal Department guideline for referral to the multidisciplinary Pre Dialysis Education Clinic is eGFR ≤ 15 or dialysis predicted in the following year. As of December 31st 2018, there were ***130 patients active within the Pre Dialysis Education clinic with a plan for renal replacement therapy***. This was a 13% increase from the previous year.

Since April 2002 there have been 1066 people who have attended the clinic. In 2018 ninety one new patients attended the Pre Dialysis Education Clinic compared to 81 new attendees in 2017. There were 74 follow up appointments compared to 95 follow up appointments in 2017.

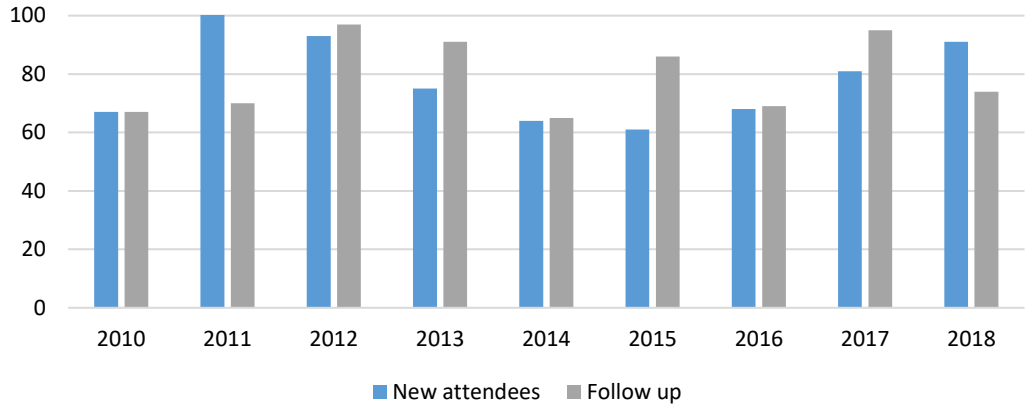


Figure 12. New attendees and follow up numbers for 2010-18

The age range of new patients seen in 2018 was 24 – 86 years. The average age was 65.4 years. The 80 Patients with eGFR <15 were active in the Pre Dialysis Education Clinic at the end of 2018 with 63 patients at the end of 2017. Below are the percentages of those patients and their chosen treatment pathways.

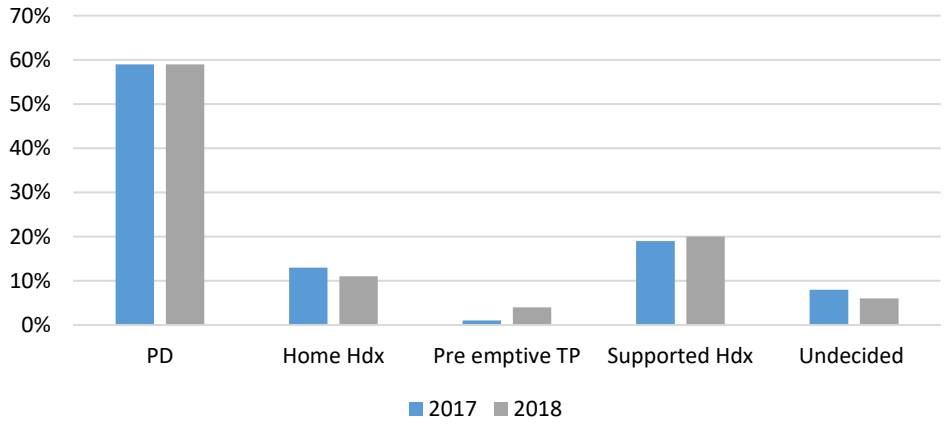


Figure 13. Percent of patients with eGFR <15 active in Pre Dialysis Education Clinic and chosen treatment pathways

4. Acceptance onto dialysis

Kylie Turner / A/Prof Ivor Katz

Activity summary

Out of 55 new patients who started dialysis in 2018, 21 (38%) patients commenced peritoneal dialysis, 9 (16%) started home haemodialysis and 25 (46%) started haemodialysis. Patients were analyzed according to their first mode of dialysis.

- There were only 6 (11%) late referrals and this was below the National average (18%). Of note is that 2 of the late referrals received PD as first modality.
- Mean age at commencement in 2018 was 63 years for peritoneal dialysis and 66 years for haemodialysis. The age of patients starting haemodialysis and peritoneal Dialysis was higher than the previous year and this is still older than the National average age which is 61 years for HD and 57 years for PD (ANZDATA 2017).

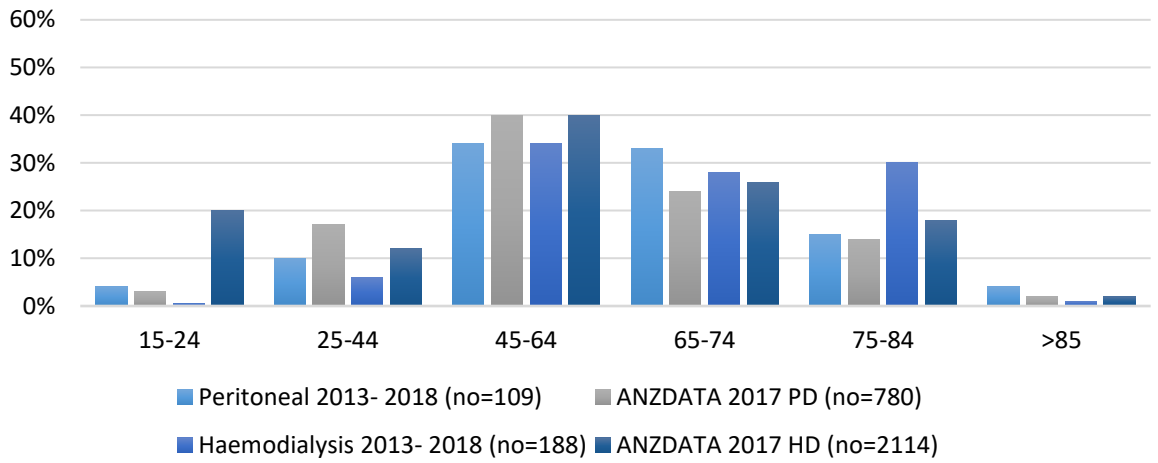


Figure 14. Age Groups of New Patients 2013-2018 compared to ANZDATA 2017

We continue to start more patients than nationally in the 75-84 age groups.

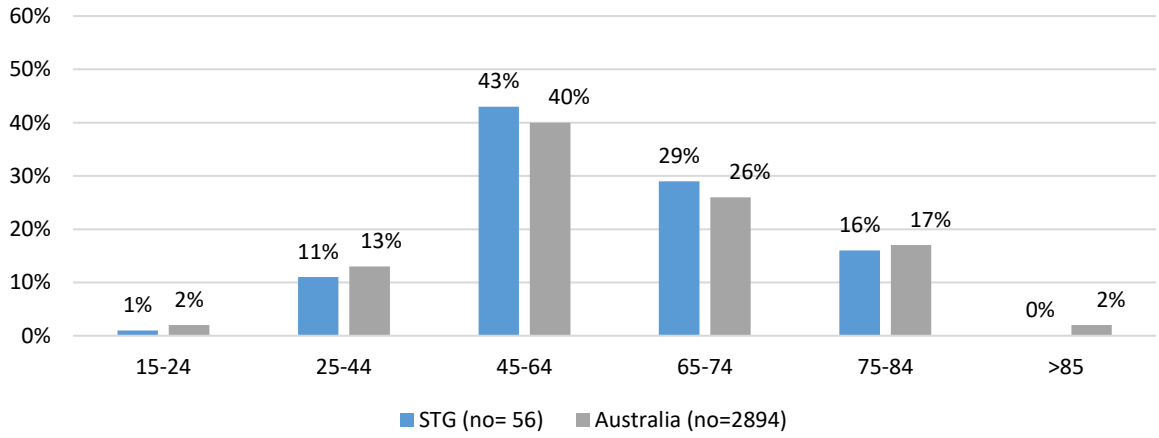


Figure 15. New Patients St George 2018 compared to ANZDATA 2017

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.

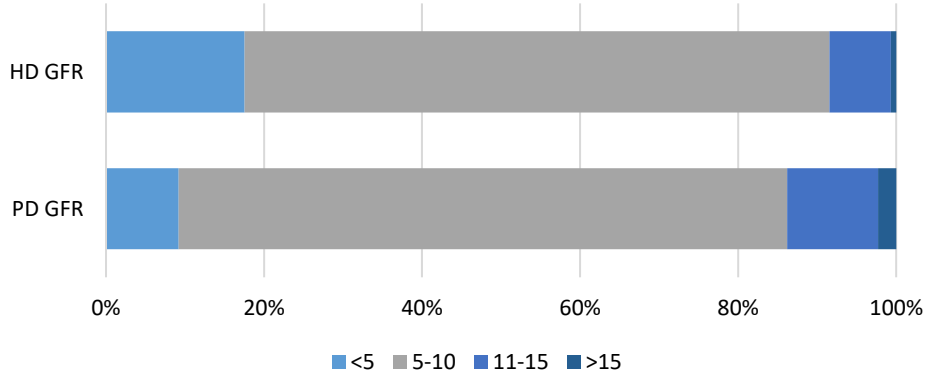


Figure 16. PD and Haemodialysis eGFR at commencement 2013-2018

Baseline characteristics of new patients- Body mass index

#Body Mass Index (kg/m)	PD 2013 – 2018 (%) N=109	HD 2013 – 2018 (%) N=188
<20	5%	4%
20-24	30%	21%
25-30	27%	31%
>30	26%	25%
>35	12%	19%

Table 2. BMI for St George Hospital new patients

*Aaccording 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 2013-2018 (n=188*)	ANZDATA HD 2017 (n=2128)	St George PD 2013-2018 (n=109*)	ANZDATA PD 2017 (n=798)
Average Age	(displayed as age in years)	66	61	63	57
Gender	Male	64%	62%	69%	63%
	Female	36%	38%	31%	37%
Late Referral	(< 3 months before first treatment)	18%	21%	9%	11%
Co - morbidities	Smoking (Current and former)	46%	48%	39%	45%
	Chronic Lung Disease (yes and suspected)	15%	15%	19%	9%
	Cerebrovascular Disease	9%	11%	17%	7%
	Coronary Artery Disease	40%	38%	43%	27%
	Peripheral Vascular Disease	16%	23%	22%	16%
	Diabetes	51%	54%	51%	45%

Table 3. Baseline characteristics compared with ANZDATA- Excludes patients who had previous mode of dialysis

KPIs for Advanced Kidney Disease and Pre Dialysis Education Clinic and acceptance onto dialysis

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

1. **Timely Referral to Pre Dialysis Education Clinic – 100% of patients referred with eGFR ≤20 or KFRE ≥20% at 2years and 3mths prior to commencing RRT**

   In 2018 we decided to report this KPI incorporating KFRE at 2years so no historical data was available for comparison. In 2018, 92 patients were referred for pre dialysis education, one patient was already receiving RRT therapy so will be excluded from the numbers. Ninety one percent of patients were referred according to the department referral guidelines. The 9% of patients referred who did not meet the referral criteria were referred due to impending surgery that was predicted to affect their remaining kidney function, recurrent renal malignancy, declining solitary kidney function, rapidly declining kidney function.
   In 2018, 55 patients commenced RRT 100% of new patients (excluding late referrals) had attended the Pre Dialysis Education Clinic, this is the same as 2017.

2. **70% patients start planned modality within 18mths of commencing RRT**

   For patients commencing dialysis in 2018, 96% started their planned dialysis choice compared to 81% in 2017. This increase in the numbers may be due to extending the KPI timeframe to patients being on their chosen modality by 18mths post commencement of RRT.
   One patient who had originally chosen home haemodialysis (hdx) had supported Hdx due to him changing his mind at the time he needed to commence. The other patient was planned for PD but had an acute decline and started Hdx in ICU and has since passed away.

3. **60% patients starting RRT have vaccinated immunity**

   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 22% of patients commenced with vaccinated immunity in 2018. This is a 3% decline from 2017. In 2018 every patient seen in the Pre Dialysis Education clinic were verbally screened for HepB vaccination. The nephrologist was notified that the patient had been screened via the pre dialysis clinic letter from the Chronic Kidney Disease Clinical Nurse Consultant. Those patients where no serology results were current or available were provided with a pathology form at the Pre Dialysis Education Clinic to have their status tested. If the Hep B levels were <10 IU a letter was faxed to the GP requesting they start the Hep B immunization process. We hope to see ongoing improvements so that we can achieve our benchmark in the future and we will continue to alter our practice as required.

4. **100% patients commencing dialysis with a signed consent**

   In 2018 there were 11% of patients consented prior to commencing dialysis, this was a new initiative to our unit and commenced in the middle of 2018. Patients attending the Pre dialysis Education Clinic in 2018 received the consent for dialysis form and an information handout regarding dialysis and non-dialysis treatments within the St George Hospital Renal Department. At their next nephrologist appointment patients were encouraged to present the documentation for further discussion. We hope to see improvement with this benchmark in 2019.

Summary and Recommendations

The Pre-dialysis program continues to work extremely well, capturing the vast majority of patients who commence dialysis, providing good education and allowing the department to plan its dialysis resources accordingly.

All patients continue to be seen prior to commencing RRT with 96% starting their planned modality and the remaining 4% with relevant explanations as to why they started had to commence an unplanned modality.

We had a 13% increase in the numbers of patients referred and this could be due to the change in referral criteria to incorporate KFRE at 2years and the raised level of eGFR to ≤ 20.

In 2019 we will focus on:

- Ensuring patients have a signed consent prior to commencing dialysis
- Yearly review of tracking spreadsheet to ensure active patients currently meet the criteria to remain active in the pre dialysis education clinic
- Pre-dialysis Education clinic letters to be uploaded to patients EMR record

5. CKD Virtual Medical Clinic (VMC)

Kylie Turner / A/Prof Ivor Katz

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.

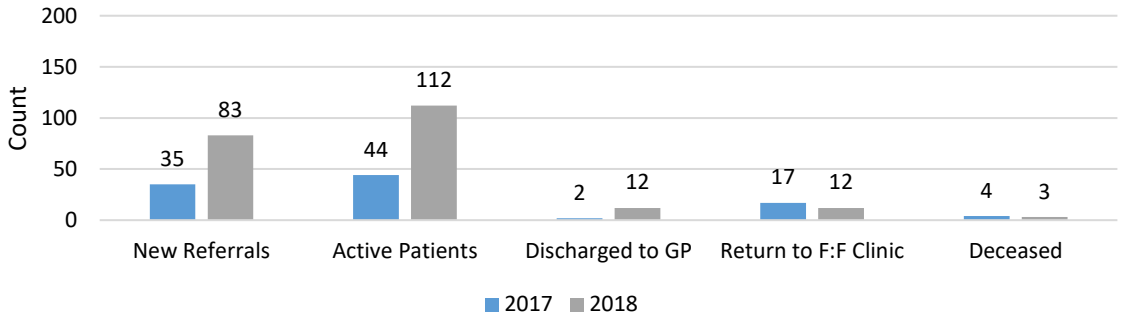


Figure 17. Virtual Medical Clinic 2017-2018

The numbers of new referrals and active patients in the virtual medical clinic more than doubled in the last 12mths. This could be explained by the streamlined process for patient follow- up and the development of clear referral criteria.

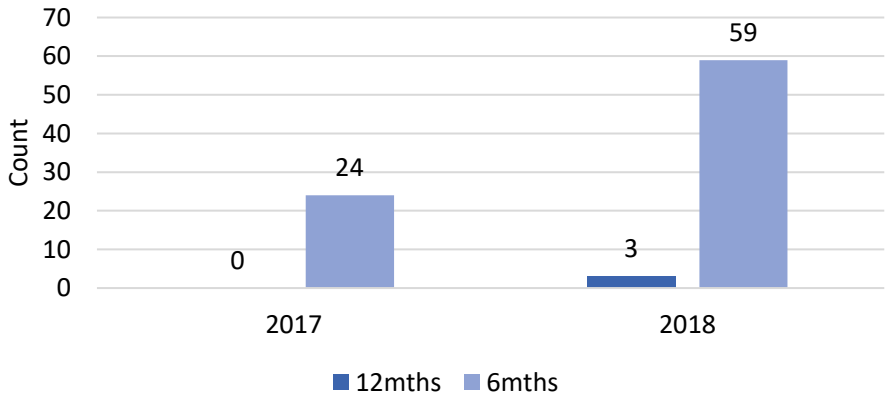


Figure 18. Follow-up appointments 12mth and 6mths 2017-2018

KPIs for Virtual Medical Clinic (VMC)

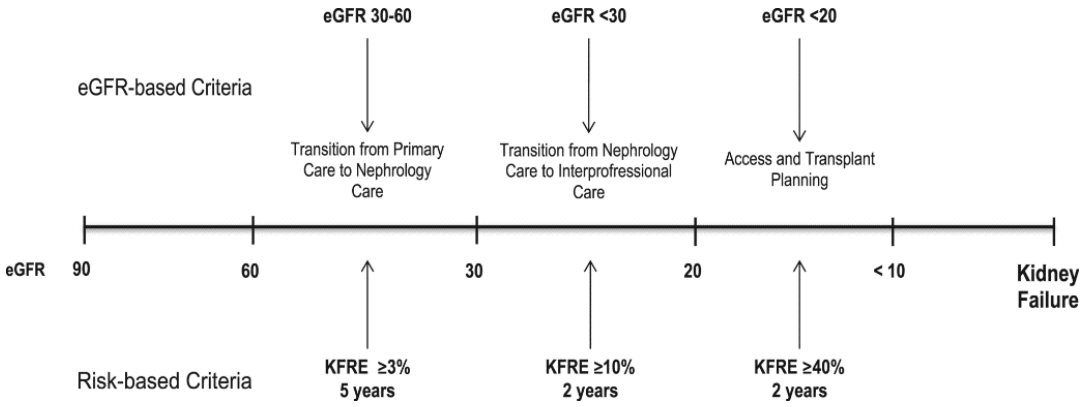
Two benchmarks for the virtual medical clinic have been established

1. **Patients referral in line with clinic criteria 5yr risk <3%**

   In 2018 out of the 83 patients who were referred to the VMC 78% met the clinic criteria of a KFRE 5yr risk of less than 3%. Out of those 83 patients three were not referred with an ACR result and one didn't have an eGFR result available.

2. **Patients meeting criteria for decision making as per guidelines outlined in the Kidney Failure Risk Equation Score**

   a. **Evaluate a risk-based versus eGFR-based approach to clinical decision-making in patients with CKD.**



Summary and Recommendations

- Yearly review of tracking spreadsheet to ensure active patients currently meet the criteria to remain active in the virtual medical clinic
- Continue to ensure patients are having ACR collected and provided at the time of referral to the VMC.

6. Renal Vascular Access

Yanella Martinez-Smith, Jayson Catiwa

BACKGROUND AND PERFORMANCE INDICATORS

- The preferred haemodialysis access is a native arteriovenous fistula (KDOQI 2006 & KHA-CARI 2013).
- The Vascular Access Nurse (VAN) aims to monitor all fistulas from creation until the commencement of dialysis to ensure maturity; perform fistula monitoring and surveillance after dialysis has commenced; and ensure a low level of fistula and catheter-related infection is maintained.

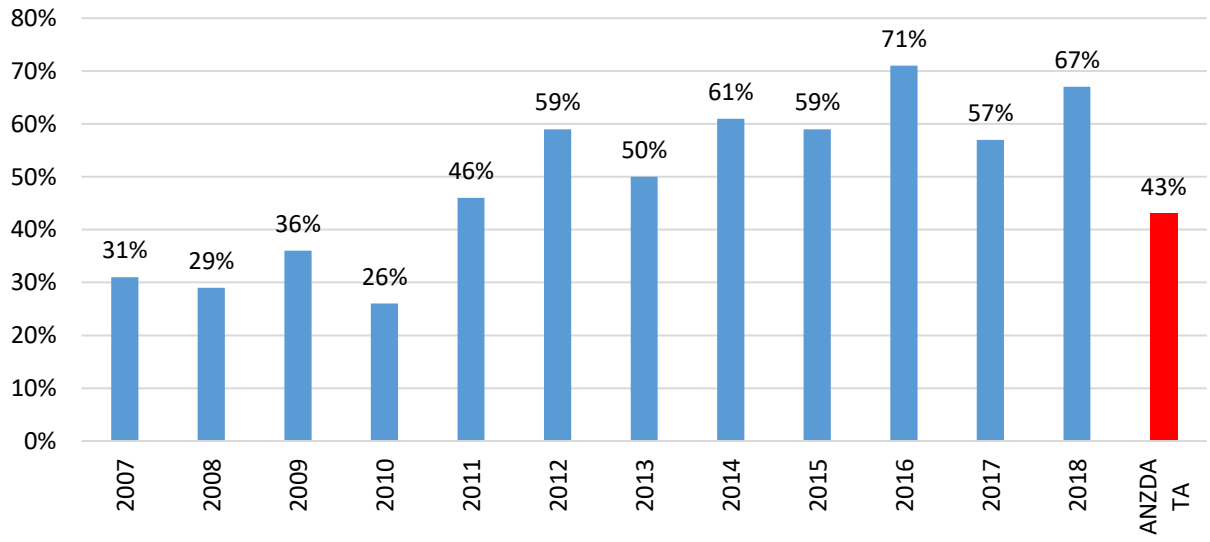
DATA BENCHMARK

- Data is benchmarked against ANZDATA Report 2018 report, KDOQI 2006 and KHA-CARI 2013 guidelines.
- The key performance measures for vascular access are:
    1. > 43% patients commencing haemodialysis with a functioning access (ANZDATA 2018)
    2. > 85% 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 AV fistula (KDOQI 2006)
    5. < 10% fistula infection rate during the useful life of the AV grafts (KDOQI 2006)
    6. > 3.0 years AVF patency and 2.0 years AVG patency (KDOQI 2006)
    7. <0.25 episodes/patient-year at risk for AV fistula thrombosis (KDOQI 2006)
    8. <0.5 episodes/patient-year at risk for AV graft thrombosis (KDOQI 2006)
    9. <1.5 episodes/1000 catheter days of tunnelled catheter infection rate (KDOQI 2006)

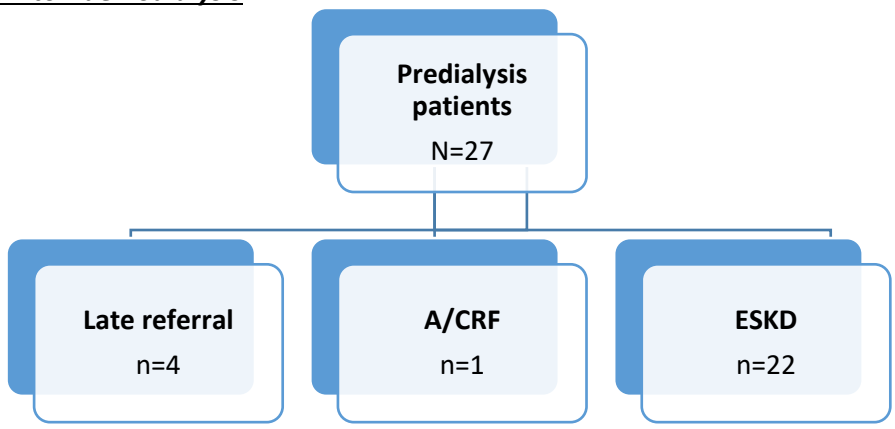
INCIDENT HAEMODIALYSIS PATIENTS

Functioning Access at Entry

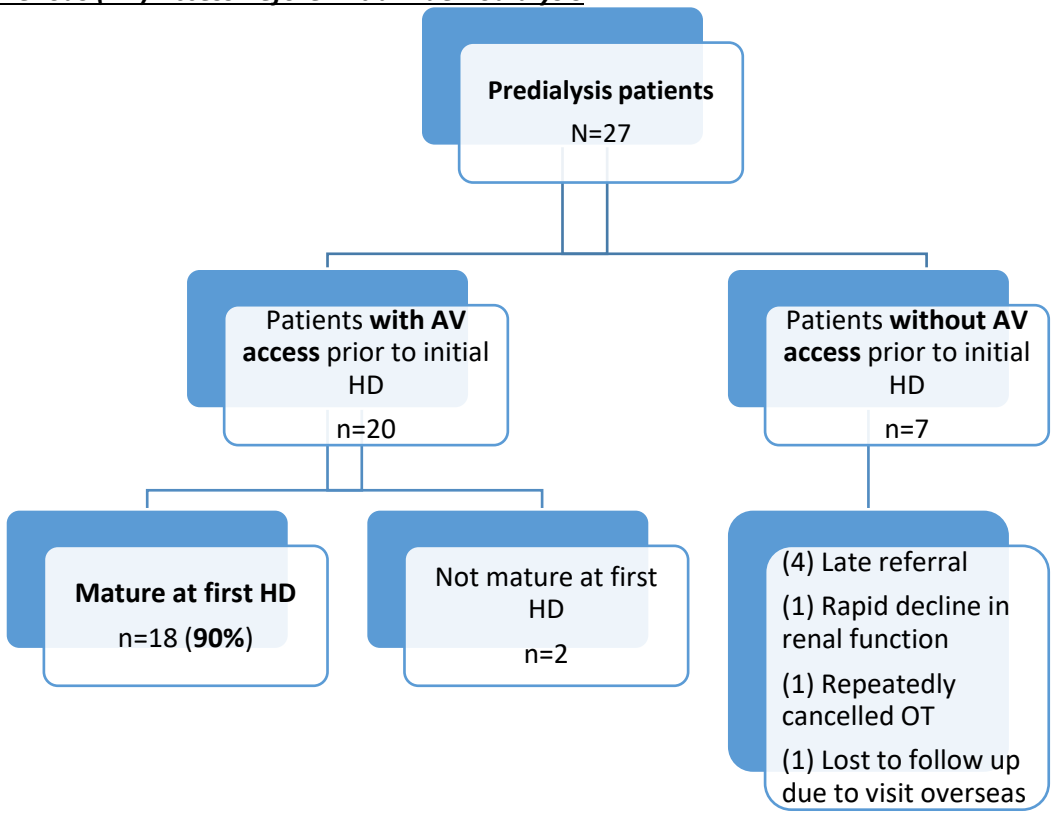
- The national average for patients having a functioning arteriovenous access at first dialysis was 43% according to the 2018 ANZDATA Report.
- In comparison, 67% of all new haemodialysis patients at St George Hospital Renal Department had a functioning access at first haemodialysis.



Patients New to Haemodialysis



Arteriovenous (AV) Access Before Initial Haemodialysis

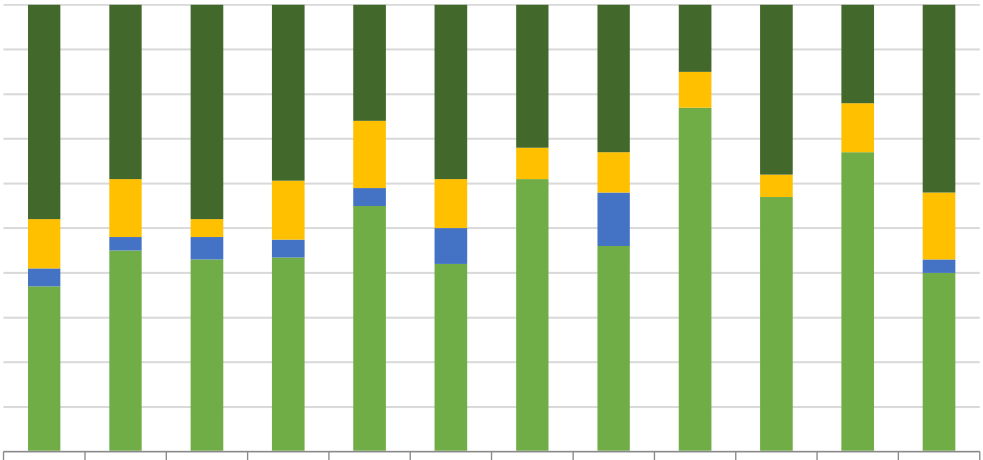


Comments

- 90% of incident patients (n=18) at St George Hospital Renal Department had a mature arteriovenous access at their first haemodialysis.
- Late referrals at St George Hospital Renal Department were at 14% compared to 18% reported in 2018 ANZDATA Registry.
- The aim is to have AV access created within 30 days from initial referral to the vascular surgeon.
- At St George Renal Department, the average time from initial referral to vascular access creation was 36 days.
- Average time from AV creation to first cannulation in 2018 was 6 months.

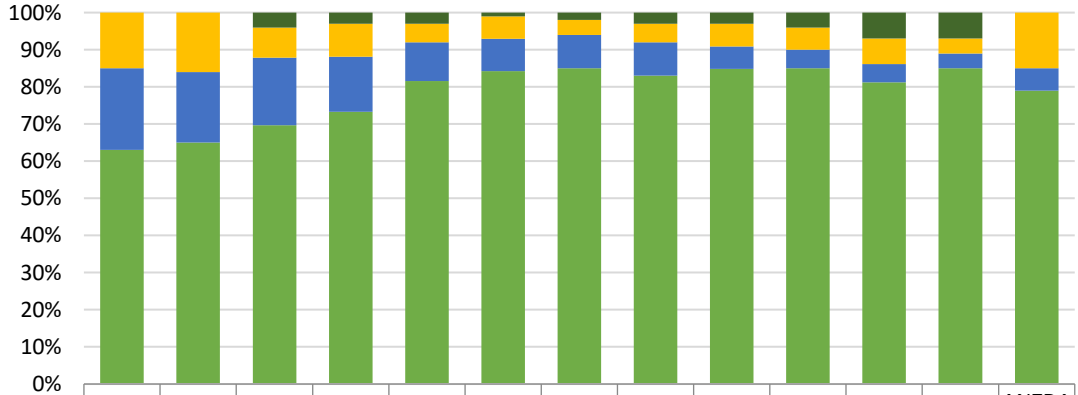
Vascular Access at First Haemodialysis

- In the 2018 ANZDATA Report, 40% of patients commenced with a native arteriovenous fistula (AVF) and 3% with an arteriovenous graft (AVG) equating to 43%. In contrast, majority of incident patients (42%) start haemodialysis treatment with tunnelled central venous catheters (CVC) while 15% with non-tunnelled catheter (**Figure 2**)
- In comparison, 67% of new patients commencing haemodialysis at St George Hospital Renal Department were utilising native AVF, which exceeds the 2018 ANZDATA benchmark (40%).
- 22% of the incident patients at St George Renal Department commenced initial haemodialysis via tunnelled CVC, which is below the benchmark of 42% (ANZDATA Report 2018).



	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	ANZDATA
Tunnelled CVC	48%	39%	48%	39%	26%	39%	32%	33%	15%	38%	22%	42%
Non tunnelled CVC	11%	13%	4%	13%	15%	11%	7%	9%	8%	5%	11%	15%
AVG	4%	3%	5%	4%	4%	8%	0%	12%	0%	0%	0%	3%
AVF	37%	45%	43%	43%	55%	42%	61%	46%	77%	57%	67%	40%

PREVALENT HAEMODIALYSIS PATIENTS



	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	ANZDATA
Permanent TCC			4%	3%	3%	1%	2%	3%	3%	4%	7%	7%	
TCC	15%	16%	8%	9%	5%	6%	4%	5%	6%	6%	7%	4%	15%
Synthetic	22%	19%	18%	15%	11%	9%	9%	9%	6%	5%	5%	4%	6%
Native	63%	65%	69%	74%	82%	84%	85%	83%	84%	85%	82%	85%	79%

Comments

- There were 194 prevalent patients on haemodialysis at St George Renal Department in 2018.
- 89% of St George Hospital Renal Department patients were using AVF/AVG for haemodialysis**,** which exceeds both the 2018 ANZDATA benchmark of 85% and the 2006 KDOQI benchmark of 40**%** (**Figure 3**)**.**
- 7% of patients at St George Hospital Renal Department were using a permanent catheter which met the 2006 KDOQI benchmark of <10%.

AV Access Infection Rates

- KDOQI (2006) recommends infection rate <1% for fistula and <10% for graft during the useful life of the access.
- St George Hospital Renal Department patients' infection rate was 0% for both native and synthetic arteriovenous access. This data does not include home haemodialysis patients**.**

	Blood stream infection (BSI) range for AVF	Blood stream infection (BSI) range For AVG/SVG
2018	**0 BSI (0 BSI/100 pt months)**	**0 BSI (0 BSI/100 pt months)**
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)

AV Thrombosis Events

The KDOQI (2006) guidelines:

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

AV Thrombosis Events			
	AVF	AVG/SVG	Average/month
2018	**7 (7pt)**	**2 (1pt)**	**0.75**
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

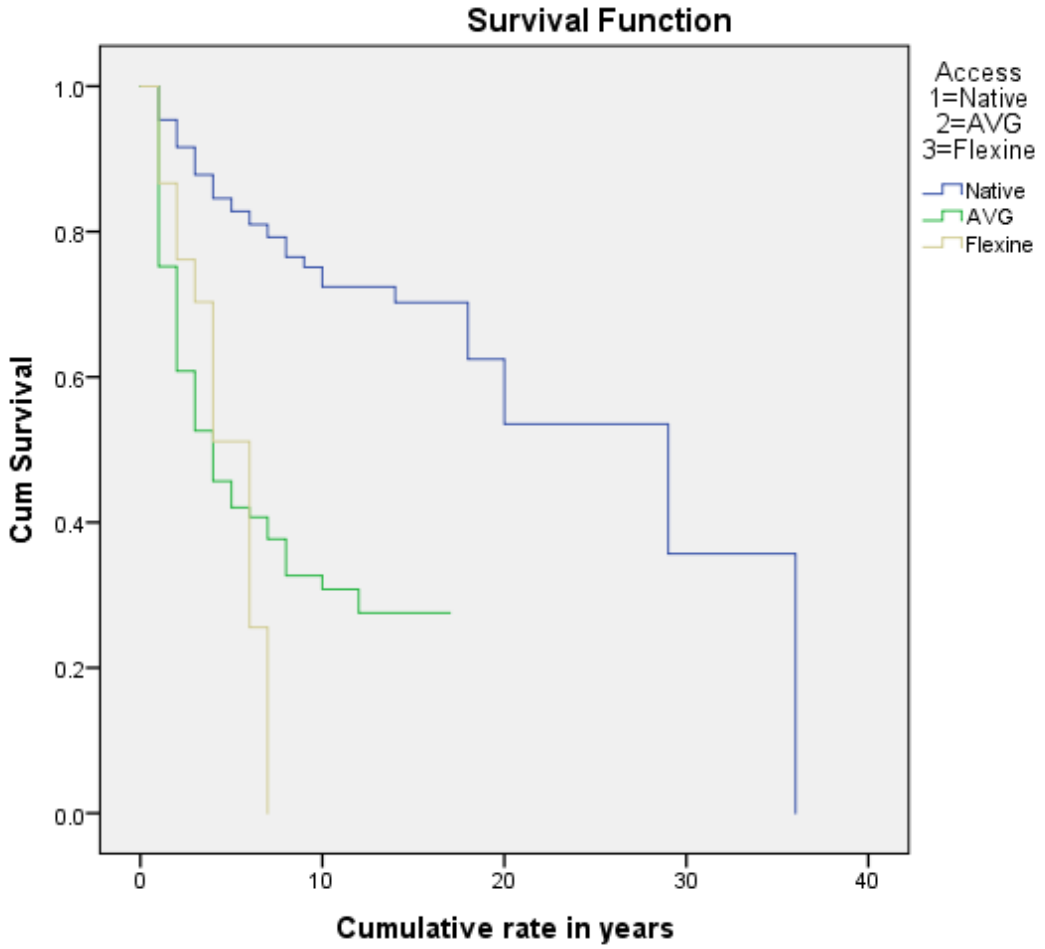
Comments

- The average thrombosis rate per month across arteriovenous access types is 0.75 episodes. The lowest ever rate for the unit.

- The introduction of Transonic machine as an additional point-of-care surveillance tool for the detection of signs of failing vascular access has positively influenced St George Renal Department's average thrombosis rate per month.

AV Access Survival

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



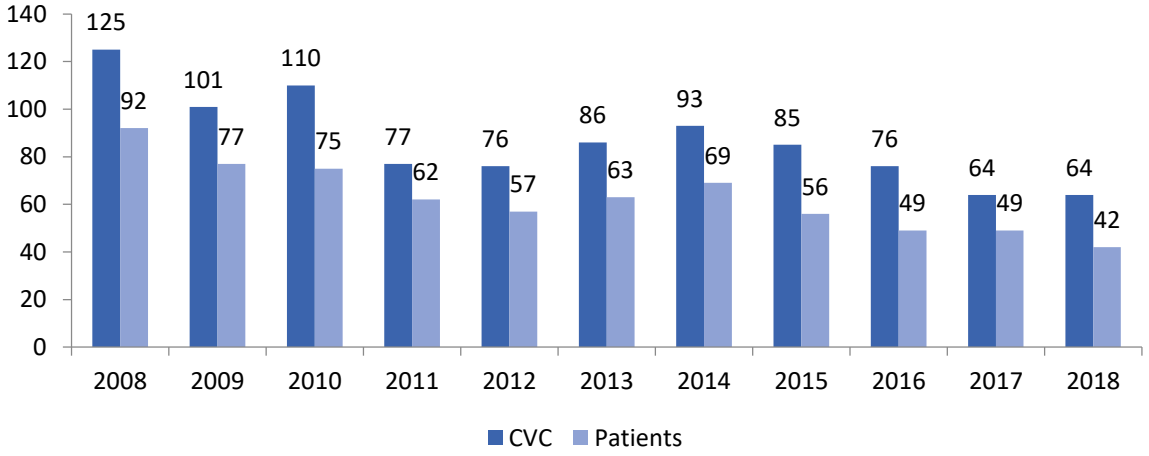
Comments

- 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 and 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 (**Table 3**)
  - AVF at 5 years (81%), at 10 years (72%)
  - AVG at 1 year (61%), 2 years (53%), 3 years (46%)
  - Flexine garfts at 1 year (76%), 3 years (51%)
- Access survival is similar to previous year's results.

CENTRAL VENOUS CATHETERS (CVC)

CVC Activity Level

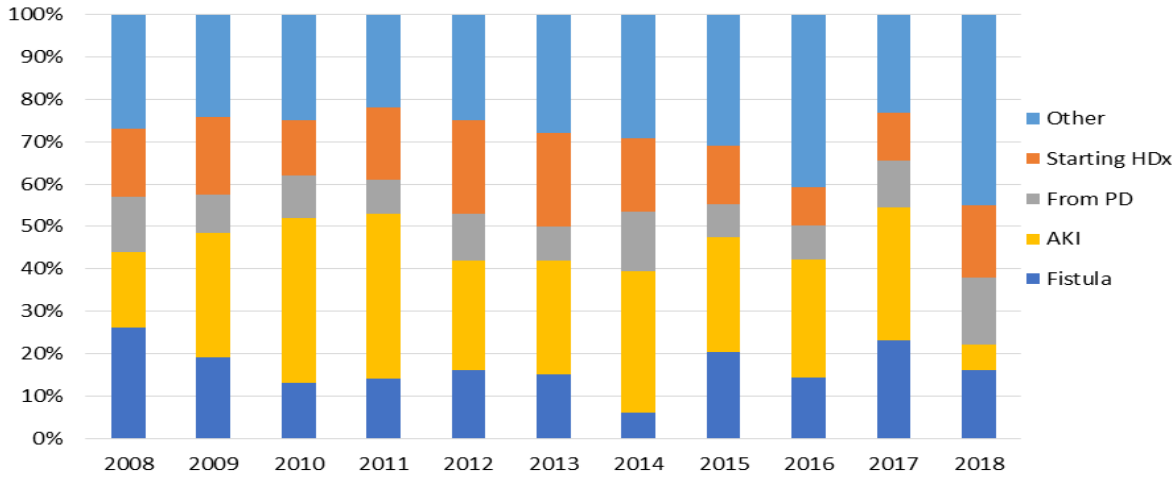
- Tunnelled cuffed catheters (CVC) are used to provide temporary access for both acute and chronic haemodialysis (HD) patients, including those with a primary AVF still to mature (KDOQI 2006). In addition, where creation of arteriovenous access is not feasible, HD can commence with the use of CVC (KHA-CARI Guideline 2013).



Comments

- The number of CVC in situ remained the same compared to the previous year (**Figure 4**).
- Total number of days all catheters are in-situ has decreased to 4700 days from 5557 days in 2017.
- Average number of days all catheters are in-situ has also declined to 73 days from 87 days in 2017.

Reason for Catheter Insertion



Comments

- Fistula group includes immature, revision or thrombosed access (**Figure 5**).
- The ICU department has managed more patients with AKI which has resulted in a reduced service by the renal department.
- Other includes replacing a non-tunnelled with a tunnelled catheter, incorrect placement, malfunction, thrombotic and infectious complications.

Catheter Infection Rates

- KDOQI (2006) recommends a catheter-related bacteraemia (CRB) rate of <1.5 episodes/1000 catheter days. Current literature suggests exit site catheter infection rate varies from 8.2 to 16.75 episodes/1000 catheter days for non-tunnelled catheters and 0.35 to 8.3 episodes/1000 catheter days for tunnelled catheters (McCann & Moore 2010).

	Catheter related bacteraemia (CRB) rate	Exit site infections (ESI) rate
2018	**7.8% (1.06 episodes/1000 catheter days)**	**6.3% (0.85 episodes/1000 catheter days)**
2017	7.4% (0.54 episodes/1000 catheter days)	5.9% (0.43 episodes/1000 catheter days)
2016	3.8% (0.30 episodes/1000 catheter days)	5% (0.41 episodes/1000 catheter days)
2015	1.2% (0.10 episodes/1000 catheter days)	4.7% (0.40 episodes/1000 catheter days)
2014	2.2% (0.23 episodes/1000 catheter days)	5.4% (0.59 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)

Comments

- The benchmark for CRB has been met based on the KDOQI 2006 Vascular Access Guidelines (**Table 4**).
- For the 64 catheters inserted in 2018, 5 cases of catheter-related bacteraemia and 4 cases of exit-site infections have occurred.
- The gentamicin/heparin lock continued to be utilised as a recommended means to reduce CRB and exit site infection events (KDOQI 2006). The KHA-CARI guideline further suggests that antibiotic locks be considered to salvage catheters (Chin 2012).
- Potential for emergence of antimicrobial resistance remains to be a major concern (Chin 2012); however random gentamicin levels of <0.5 mg/L indicates toxicity is unlikely.

FUTURE PLANS

- Nurse-led vascular access clinic remains twice weekly.
- The combined Nephrologist/Vascular Surgeon meeting will continue quarterly.
- The VA professional development group will maintain to produce the quarterly staff newsletter. Regular in-service education sessions will be provided to the staff.
- Vascular access workshop incorporating ultrasound and Transonic machine use for point-of-care access-guided cannulation and surveillance will be carried out bi-annually.

SUMMARY

- Almost all vascular access performance measures are met and within the national and international benchmark; primary AVF & AVG rates are above national average. Infectious complications across all access types (AVF, AVG, CVC) are low, and access survival remains excellent. AV access thrombosis rates are the lowest for the unit.

REFERENCES (see apeendix 2)

7. Haemodialysis

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

- St George Hospital operates a 34 chair haemodialysis service providing high level care haemodialysis and home haemodialysis training.
- In 2018 an average of 128 patients were dialysed each month and a total of 20,212 treatments were completed - a marginal drop compared to 2017 activity, where 20,596 treatments were performed. 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 2018, 7085 treatments were performed, 123 treatments less than in 2017 and on average, 47 patients dialysed each month.
- In 2018 12 patients commenced Home haemodialysis training

Activity for haemodialysis

- A total of 27,297 sessions performed (in-centre and satellite treatments). The graph below shows annual growth patterns since 2013. This includes haemodialysis for acute kidney injury and chronic kidney disease stage 5/end stage kidney disease (ESKD).

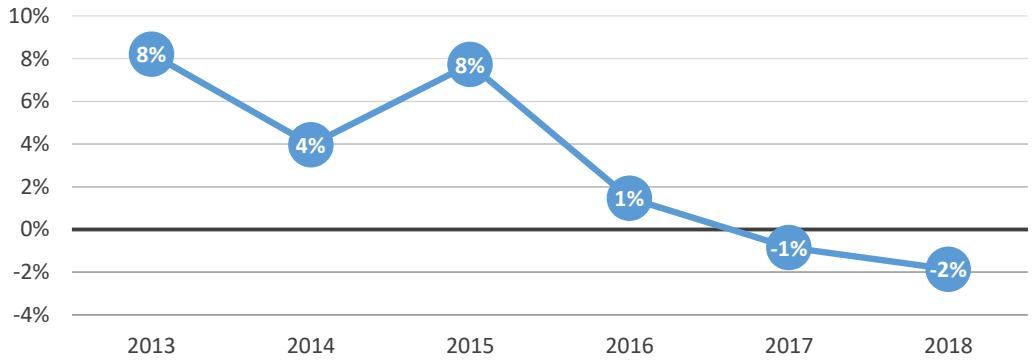


Figure 19. Growth Rates in Haemodialysis at St George and Sutherland Dialysis Units

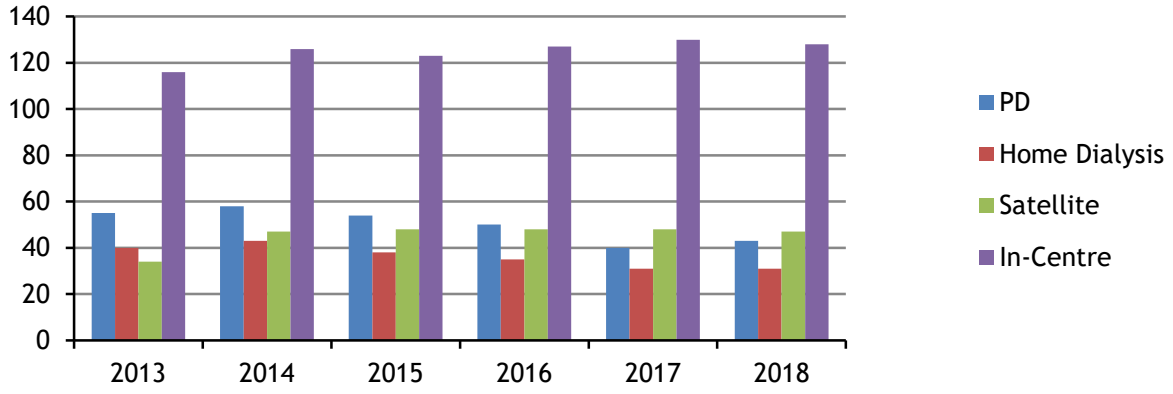


Figure 20. Distributions of dialysis modalities for 2013 through to 2018

	2014	2015	2016	2017	2018
In-centre haemodialysis patients at beginning of year	116	126	123	135	133
IN					
1. New Patients	36	27	29	24	20
2. Transfers from other units	1	11	2	11	18
3. Transfers from PD	14	7	10	13	6
4. Failed transplants	2	2	1	2	3
5. Transfers from Home Hdx/Satellite	1	4	5	8	4
6. Acute Kidney Injury*	29	27	24	22	11
7. Other		1	5		1
Subtotal	***82***	***79***	***76***	***80***	***63***
OUT					
7. Transplants	3	8	4	6	2
8. Transfers to other units/overseas	2	2	5	3	6
9. Transfers to Home Hdx	3	6	3	2	
10. Transfers to PD	5	5	2	5	1
11. Transfers to Satellite	10	15	6	14	7
12. Regain Function	26	18	13	16	8
13. Deaths (medical)	11	12	11	21	17
14. Deaths (withdrawal)	12	16	20	15	15
Subtotal	***72***	***82***	***64***	***82***	***56***
NET GAIN/ LOSS	10	-3	12	-2	-14
In-centre haemodialysis patients at end of year	126	123	135	133	119

Table 4. Patient Flow at St George Hospital from and to haemodialysis 2014- 2018

*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

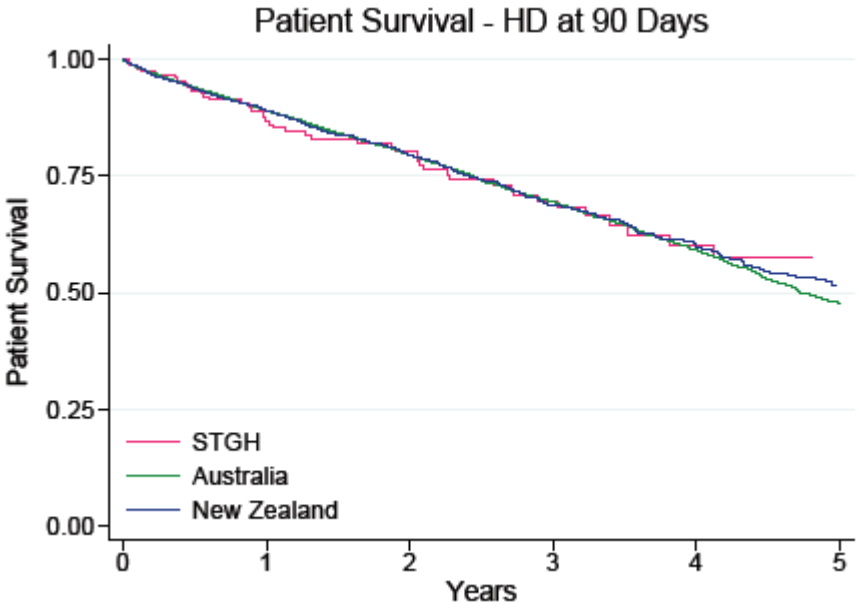
	2014	2015	2016	2017	2018
Satellite haemodialysis patients at beginning of year	**39**	**47**	**48**	**48**	**48**
IN					
1. New Patients	1	2	0	0	0
2. Transfers from other units	1	1	1	0	2
3. Transfer from PD	1	0	0	1	4
4. Transfer from Incentre	10	12	7	14	11
5. Transfer from home/training					6
Subtotal	***13***	***15***	***8***	***15***	***23***
OUT					
5. Transplants	0	2	1	0	4
6. Transfers to Home Hdx	2	1	1	2	1
7. Transfers to PD	0	0	1	1	1
8. Transfers to Incentre	0	5	3	8	11
9. Transfer to other units	1	1	1	1	0
10. Deaths (medical)	2	5	1	3	5
11. Deaths (withdrawal)	0	0	0	0	1
12. Regain Function	0	0	0	0	0
Subtotal	***5***	***14***	***8***	***15***	***23***
NET GAIN/ LOSS	**8**	**1**	**0**	**0**	**0**
Satellite haemodialysis patients at end of year	**47**	**48**	**48**	**48**	**48**

Table 5. Patient Flow at The Sutherland Hospital from and to haemodialysis 2014- 2018

	2014	2015	2016	2017	2018
Home haemodialysis patients at beginning of year	**40**	**43**	**38**	**38**	**32**
IN					
1. New Patients	4	2	6	5	4
2. Transfer from PD	1	2	2	3	0
3. Transfers from other units	0	0	0	0	0
4. Transfer from Satellite	2	1	0	2	2
5. Failed transplants	0	0	0	2	1
6. Transfer from Incentre Hdx	3	0	2	2	0
Subtotal	***10***	***5***	***10***	***14***	***7***
OUT					
Transplants	4	7	5	4	4
Transfers to other units	0	1	0	0	0
Transfers to Incentre Hdx	1	2	3	0	2
Transfers to Satellite	1	0	0	3	3
Deaths	1	0	2	2	1
Subtotal	*7*	*10*	*10*	*9*	*10*
NET GAIN/ LOSS	3	-5	0	-5	-3
Home haemodialysis patients at end of year	**43**	**38**	**38**	**33**	**29**

Table 6. Flow to and from Home Haemodialysis from 2014 to 2018

Patient survival was similar to the national average with one year survival of 86.9% and 5 year survival 57.5%. 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	165	100.0	9723	100.0	1658	100.0
3 months	149	96.9 (92.7-98.7)	8710	96.7 (96.3-97.0)	1488	96.3 (95.3-97.1)
6 months	134	93.4 (88.1-96.4)	7894	94.1 (93.6-94.5)	1370	93.7 (92.4-94.8)
1 year	115	86.9 (80.1-91.4)	6435	89.2 (88.5-89.8)	1145	89.1 (87.4-90.6)
2 years	86	80.2 (72.3-86.0)	4176	79.7 (78.7-80.6)	795	79.5 (77.1-81.6)
3 years	50	69.6 (60.1-77.2)	2424	69.4 (68.2-70.6)	500	69.0 (66.1-71.7)
4 years	25	60.2 (48.6-70.0)	1247	59.2 (57.6-60.7)	249	59.9 (56.4-63.2)
5 years	8	57.5 (45.2-68.0)	415	47.8 (45.7-49.8)	90	51.7 (47.4-55.9)

Figure 21. Patient Survival –for HD patients on dialysis > 90 days

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. (For further detail see Appendix 1).

Many targets are used and achieving these targets 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 Adequacy assessed by Kt/v and URR

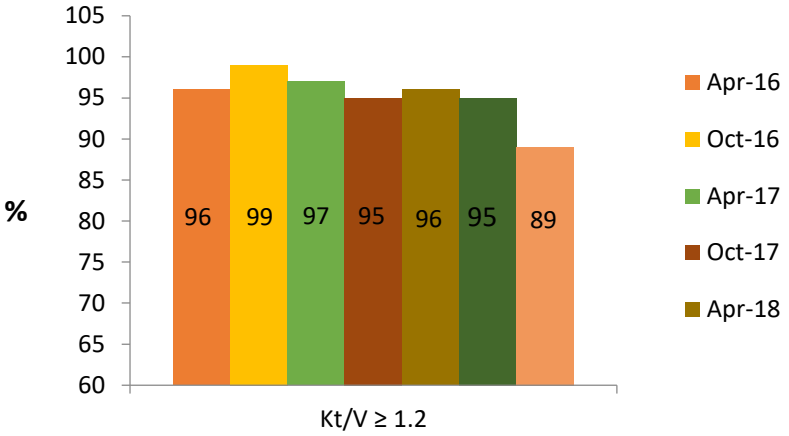


Figure 22. Dialysis Adequacy assessed by Kt/v from 2013 to 2018

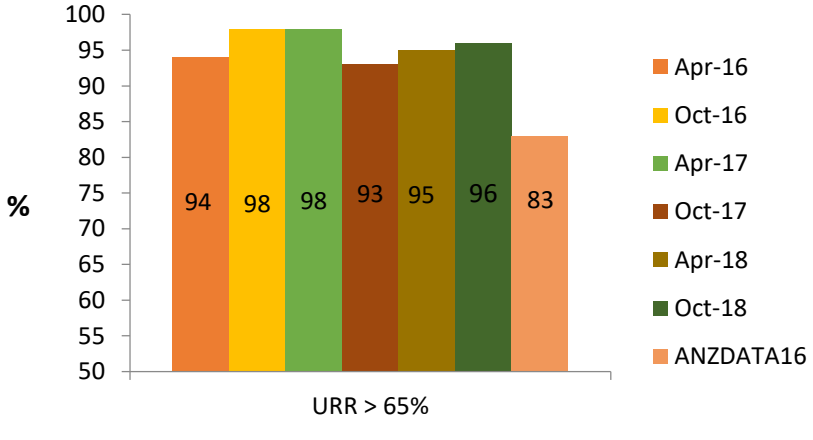


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Figure 23. Urea Reduction Ratio (URR) >65% in patients on Haemodialysis by Year

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 96% 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 16	Oct 16	Apr 17	Oct 17	Apr 18	Oct 18	ANZDATA 2017
Ca	2.25-2.58 mmol/L	67	71	63	69	65	60	
Corr Ca	2.1-2.4 mol/L	43	26	45	46	**45**	**64**	
PO4	0.8-1.6 mmol/L	48	48	46	50	**51**	**49**	**44**
$CaPO_4$ (Corrected Ca)	<4.0 mmol/L	50	53	57	52	**53**	**59**	
CaPO4	<4.0 mmol/L	57	57	61	59	**58**	**61**	**57**
Ferritin	200-800 ug/L	66	69	63	60	**71**	**71**	**75**
Fe Sats	20-40%	57	58	59	61	**59**	**64**	**66**
Albumin	33-48 g/L	72	61	23	49	58	60	-
PCR	<1.0	51	51	59	52	56	55	-
KT/V	≥ 1.2	96	99	99	95	**96**	**95**	**89**
URR	>65%	94	98	98	93	**95**	**96**	**83**

Table 7. 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. (For further detail see Appendix 1). ANZDATA presents their Hb as a median range. In Australia, median haemoglobin for each centre ranged from 106 to 122 g/L for haemodialysis patients.

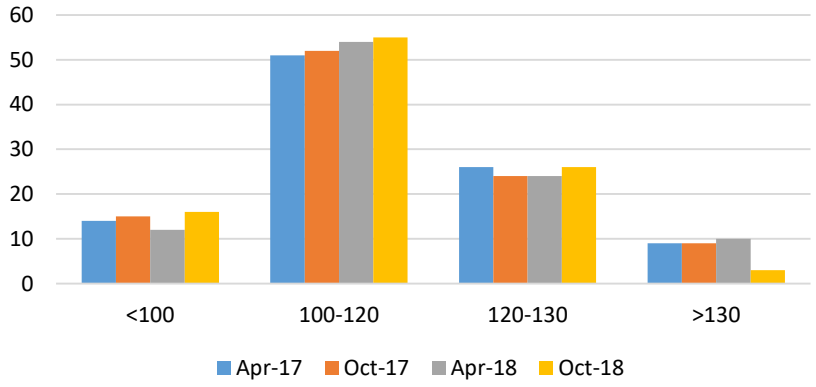

Figure 24. Serum Haemoglobin levels by target level

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

In order to reduce the fluctuation in target Hb we have changed our erythropoietin dosing practice.

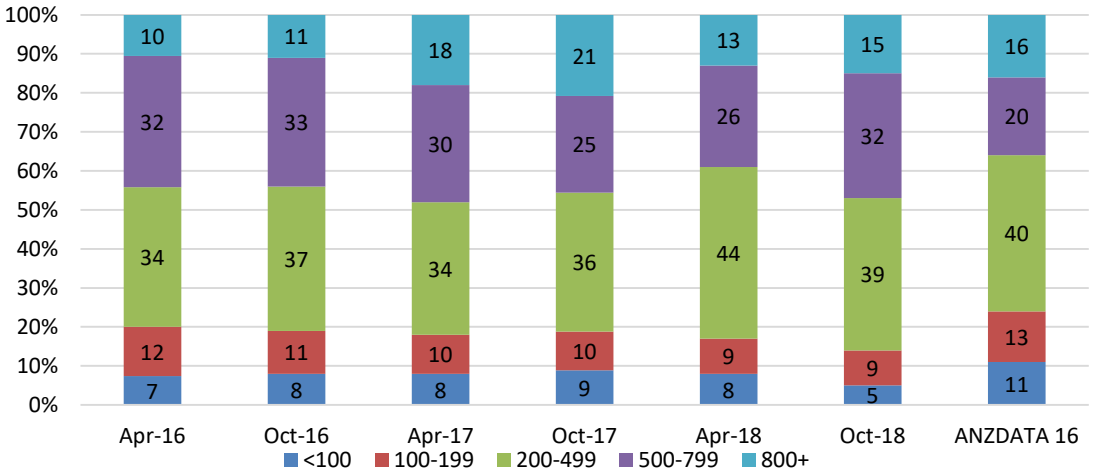

Figure 25. Serum Ferritin levels by target level

Those with serum ferritin 200-500mcg/L at St George and Sutherland were 39% similar to 2016 ANZDATA (40%). 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%. 15% of our patients had a serum ferritin >800% vs. 16% from ANZDATA.

Target levels for transferrin saturation are between 20-40% are targeted to ensure optimal iron stores. ANZDATA 2016 serum transferrin saturation levels between this range were in 55% of the dialysis population compared to 64% at St George and Sutherland hospital. We believe these results are due to our 'primary haemodialysis nurse' policy which includes highly specialised nurses having more autonomy to control iron use and withdraw of erythropoietin.

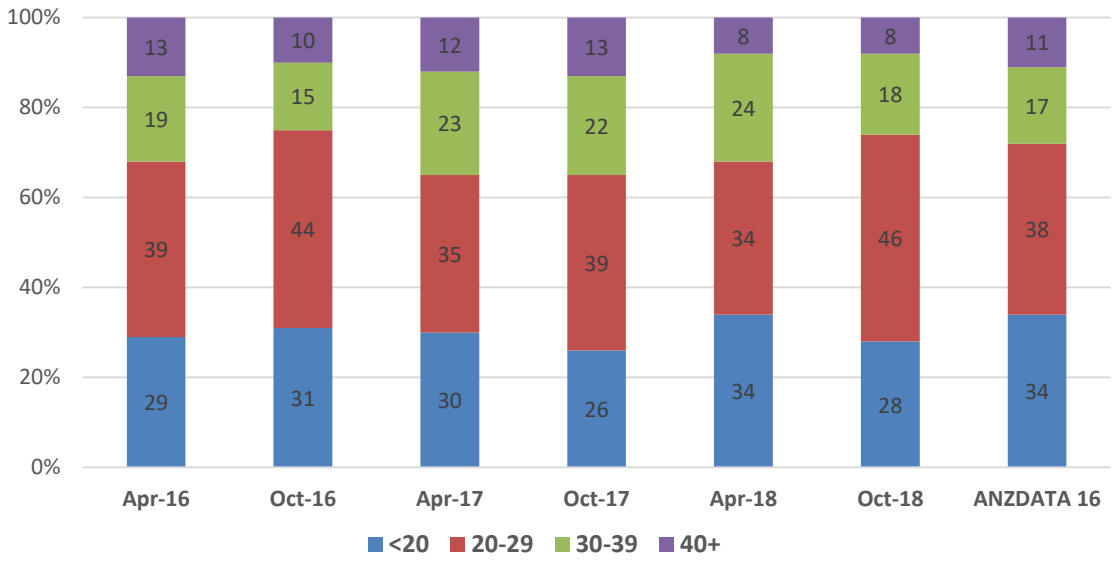

Figure 26. Serum Iron Transferrin Saturation by target Level

Renal Bone and Mineral Disorder (MBD) Metabolism Management

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 (43%) continue to have iPTH levels <20pmol/L. Parathyroid hormone levels are not reported in ANZDATA. (For more detail see Appendix 1)

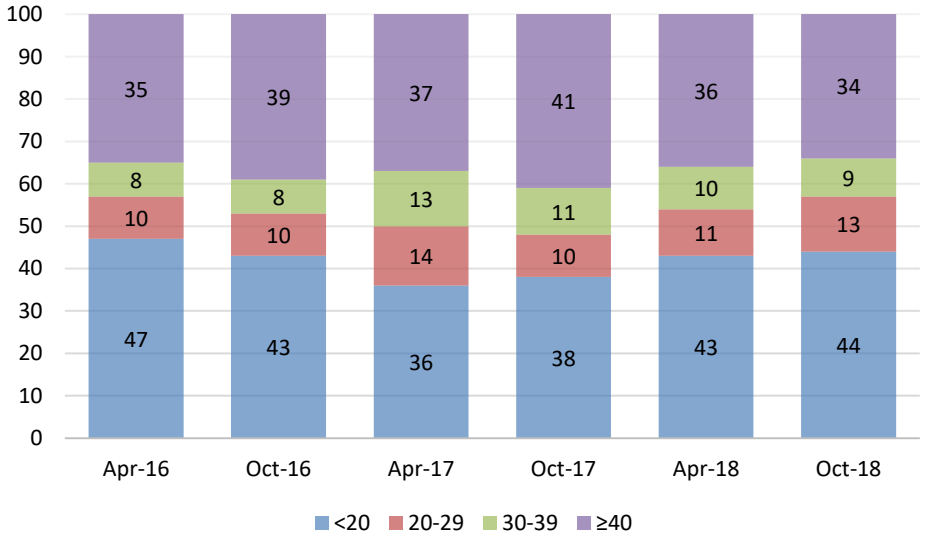

Figure 27. Serum PTH for Haemodialysis patients from 2015 to 2018

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. 70% versus 57%. 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.

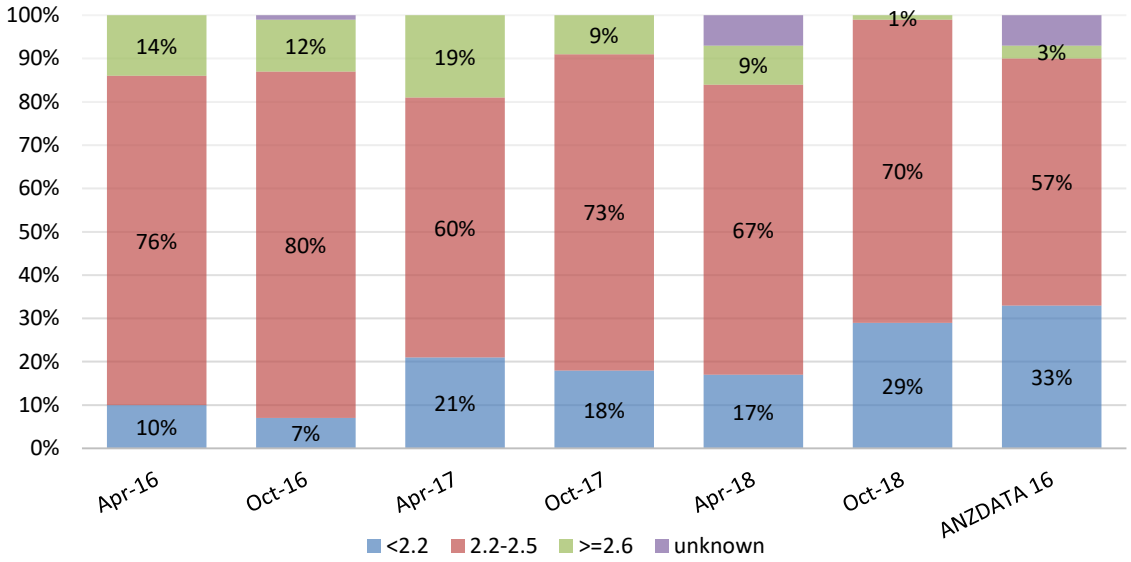

Figure 28. Serum Calcium (uncorrected) target levels 2016 to 2018 versus ANZDATA 2016

Serum Phosphate targets

Target serum phosphate 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.

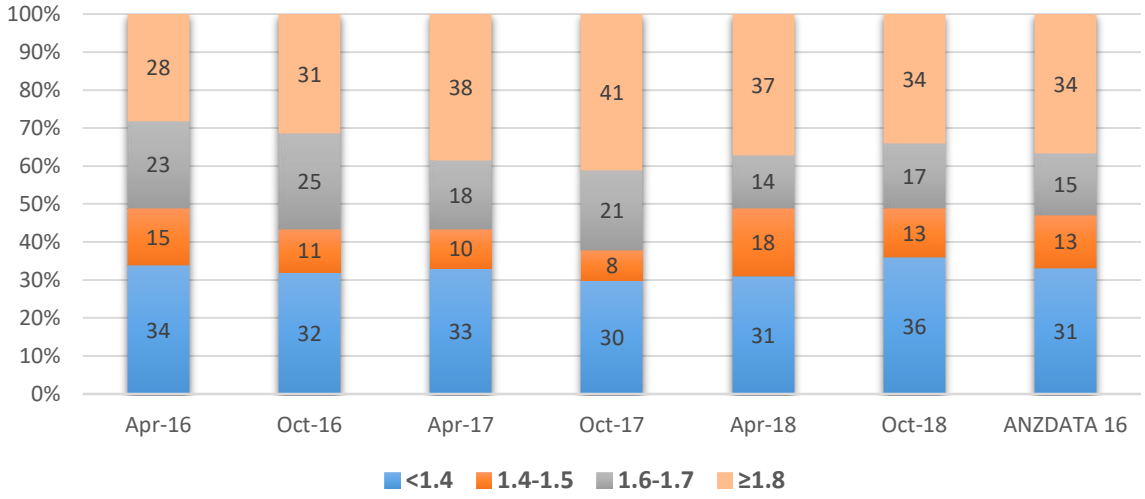

Figure 29. Serum Phosphate target levels from 2015 to 2017 versus ANZDATA 2016

Blood Lipid Targets

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 (for more details see Appendix 1). 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.

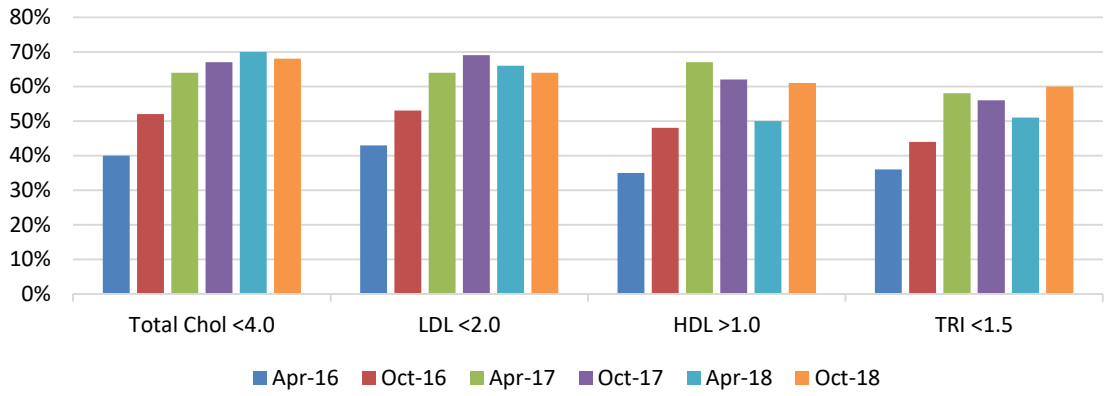

Figure 30. Lipid levels for high risk Haemodialysis patients

Diabetes Control measured by HbA1c

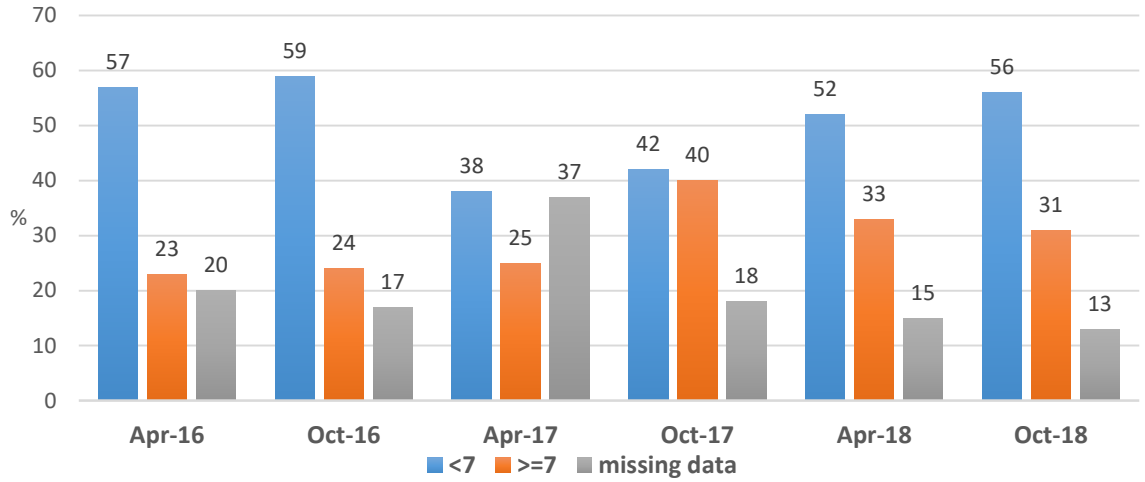

Figure 31. HbA1c for Diabetes patients on Haemodialysis

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.

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8. Peritoneal Dialysis

Claire Cuesta and Franziska Pettit

Activity

- Peritoneal dialysis was used to treat 17% of all dialysis patients in St George compared to 19% reported in the 41st Annual ANZDATA report (2018).
- A total of 63 patients were on PD in 2018 compared to 69 in 2017. In December 2018, the proportion of patients receiving automated peritoneal dialysis (APD) was 91% and 9% for continuous ambulatory peritoneal dialysis (CAPD). Our APD population continues to be above the proportion reported by ANZDATA of 66%.

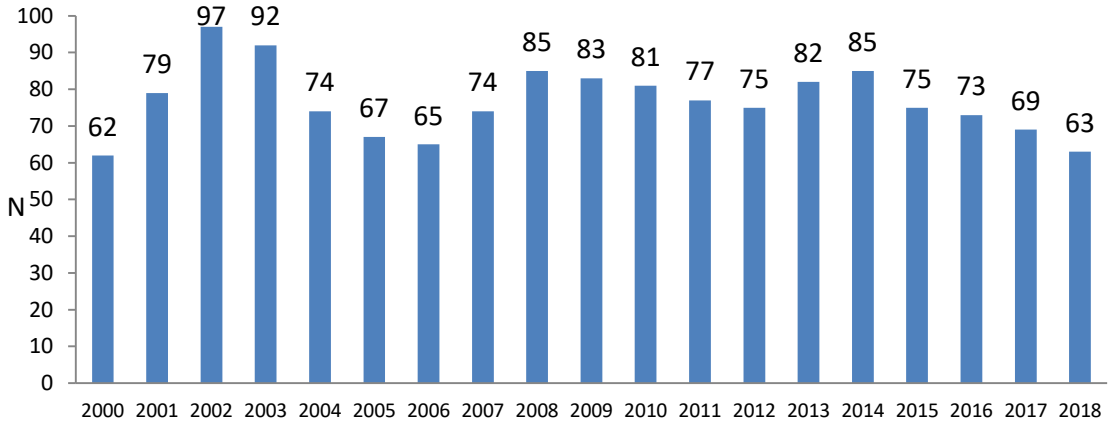


Figure 32. Total persons (prevalent and incident) on peritoneal dialysis

APD	*ANZDATA 66% (1625/2427)*	*St George 91% (39/43)*
CAPD	*ANZDATA 33% (802/2427)*	*St George 9% (4/43)*

PD patient flow

	PD patients December 31st 2017		**40**
In	New Patients	21	
	Transfer from another hospital	0	
	Transfer from HD	2	
	On hospital IPD	3	
	Returns from dialysis break	0	
	In Subtotal		**23**
Out	Transplants	6	
	Transfer to other units/overseas	1	
	Transfer to Home Haemodialysis	1	
	Temporary Transfers to Haemodialysis	0	
	Permanent Transfers to Haemodialysis	9	
	Return of renal function	0	
	Withdrawal from dialysis	2	
	Deaths on PD	1	
	Out Subtotal		**20**
	Net gain	**3**	
	PD patients December 31st 2018		**43**

Figure 33. 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 16	Oct 16	Apr 17	Oct 17	Apr 18	Oct 18	ANZDATA 18
Corr Ca	2.1-2.4 mmol/L	53%	46%	29%	42%	59%	57%	-
PO4	0.8-1.6 mmol/L	63%	50%	53%	46%	47%	48%	41%
CaPO4	<4.0 mmol/L	51%	42%	42%	44%	41%	44%	-
Uncorrected CaPO4	<4.0 mmol/L	63%	56%	60%	52%	55%	61%	58%
Albumin	33-48 g/L	29%	36%	31%	24%	34%	26%	-
PTH	7-45 mmol/L	67%	69%	63%	61%	59%	59%	-

Table 8. Biochemical targets

- Serum Calcium
  - 57% of patients achieved the target for corrected calcium in October 2018. The ANZDATA benchmark is for uncorrected calcium only.
  - 46% of patients have serum Ca level 2.2-2.4 in October 2018. The mean calcium result is 2.25 (SD 0.29).

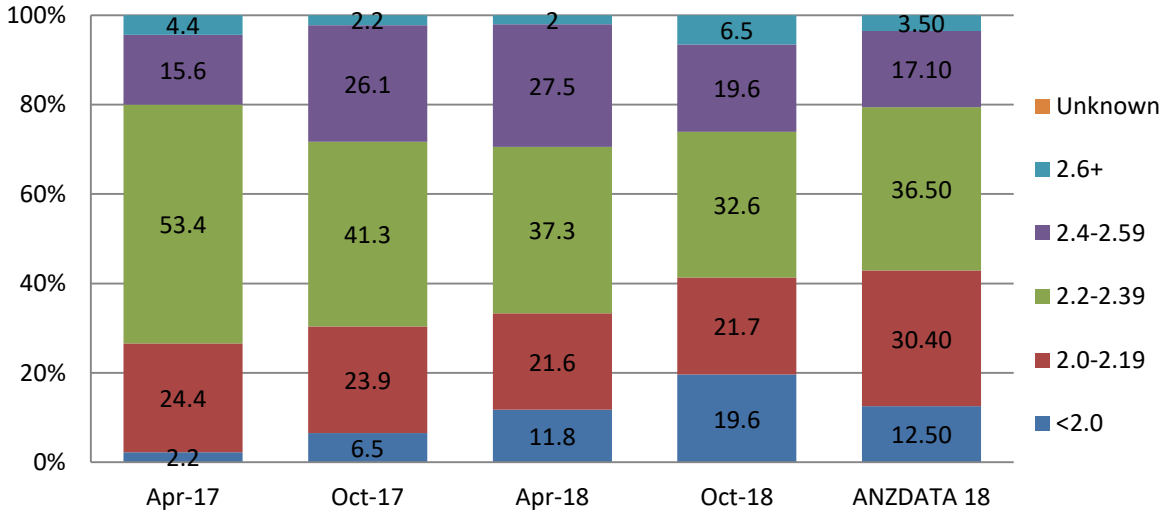


Figure 34. Uncorrected Serum Calcium (mmol/L)

- Phosphate
  - In October 2018, 48% of patients were within the target for serum phosphate of 0.8-1.6 mmol/L. The mean phosphate result was 1.74 mmol/L (SD 0.41).

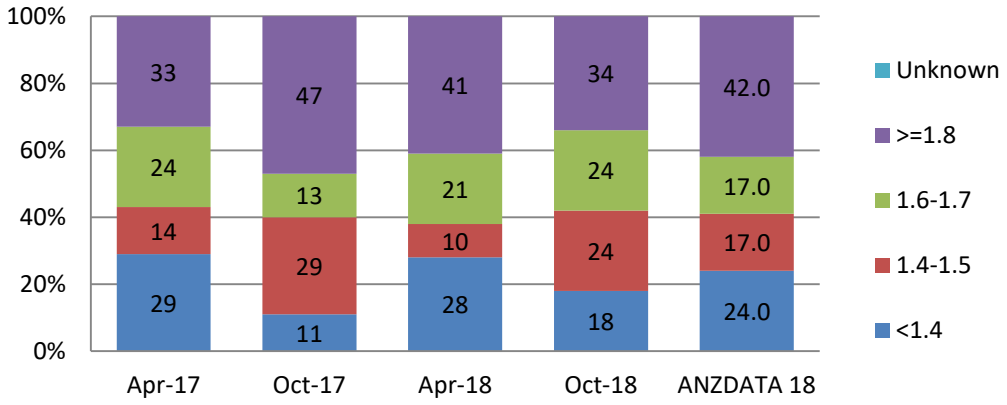


Figure 35. Serum Phosphate (mmol/L)

- Calcium Phosphate Product
  - ANZDATA calculated the calcium phosphate product with uncorrected calcium. There are fewer patients with high uncorrected calcium x phosphate (≥ 5) in 2018, the mean uncorrected calcium x phosphate product is 3.9 (SD 0.98)
  - We also calculate Calcium phosphate product with corrected calcium, the mean for our corrected Calcium phosphate product is 4.25 (SD 1.08)

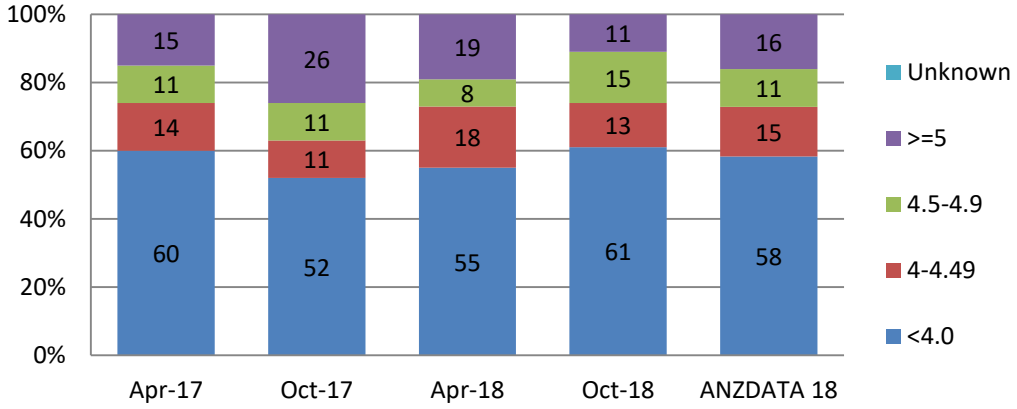


Figure 36. Uncorrected Calcium x Phosphate Product

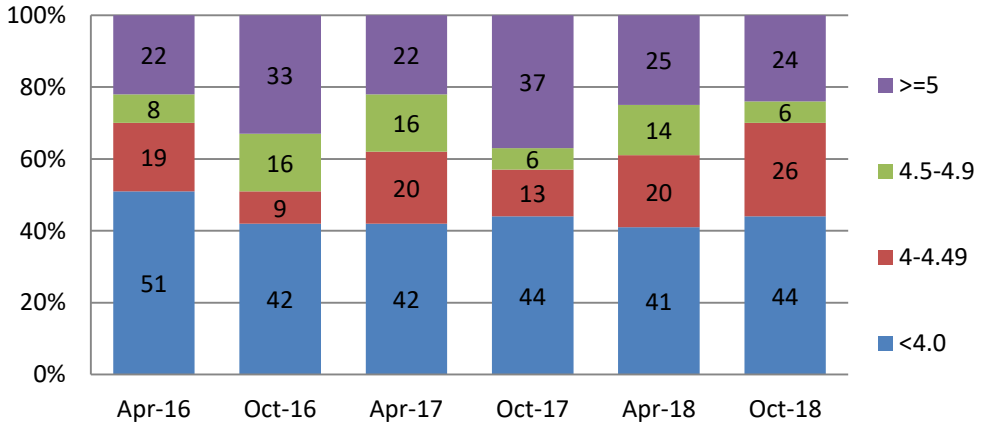


Figure 37. Corrected Calcium x Phosphate Product

- Albumin
  - 26% of PD patients had albumin level within 33-48 g/L in 2018, slightly better than last year at 24%. 31% of PD patients had albumin level 30-32 g/L and mean albumin level was 29.9 g/L (SD 4.42).

- PTH
  - In October 2018, 59% of PD patients had PTH 7-45 mmol/L. The median PTH result in 2018 was 28.9 mmol/L (CI 25.6, 48.7). Fewer patients (24%) have higher PTH in 2018 compared to last year at 33%.

2. **Haematological targets**

- Haemoglobin
  - 61% achieved our target of 100-120 g/L in October 2018, mean Hb was 109 g/L (SD 14.8, min 70, max 139).
  - In October 2018, 90% of PD patients with Hb <100 were receiving erythropoiesis stimulating agents (ESA). 37% of the patients with high Hb (>120) were also receiving ESA. These patients had stopped or reduced ESA dose or frequency. 20% 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.

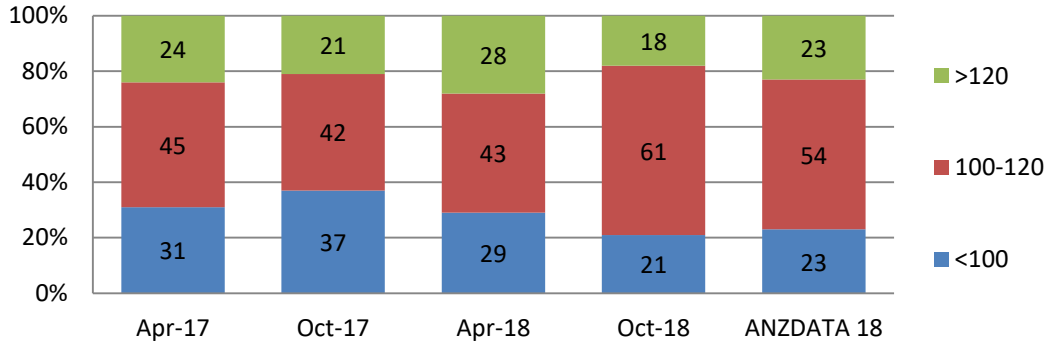


Figure 38. Haemoglobin in Peritoneal Dialysis patients

- HbA1c (Glycosylated Haemoglobin)
  - 59% of peritoneal dialysis patients had diabetes in October 2018.
  - All patients with diabetes were screened for HbA1C in October 2018. The mean HbA1C result was 7.6% (SD 1.79, min 5.4%, max 12.5%). 41% of screened diabetic patients had results below 7, an improvement from last year.
  - Adjusting the HbA1c target to the International Society of Peritoneal Dialysis (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), 45% of screened diabetic patients are within ISPD target in 2018.

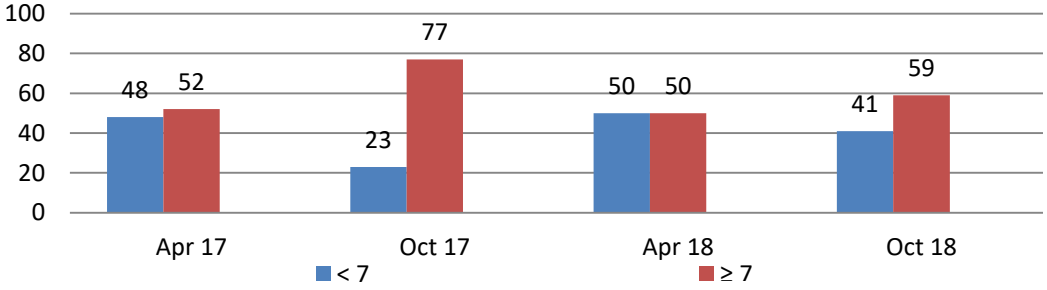


Figure 39. HbA1c results in PD patients

- Lipids
  - 76% of PD patients (N=35) in October 2018 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 97% of high-risk PD patient and 2018 results are better.

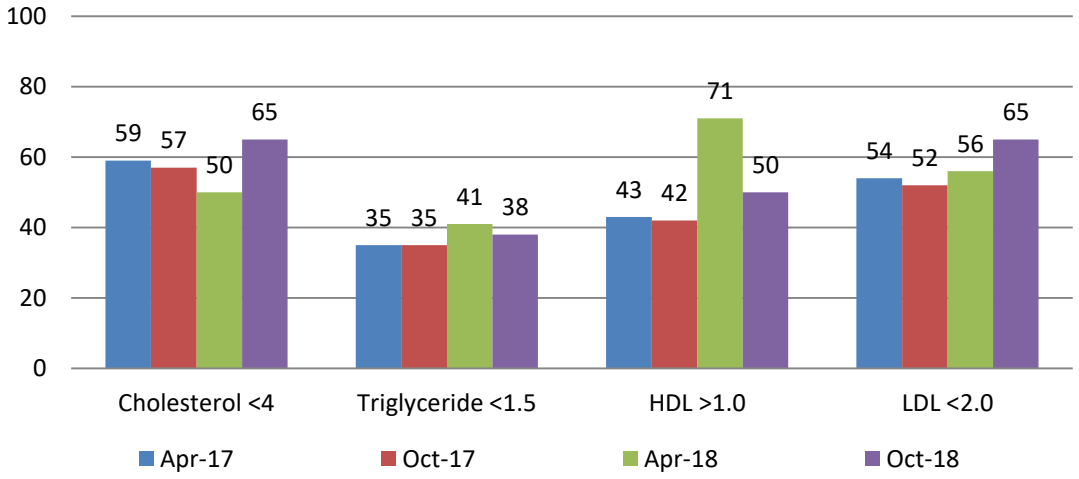


Figure 40. Lipids within normal limits in high risk patients only

- 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 2018 and median ferritin was 306.5 ug/L (CI 296, 451), mean transferrin was 22.45% (SD 7.75).

Parameter	Target	Apr 16	Oct 16	Apr 17	Oct 17	Apr 18	Oct 18	ANZDATA 18
Ferritin	200-800 ug/L	63%	62%	61%	69%	53%	57%	49%
Transferrin	20-50%	80%	64%	67%	69%	47%	57%	61%

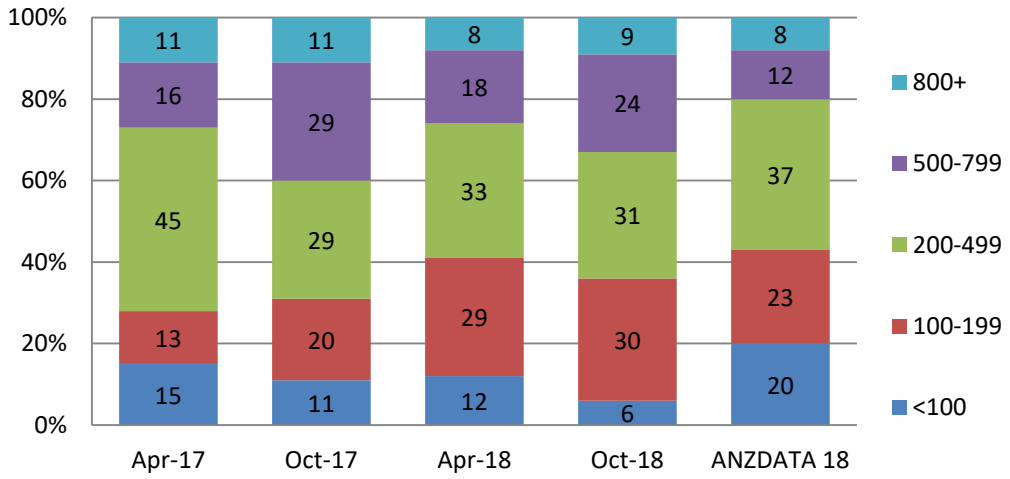


Figure 41. Ferritin

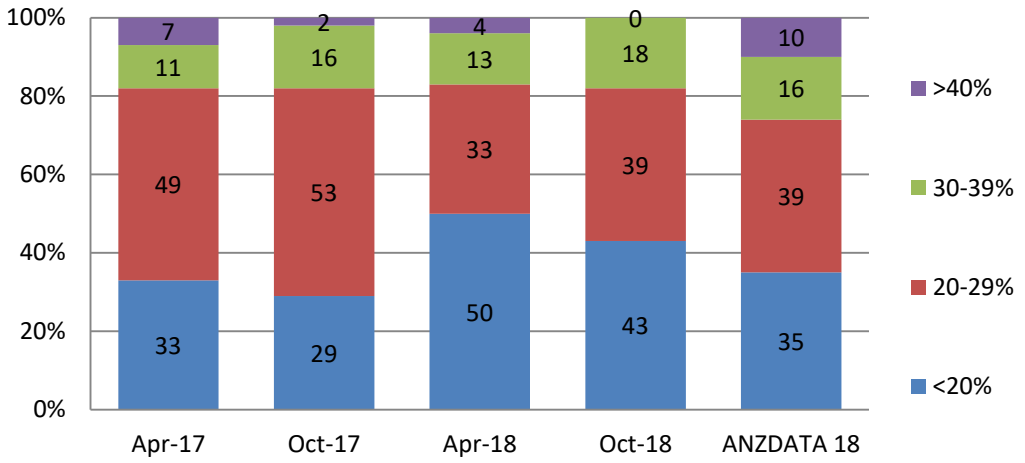


Figure 42. Iron Saturation (Transferrin)

3. **<u>Dialysis Adequacy</u>**
   - 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 2018, the mean Kt/V was 2.2 (SD 0.7, min 1.2, max 4.16)
     - 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 2018, median creatinine clearance was 79 L/week/1. 73 m2 (CI 72,93, min 35.6, max 148.4) and 95% of APD patients had creatinine clearance of >45 L/week/1.73m2 (ISPD target for patients on APD).

Parameter	Target	Apr 16	Oct 16	Apr 17	Oct 17	Apr 18	Oct 18
KT/V	≥ 1.7	74%	82%	77%	80%	72%	73%
CCL	>50L (L & LA) or >60L (H & HA)	72%	77%	72%	75%	69%	73%
CCL (ISPD)	>45L (for APD patients)	80%	85%	84%	84%	92%	95%

Table 9. Dialysis adequacy

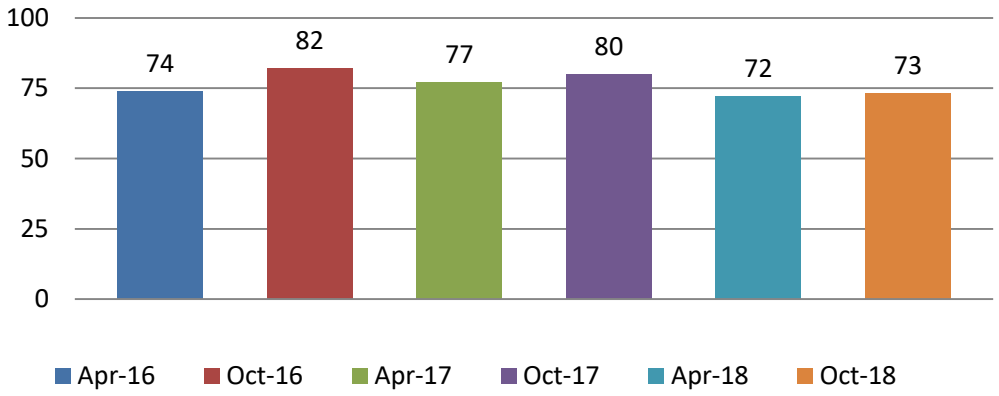


Figure 43. Kt/V ≥1.7

4. **Patient and Technique Survival**

Survival is analysed from the 90th day of treatment until death. Censoring occurs at first transplant, loss to follow-up or recovery of renal function lasting >30 days. Graphs and tables are from ANZDATA Individual Hospital Report 2012-2017. The 5-year patient survival rate for St George Hospital was better than the national rates of Australia and New Zealand.

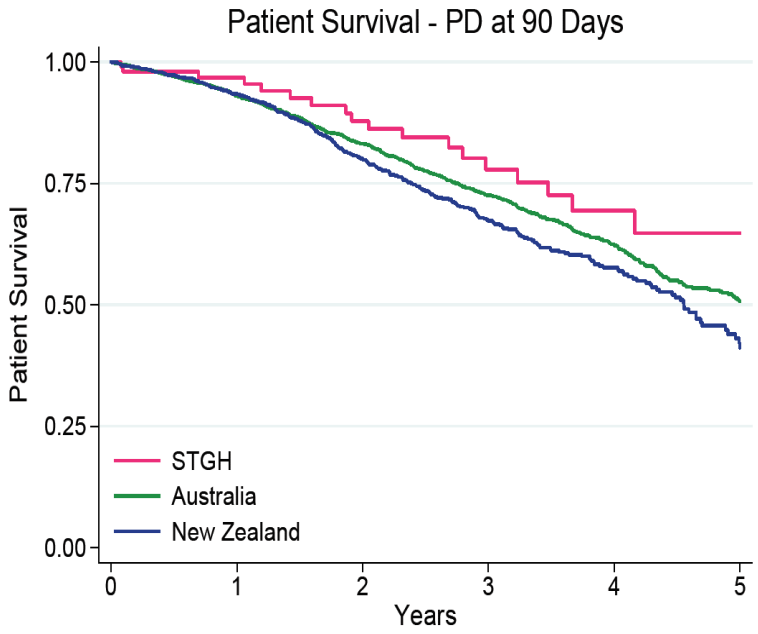


Table 23: PD patient survival

	STGH		Australia		New Zealand	
Time	n	% Survival (95% CI)	n	% Survival (95% CI)	n	% Survival (95% CI)
0	100	100.0	4497	100.0	1279	100.0
3 months	88	98.0 (92.2-99.5)	4112	98.6 (98.2-98.9)	1172	98.6 (97.8-99.1)
6 months	83	98.0 (92.2-99.5)	3743	97.1 (96.5-97.5)	1084	97.3 (96.2-98.1)
1 year	74	96.8 (90.2-98.9)	3010	93.1 (92.2-93.8)	901	93.4 (91.7-94.7)
2 years	54	87.9 (77.7-93.6)	1845	83.2 (81.8-84.5)	565	80.0 (77.2-82.5)
3 years	33	77.8 (64.8-86.5)	1010	72.6 (70.7-74.4)	311	67.3 (63.7-70.7)
4 years	19	69.4 (54.1-80.5)	487	62.3 (59.9-64.7)	158	57.7 (53.4-61.8)
5 years	2	64.8 (47.6-77.6)	167	50.8 (47.5-54.0)	41	41.1 (34.8-47.4)

Figure 44. PD Patient survival – PD at 90 days. ANZDATA individual hospital report 2011-2016

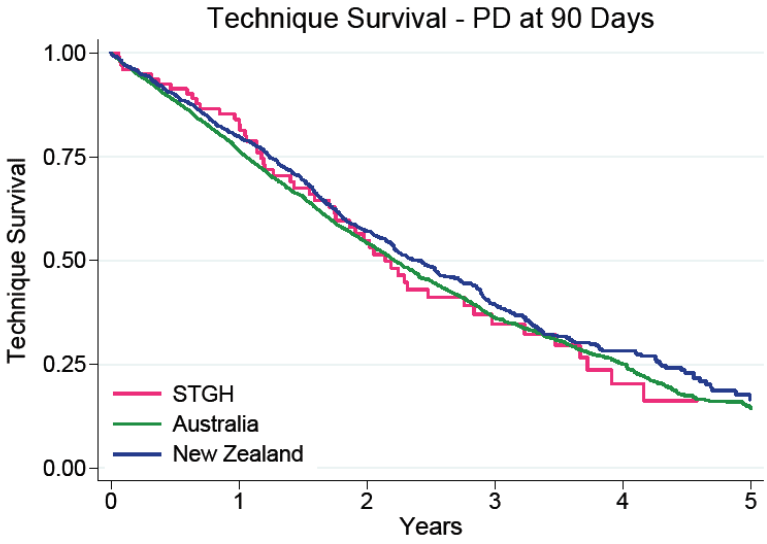


Table 19: PD technique survival

	STGH		Australia		New Zealand	
Time	n	% Survival (95% CI)	n	% Survival (95% CI)	n	% Survival (95% CI)
0	100	100.0	4497	100.0	1279	100.0
3 months	85	94.9 (88.1-97.8)	3919	94.0 (93.2-94.6)	1127	94.7 (93.4-95.9)
6 months	77	91.4 (83.5-95.6)	3414	88.6 (87.6-89.5)	1002	90.0 (88.2-91.6)
1 year	64	84.0 (74.4-90.2)	2472	76.6 (75.2-77.9)	771	79.9 (77.4-82.1)
2 years	33	54.8 (42.5-65.5)	1209	54.3 (52.5-56.1)	400	57.1 (53.8-60.3)
3 years	15	34.8 (23.0-46.8)	507	36.2 (34.2-38.2)	182	39.5 (35.8-43.2)
4 years	6	20.3 (9.8-33.5)	199	25.0 (22.8-27.3)	74	28.3 (24.4-32.2)
5 years			47	14.5 (12.1-17.0)	13	16.5 (11.8-21.8)

Figure 45. PD Technique Survival – PD at 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 37%, followed by infection at 35% in 2017. At St George Hospital, the primary cause of technique failure in 2018 was similar to ANZDATA (2018) with "total dialysis/technical failure" being the main cause at 64%. These were due to blocked catheter, pleuro-peritoneal leak and inadequate solute clearance or ultrafiltration due to peritoneal membrane failure.
- Ten patients were transferred to haemodialysis permanently in 2018. Mean age of patients at time of transfer to haemodialysis was 60 years (min 35, max 84) and mean time on PD at time of transfer to haemodialysis was 22.2 months (min 0.4, max 108.4).

Primary reason for technique failure	2012 n=9	2013 n=12	2014 n=17	2015 n=9	2016 n=14	2017 n=13	2018 n=11	ANZDATA 2018
Infective	22%	30%	23%	0%	18%	21%	18%	35%
Total Dialysis/Technical Failure (catheter block, inadequate dialysis, leaks)	78%	60%	60%	89%	64%	65%	64%	37%
Social (geography)	0%	10%	17%	11%	18%	14%	9%	13%
Other causes or unreported cases	0%	0%	0%	0%	0%	0%	9%	15%

Table 10. Primary reason for technique failure

6. PD-related Infection rates

- Peritonitis episodes and rates
  - 2018 peritonitis rate results continue to surpass the national benchmark and is better than last year. The St George peritonitis rate over a 3 year period from 2016–2018 is 1/65.2 months.
  - 91% (39/43) of patients on peritoneal dialysis in 2018 were peritonitis-free.
  - The average time on dialysis for current patients who have had peritonitis was 20.8 months, and for those who are peritonitis free was 21.4 months.
  - In 2018, 1.6% of our patients could expect peritonitis in any one year compared to 12 years ago at 46%
  - The number of episodes of peritonitis and the number of patients who had peritonitis in 2018 slightly reduced from last year. The proportion of peritoneal dialysis patients who were 3 years peritonitis-free in 2018 was 86%, an improvement from last year at 80% and better than ANZDATA 2018 at 45%.

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

	STGH			Australia		
Year	Episodes	Years	Rate (95% CI)	Episodes	Years	Rate(95% CI)
2012	6	58.39	0.10 (0.04-0.22)	775	2081.24	0.37 (0.35-0.40)
2013	10	56.76	0.18 (0.08-0.32)	831	2180.22	0.38 (0.36-0.41)
2014	8	64.32	0.12 (0.05-0.25)	847	2297.31	0.37 (0.34-0.39)
2015	5	55.20	0.09 (0.03-0.21)	906	2408.12	0.38 (0.35-0.40)
2016	10	52.53	0.19 (0.09-0.35)	822	2402.77	0.34 (0.32-0.37)
2017	8	45.32	0.18 (0.08-0.35)	764	2350.81	0.32 (0.30-0.35)
Overall	47	332.51	0.14 (0.10-0.19)	4945	13720.47	0.36 (0.35-0.37)

Table 11. Rates of peritonitis (per patient-year) ANZDATA Individual Hospital Report 2012-2017

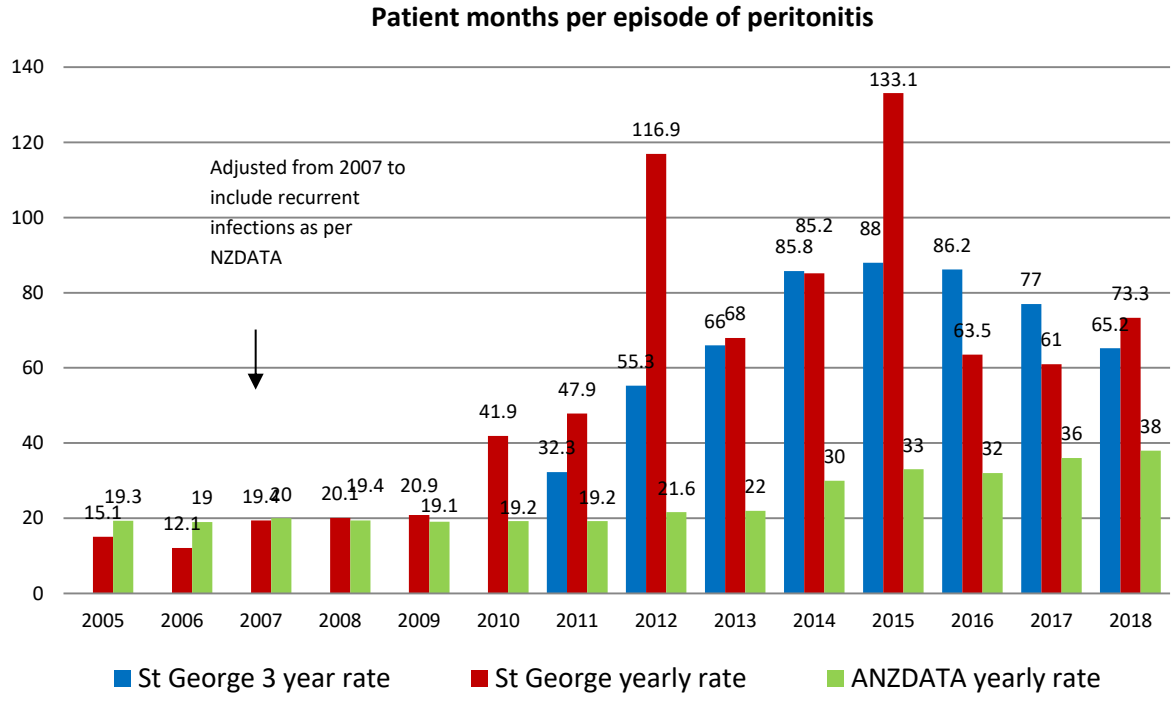


Figure 46. Patient months per episode of peritonitis

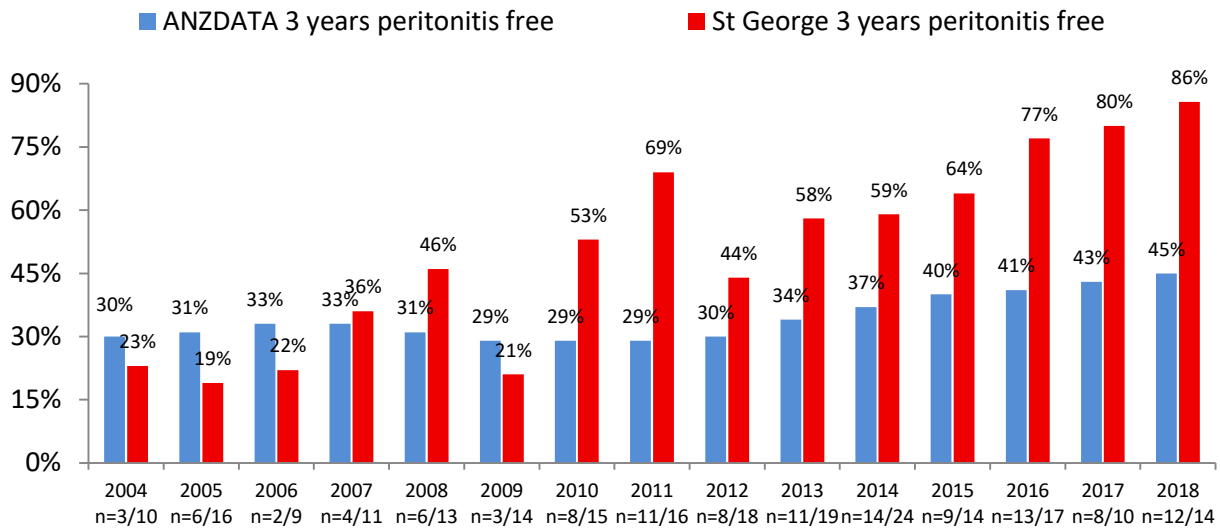


Figure 47. Proportion of patients 3 years peritonitis free

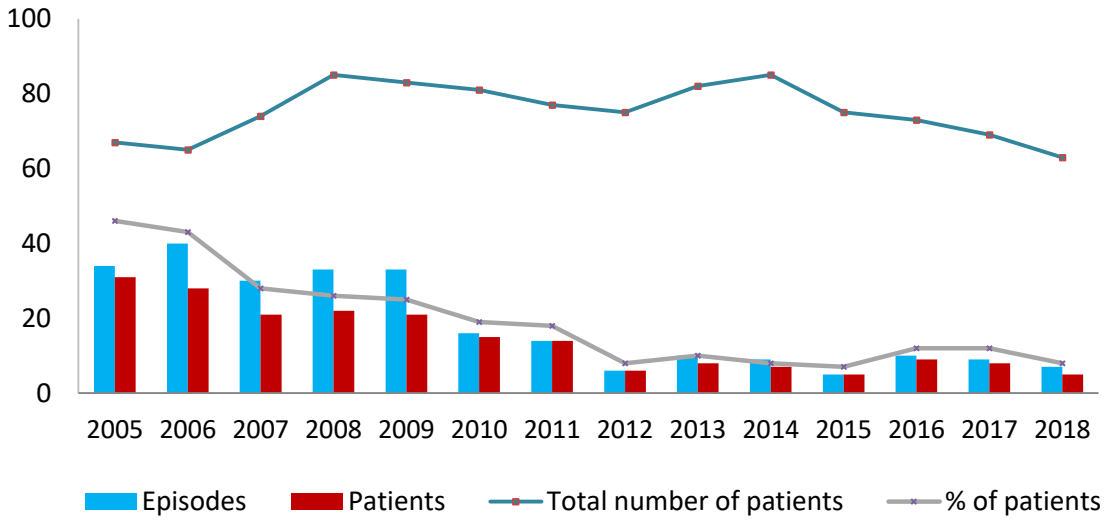


Figure 48. Peritonitis Episodes

	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
Total patients	65	74	85	83	81	77	75	82	85	75	73	69	63
Peritonitis episodes	40	30	33	33	16	14	6	10	9	5	10	9	7
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%	n=5 8%
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%	n=4 6%

Table 12. 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. 2 patients were transferred permanently to haemodialysis as a result of peritonitis in 2018.

Change in treatment as a direct result of peritonitis (%)	2008	2009*	2010*	2011*	2012*	2013*	2014*	2015	2016	2017	2018
Interim Haemodialysis	6	0	6	0	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)	28 (2/7)
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)	28 (2/7)

Table 13. 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.

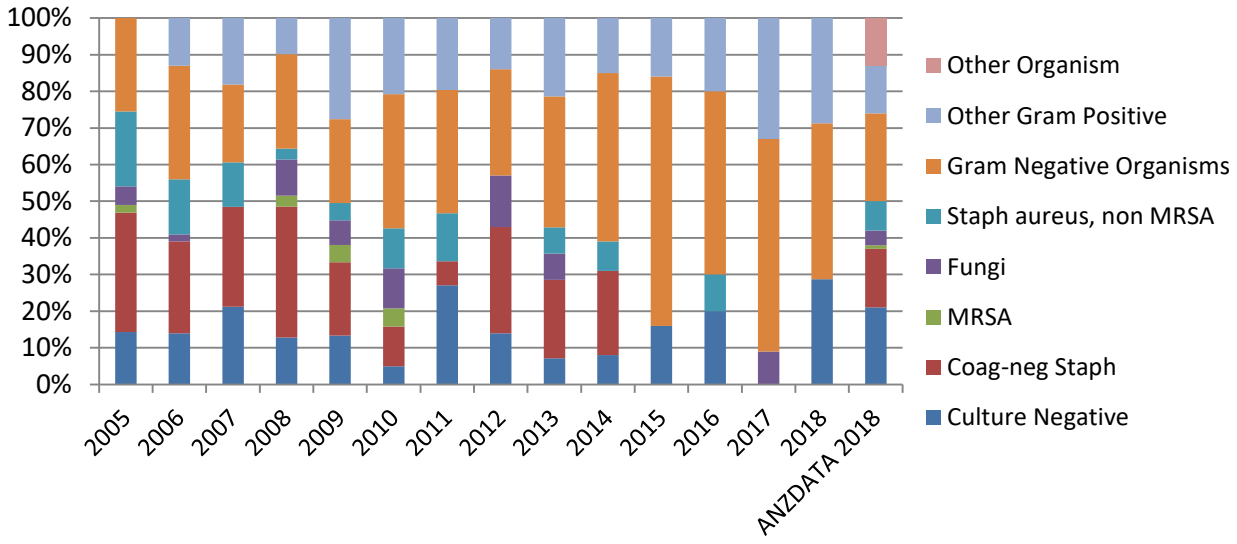


Figure 49. Peritonitis Causative Organism

- Exit Site Infections (ESI)
  - ANZDATA does not collect data on exit site infections, we can only compare to previous year's result.
  - 2018 exit site infection rate is 1/102.6 months. Exit site infection rate over a 3 year period from 2015–2017 is 1/89.2 months.
  - The primary (and only) causative organism for exit site infection in 2018 is pseudomonas aeruginosa.
  - 6% of PD patients had exit site infection in 2018, slightly lower than last year.

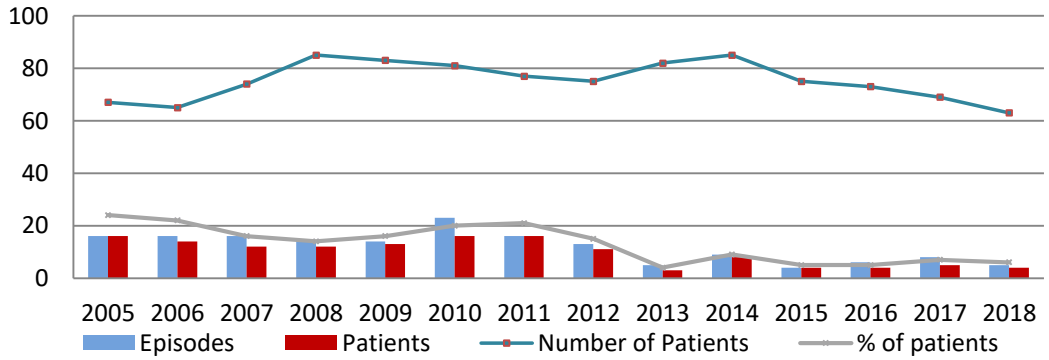


Figure 50. Exit Site Infection Episodes

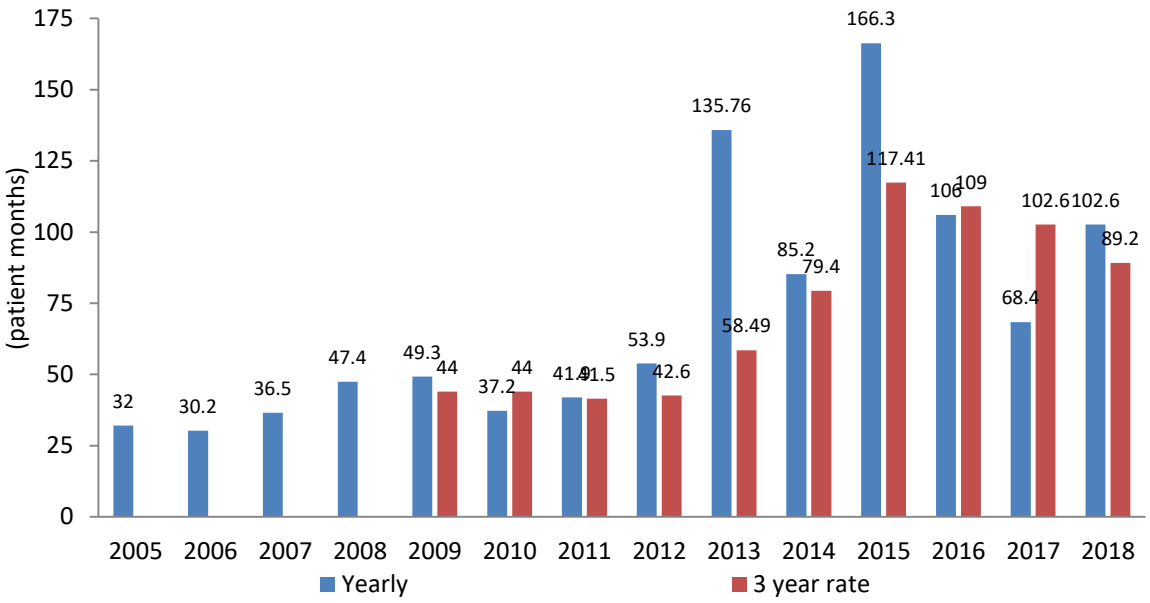


Figure 51. Exit site infection rate per patient months

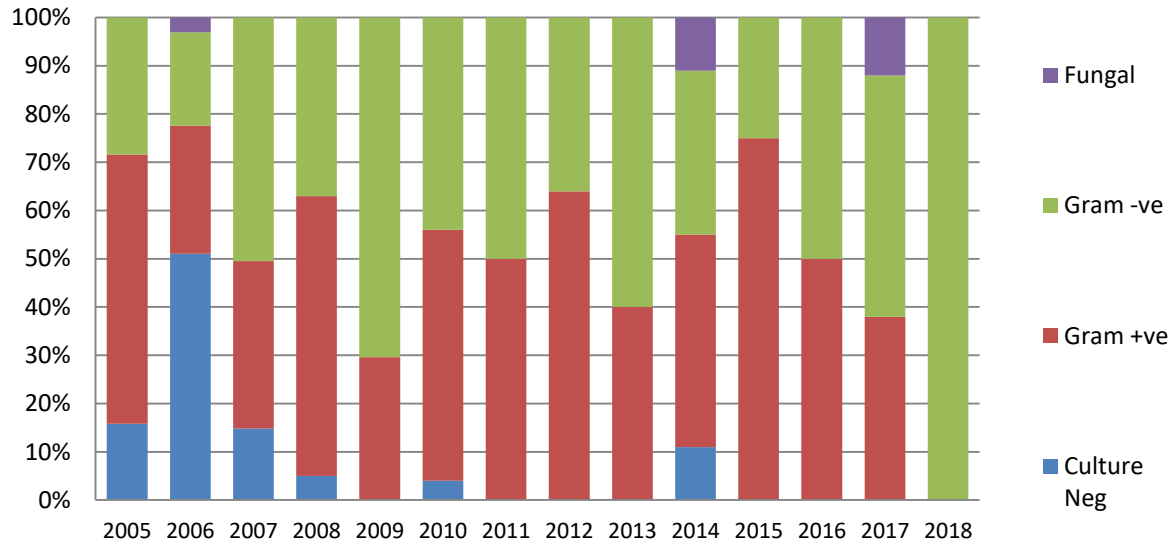


Figure 52. Exit site infection causative organisms

7. Change of Modality and Deaths

- We have fewer deaths than the national average. Mean age of our patients at time of death was 74.5 years (min 69, max 83) and mean time on PD at time of death was 13.2 months (min 0.4, max 20).

	St George 2012 (%)	St George 2013 (%)	St George 2014 (%)	St George 2015 (%)	St George 2016 (%)	St George 2017 (%)	St George 2018 (%)	ANZDATA 2018 (%)
Transplants	5	4	11	17	4	10	14	13
Changed to haemodialysis	16	15	26	17	19	40	23	22
Deaths	9	8	5	4	12	25	7	12

Table 14. Change of Modality and deaths

Note: The rates are calculated using the total number of patients on peritoneal dialysis at 31.12.2018 (n=43), 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. There is a gradual decline in our total patient numbers since 2014.
4. Improvements with calcium, phosphate, lipids and diabetes management in 2018.
5. More patients are within Hb target of 100 – 120 g/L, however, fewer patients were iron replete.
6. More APD patients reached the ISPD creatinine clearance target $\geq$ 45L, however, fewer patients reached the ISPD Kt/V target $\geq$ 1.7.
7. Patient survival and peritonitis rates continue to be better than the national outcomes.
8. The percentage of patients who are peritonitis-free at 3 years was better than last year and higher than the ANZDATA 2018. 91% patients on peritoneal dialysis at the end of 2018 were peritonitis-free.
9. Our peritonitis and exit site infection rates improved in 2018.
10. Fewer deaths in 2018 than that of the national rate and compared to last year.
11. Similar to national data and last year is "total dialysis and technical failure" as the primary reason for PD technique failure in 2018.

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 links between modifiable practices and outcomes, with the goal to extend patient survival and improve quality of life. St George PD unit consent rate was 78.5% and was in top 5 Australia-wide. Data entry and recruitment was completed by close out date. Final ethics report was approved by HREC on 28th March 2019. Final results are yet to be completed as the global PDOPPS study is continuing in other participating countries. Results will be reported in peer reviewed scientific journals, at conference presentations, and publication on study website.

- 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 and is continuing to benefit patients identified at risk of PD failure through early planning, referrals and education.

- St George PD unit has agreed to participate in TEACH – PD trial (Targeted Education ApproaCH to improve Peritoneal Dialysis outcomes). This is a pragmatic phase 4, multi-centre, multinational, cluster-randomised trial (CRCT), randomising PD units to implement TEACH-PD training modules targeted at PD trainers and incident PD patients versus standard existing practices. It aims to determine whether implementation of standardised training modules based on the ISPD guidelines, targeting both PD trainers and patients, results in a longer time to the composite end-point of exit site infections, tunnel infections, and peritonitis in incident PD patients compared with existing training practices. Approved by NHMRC for $2.38M from MRSS fund. Site ethics (HREC & SSA) applications are in progress.

Management: Clinical and QA activities

- Patient satisfaction survey was completed for all PD patients in 2018. 60% responded. Survey questions and responses were divided into 4 sections:

- Overall management of care – All responders were satisfied with the service, support and clinical advice provided by the PD nurses.
- Educational needs – Almost all responders were satisfied with the PD training/retraining and periodic education (PD newsletter) they received from the PD nurses. Half of them believed they will benefit from more education sessions but only very few would be interested to attend retraining sessions or the annual gathering for PD patients. Only a third of the responders are able to use computers & only 16% have access to computers.
- New PD machine (Claria) – A third of the responders confirmed they were converted to Claria PD machine, all have found it easy to use & believed they received enough training for it.
- Open questions to encourage feedback and suggestions - majority of the feedback received were praises for the PD team for being "courteous, excellent, friendly, helpful, knowledgeable, patient, professional and wonderful"
- Recommendations that came out from the survey are:
  - Discontinue the planned regular PD retraining at 18 months on PD
  - Continue ad hoc PD retraining
  - Discontinue PD Christmas party/dietitian session
  - Continue the 6 monthly newsletter
  - Continue with Claria conversion and training
  - Repeat survey in 2021

- Patient compliance for blood testing and HbA1c screening for patients with diabetes continues to improve through mailing of pre-filled blood request forms to patients with SMS reminders.
- 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 dietitian and nephrologists assisted in improving the anaemia, calcium, phosphate, PTH, diabetes, lipids and nutrition management.
- Pre PD assessment and education program is ongoing through group and individual face to face sessions for predialysis patients choosing PD. Group education sessions will continue in 2019 despite fewer attendance in 2018.
- All effective initiatives and projects will continue i.e. clinic review checklist project, nurse-facilitated iron management, bi-annual patient newsletters, 2-monthly MDT patient review, 1:1 comprehensive training and retraining program and outpatient follow-up and support.
- There are 8 nursing homes within the SGH catchment area trained on PD, however only 6 are willing to accommodate PD patients pending bed availability. There is also a private nursing agency trained on PD. The structured PD support and training program tailored to nursing home nurses to streamline the uptake of PD patients into aged care facilities will continue throughout 2019.
- 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

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 potential renal transplant recipients currently listed on the National Organ Matching Service (NOMS) transplant waiting list and about living renal donors under the care of a SGH nephrologist.

Highlights

- A total of 236 kidney transplant recipients and 63 living kidney donors were under the care of the St George team during 2018.
- Nineteen people received a kidney transplant: two from live donors and seventeen from deceased donors. One person received a simultaneous pancreas kidney transplant
- Two people donated a kidney.
- One of the live donor transplants were pre-emptive.
- Four transplant recipients died with functioning grafts.
- Five transplant recipients had graft failure and returned to dialysis.
- Two transplant recipients transferred out and two transferred in.
- A total of 51 people were reviewed at the SGH transplant assessment clinic by a nephrologist from Prince of Wales hospital, the transplanting unit.
- At 31/12/18 31 SGH dialysis patients were listed with NOMS.

Transplant patient flow

1/1/18 SGH transplant patients registered with ANZDATA	**214**
In	
Transplanted	20
Transferred care in	2
In Subtotal	**22**
Out	
Transferred care out	2
Died	4
Graft failure transferred back to dialysis	5
Out Subtotal	**-11**
Net Gain	**11**
31/12/17 SGH transplant patients	**225**

Post-transplant follow up

Of the 236 kidney transplant recipients cared for at SGH in 2018:

- 221 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

KPIs 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)
-

In the first 12 months post-transplant SGH renal transplant recipients demonstrate rates of acute rejection, CMV viraemia and CMV infection below the benchmarks, while rates of NODAT, BK viraemia, BK nephropathy and surgical complications are above benchmark.

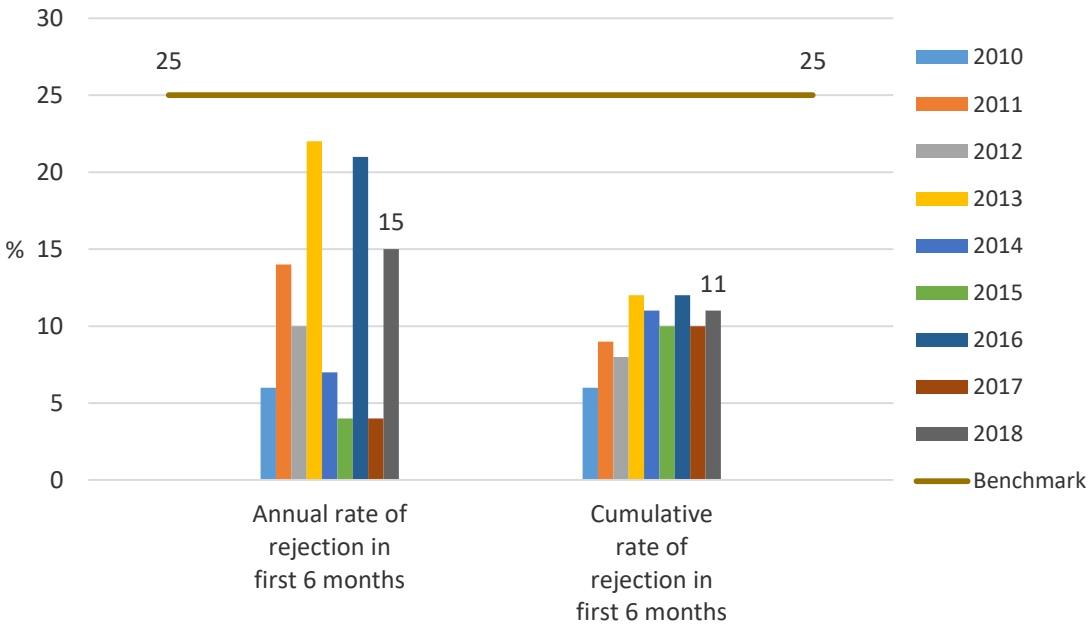


Figure 53. Rate of biopsy proven acute rejection in first 6 months

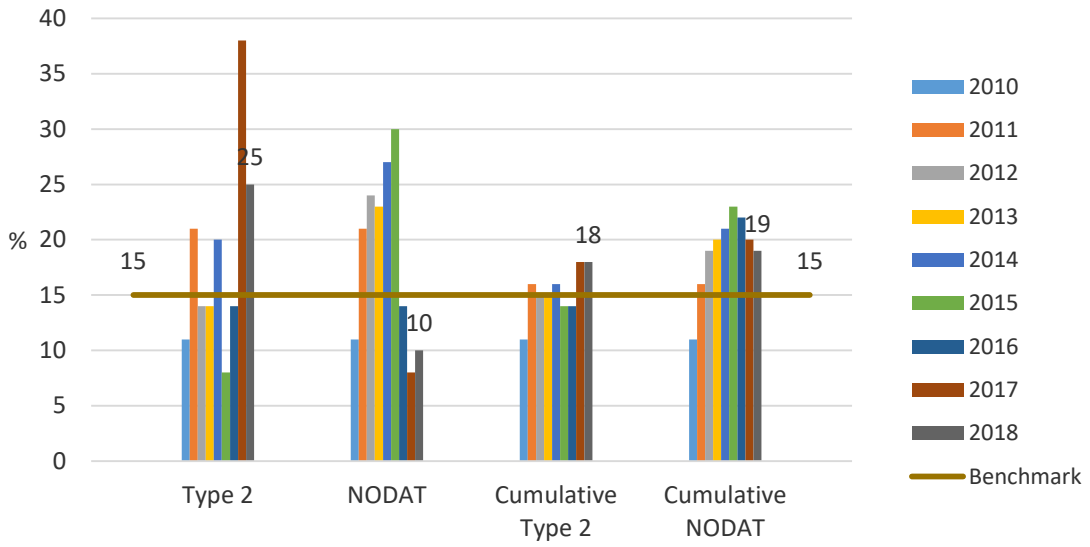


Figure 54. Rate of diabetes in first 12 months

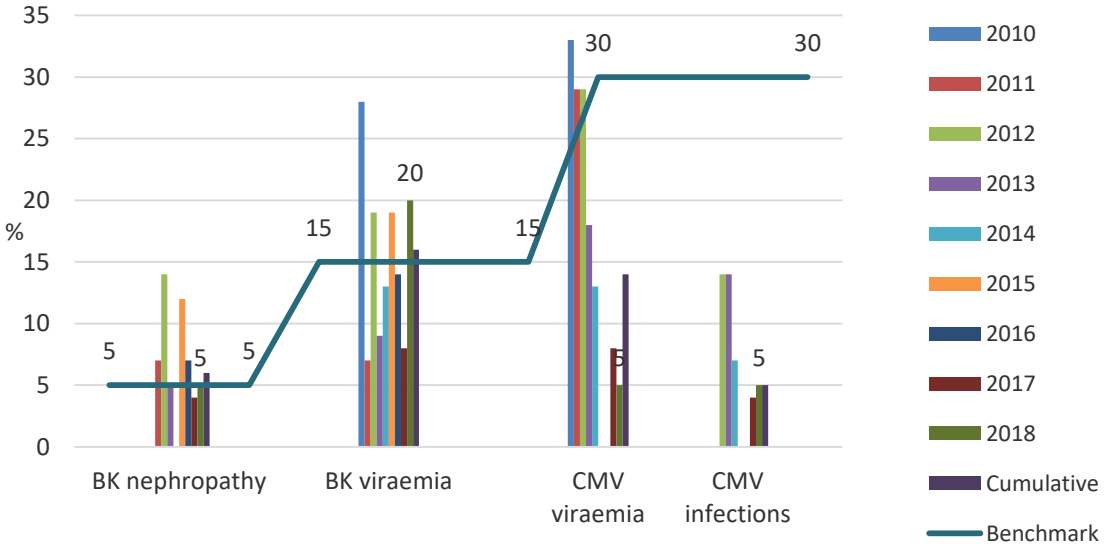


Figure 55. Infection in first 12 months

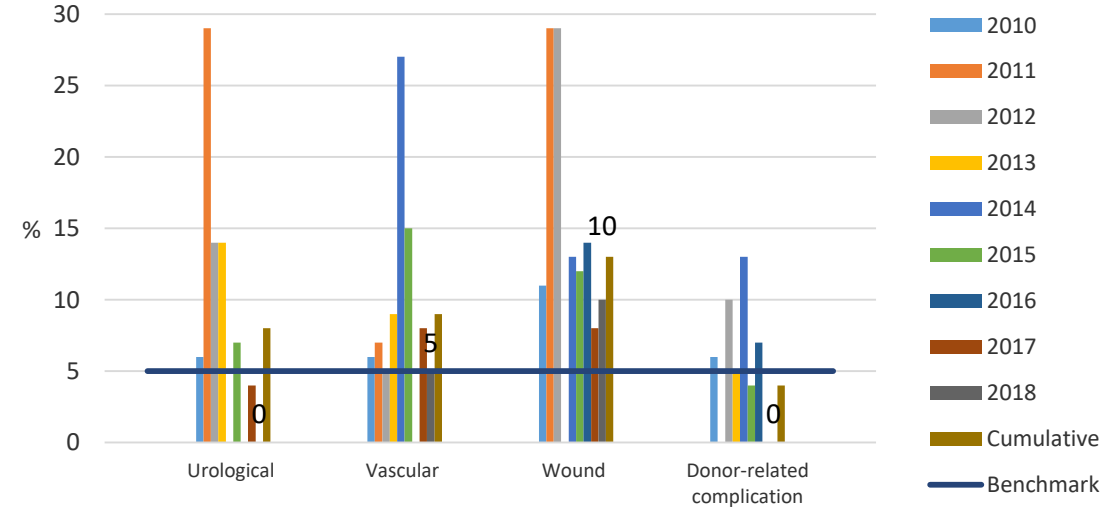


Figure 56. Surgical Complications

Graft and Patient Survival ANZDATA report for transplants 2012-2017; n=115

1. **Deceased Donors**

   Compared with national data (Benchmarks are against the national average)

   - Recipients of deceased donor grafts are of similar ages, sex (2/3 male), primary diagnosis, primary grafts (91%); more Asian recipients (30 vs. 14%); longer time on dialysis (91 vs. 70% >2yrs dialysis)
   - Deceased donor factors: more over age 60 (38 vs. 27%); more CVA (52 vs. 45%); 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	74	100.0	3234	100.0	393	100.0
3 months	71	98.6 (90.7-99.8)	3046	98.9 (98.5-99.2)	359	99.5 (98.0-99.9)
6 months	69	98.6 (90.7-99.8)	2878	98.4 (97.8-98.8)	337	99.2 (97.5-99.7)
1 year	62	97.1 (89.0-99.3)	2527	97.4 (96.8-97.9)	281	98.2 (96.1-99.2)
2 years	54	97.1 (89.0-99.3)	1885	95.6 (94.7-96.3)	205	96.7 (93.8-98.2)
3 years	32	93.1 (82.2-97.4)	1354	93.9 (92.8-94.8)	143	94.5 (90.6-96.8)
4 years	24	93.1 (82.2-97.4)	878	91.9 (90.6-93.1)	88	92.1 (87.1-95.2)
5 years	10	89.0 (73.5-95.7)	424	90.1 (88.3-91.6)	37	89.3 (82.4-93.6)

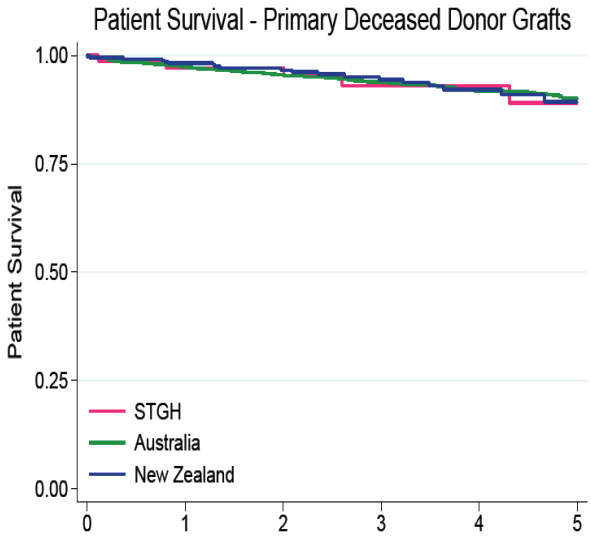


Figure 57. Patient survival for primary deceased donor grafts (ANZDATA Individual Hospital Report 2012-2017 (Table 11))

	STGH		Australia		New Zealand	
Time	n	% Survival (95% CI)	n	% Survival (95% CI)	n	% Survival (95% CI)
0	81	100.0	3760	100.0	430	100.0
3 months	75	95.0 (87.2-98.1)	3476	97.4 (96.8-97.8)	387	98.1 (96.3-99.1)
6 months	73	95.0 (87.2-98.1)	3255	96.3 (95.6-96.8)	364	97.6 (95.6-98.7)
1 year	64	92.2 (83.5-96.4)	2828	94.4 (93.6-95.1)	304	96.2 (93.7-97.7)
2 years	55	92.2 (83.5-96.4)	2070	92.1 (91.1-93.0)	218	93.4 (90.2-95.6)
3 years	34	87.9 (76.6-93.9)	1465	89.1 (87.9-90.3)	150	90.0 (85.7-93.0)
4 years	25	87.9 (76.6-93.9)	935	86.2 (84.7-87.6)	91	85.2 (79.5-89.4)
5 years	9	80.7 (64.9-89.9)	450	83.4 (81.5-85.1)	34	76.5 (67.8-83.1)

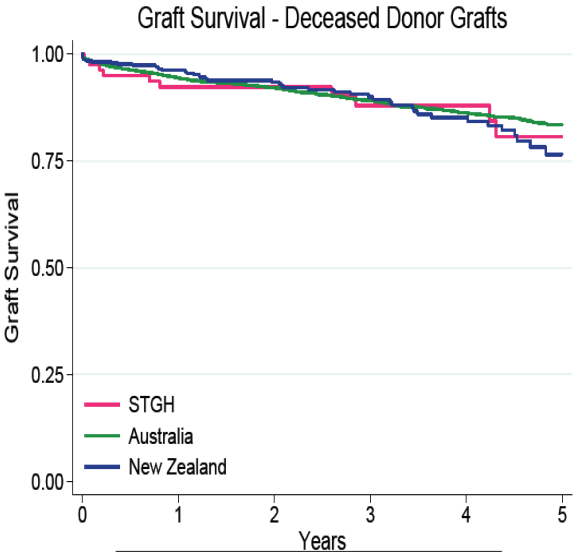


Figure 58. Graft survival – deceased donor grafts (Table 17)

DD graft survival is improved compared to last year although still slightly lower than expected at 12 months (92.2 vs 94.4). There were several early graft losses that continue to influence these results.

2. Live Donors

	STGH		Australia		New Zealand	
Time	n	% Survival (95% CI)	n	% Survival (95% CI)	n	% Survival (95% CI)
0	32	100.0	1200	100.0	346	100.0
3 months	30	100.0	1134	99.7 (99.2-99.9)	328	98.8 (96.9-99.6)
6 months	24	100.0	1072	99.6 (99.0-99.8)	315	98.8 (96.9-99.6)
1 year	20	100.0	975	99.6 (99.0-99.8)	286	98.5 (96.4-99.4)
2 years	16	100.0	744	98.1 (97.0-98.8)	215	97.7 (95.2-98.9)
3 years	14	100.0	557	97.1 (95.6-98.0)	153	97.2 (94.4-98.6)
4 years	10	100.0	353	96.0 (94.2-97.3)	91	97.2 (94.4-98.6)
5 years	5	100.0	167	95.1 (92.8-96.7)	39	97.2 (94.4-98.6)

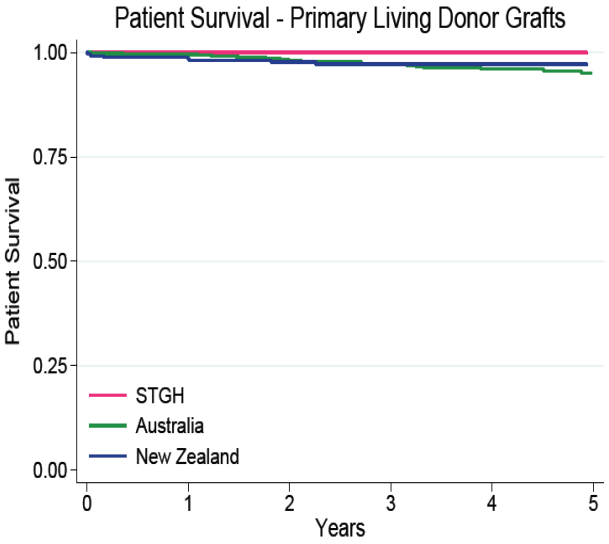


Figure 59. Patient survival - primary living donor grafts (ANZDATA Individual Hospital Report 2012-2017 (Table 12))

	STGH		Australia		New Zealand	
Time	n	% Survival (95% CI)	n	% Survival (95% CI)	n	% Survival (95% CI)
0	34	100.0	1364	100.0	378	100.0
3 months	32	100.0	1273	98.6 (97.8-99.1)	356	98.4 (96.5-99.3)
6 months	26	100.0	1204	98.4 (97.6-99.0)	340	98.1 (96.1-99.1)
1 year	22	100.0	1091	98.2 (97.3-98.8)	306	97.2 (94.8-98.5)
2 years	15	94.1 (65.0-99.1)	832	96.4 (95.2-97.4)	227	95.7 (92.7-97.4)
3 years	13	94.1 (65.0-99.1)	612	94.4 (92.8-95.7)	160	95.2 (92.1-97.1)
4 years	10	94.1 (65.0-99.1)	381	92.4 (90.4-94.1)	94	95.2 (92.1-97.1)
5 years	5	94.1 (65.0-99.1)	171	89.7 (86.7-92.0)	42	93.2 (86.9-96.5)

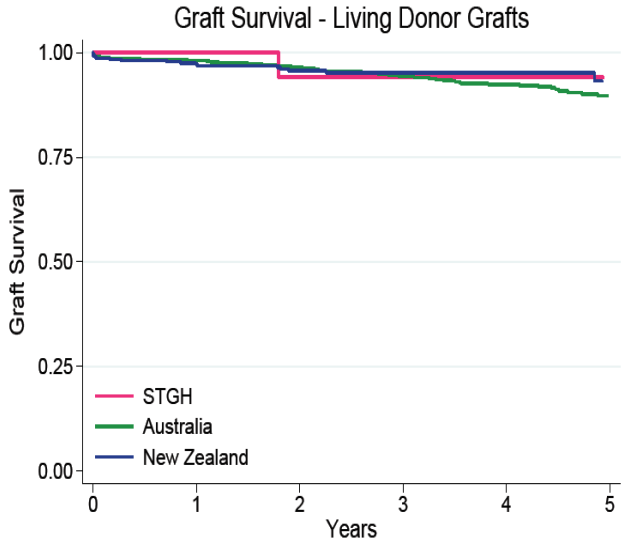


Figure 60. Graft survival for living donor grafts (ANZDATA Individual Hospital Report 2012-2017 (Table 18))

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

3. Waiting list data

KPI: All dialysis patients under 75years to have their suitability for transplant assessment reviewed.

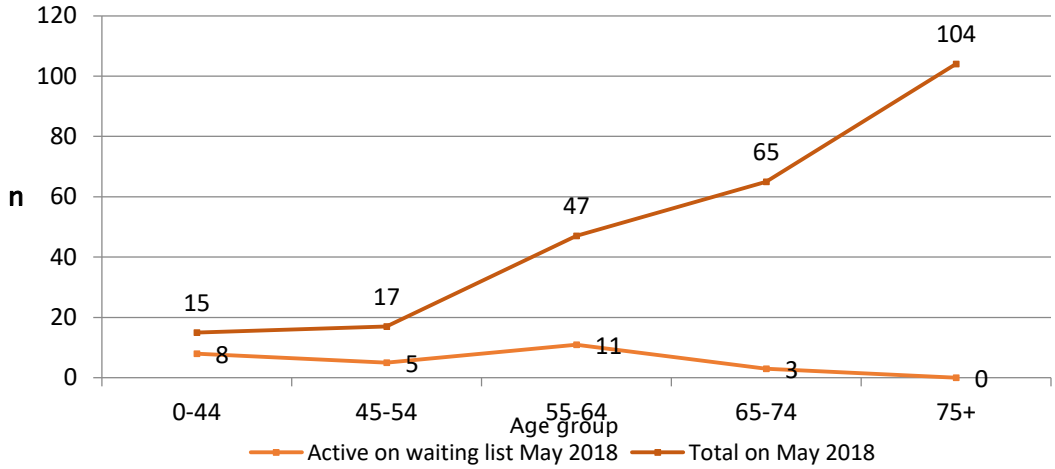


Figure 61. Number of people on dialysis and on the transplant waiting list May 2018

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.

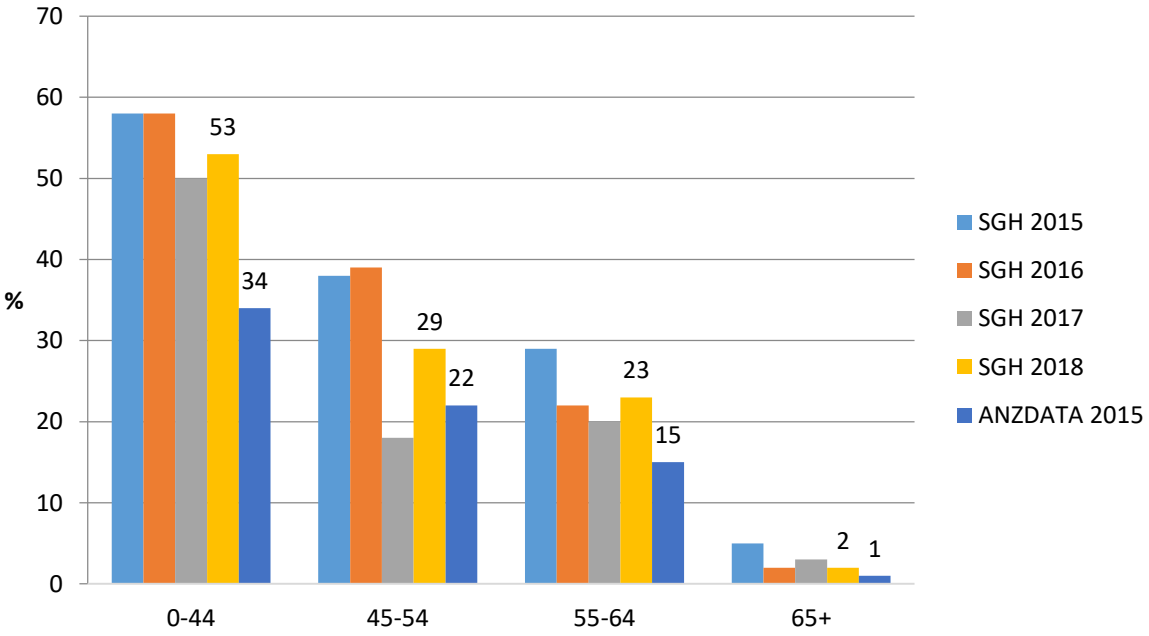


Figure 62. Percentage of SGH dialysis patients listed for transplant compared to ANZDATA 2015

4. Donor Data

KPIs:

- All living kidney donors to be reviewed annually
- Living donor assessment to be completed in <12months

At 31/12/18 there were 65 living kidney donors under the care of SGH nephrologists.

- During 2018 62 donors (95%) attended for review with the remaining 3 followed up by letter.
- Among the donors there were no deaths and no one on dialysis.
- Creatinine ranged from 57-166umol/L, eGFR from 35-90mL/min/1.73m^2 and albumin creatinine ratio from 0–14.5.
- Fourteen SGH renal donors have CKD stage 3A (GFR 45-59) and 3 have CKD stage 3B (GFR 30-44).
- Fifteen donors had hypertension requiring treatment, with eleven requiring one agent and four requiring two.

Renal Donor patient flow

1/1/18 SGH renal donors registered with ANZDATA	**63**
In	
Donated	2
Transferred care in	0
In Subtotal	**2**
Out	
Transferred care out	0
Died	0
Out Subtotal	**0**
Net Gain	**2**
31/12/18 SGH renal donors	**65**

Two people under the care of SGH proceeded to donate a kidney during 2018. The whole process from referral to the coordinator to kidney donation took 20 weeks for one of these donors and 110 weeks for the other largely driven by recipient factors.

Twenty nine new donors presented to SGH for work up during 2018. One went ahead and donated. Eighteen did not proceed: seven due to medical reasons; two because another donor went ahead for the same recipient; three because the recipient was not suitable to go ahead; and six did not make any progress after the initial phone call. At 31/12/18 a total of 13 people remain in assessment at SGH for suitability for renal donation.

5. Plans for the next 12 months

- Renal Transplant Celebration planned for 15/3/19
- Pre-transplant education planned for 2/4/19

10. Renal Supportive Care Service

Frank Brennan, Kelly Li, Elizabeth Josland, Alison Smyth, Jessica Stevenson, Su Bahceci, Hannah Burgess and Anna Hoffman

Overview

- The 9th Renal Supportive Care Symposium was held in August 2018 and was attended by health professionals from around Australia and overseas.
- Numerous education sessions and site visits were conducted for RSC staff across NSW. St George staff also mentored a number of visitors to the hospital, including staff from Europe and USA.
- The eighth annual Renal Memorial Service was held on 13 September 2018 and was attended by approximately 30 people, consistent with previous years' attendances. There were a mix of new and returning families. This service aims to provide families and friends of past renal patients with a supportive environment to commemorate their loved ones.
- Details of current research, guidelines, patient information, education and presentations can all be found on the Renal Supportive Care section of the Renal Department website: https://stgrenal.org.au/renal-supportive-care.

Patient Demographics and Outcomes

Demographics of patients seen by the renal supportive care service (at their first visit/ consult) are tabled below.

- The age of patients ranges from 25-99 years, with an average age of 77years
- Conservatively managed patients are on average older than the other patients seen by the service.

Clinic Patients	Conservative	Dialysis	Transplant	Pre-Dialysis/ undecided	Total
No. of patients (count)	329	205	19	37	590
Age (average, years)	82	72	60	76	77
Age (range, years)	30-99	25-90	41-80	56-86	25-99
eGFR (average)	17		40	32	17
IHD (%)	47	46	21	35	45
Dementia (%)	11	5	0	0	8
2 or more co-morbidities* (%)	89	89	58	89	88
Current or former smokers (%)	22	32	16	16	25
Inpatient consults only	**Conservative**	**Dialysis**	**Transplant**	**Pre-Dialysis/ undecided**	**Total**
No. of patients (count)	114	121	9	31	275
Age (average, years)	84	72	61	71	77
Age (range, years)	58-98	23-90	33-76	41-90	23-98
eGFR (average)	13		23	26	15
IHD (%)	52	48	11	32	47
Dementia (%)	9	7	0	6	7
2 or more co-morbidities* (%)	97	86	67	84	90
Current or former smokers (%)	11	33	33	16	22

Table 15. Patient demographics on first clinic visit 2009-2018
**Using co-morbidities included in the Charlson –morbidity Score*

- 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
2018	258	136	**948***	1533	46	362	241

Table 16. Occasions of Service (OOS) *data collection commenced Nov 2010,*
** Includes all other OOS (case management, family meetings etc)*
*** Home visits include Telehealth*

Inpatient services

- Inpatients are predominantly seen by the CNCs. The majority of new inpatient referrals continue to be for pain and symptom management.
- There is an average of 6 new inpatient referrals per month
- There was an average of 20 consults per month for patients on dialysis

Outpatient services

- Telehealth consults commenced in 2018. These consults assist patients who are too frail to physically attend the clinic and to manage patients who require frequent follow up.

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, 72% 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.
- 22% of patients reported severe/ overwhelming itch at their first visit, compared to only 12% at visit 3.

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 2018.

- 79% of non-dialysis patients attending the RSC clinic, that are competent had an advance care plan

NFD - RSC clinic	**75**
With ACP	37
Without ACP - Suitable	10
Discussed	2
For Follow-up	8
Without ACP- not suitable	**28**
Unable due to Dementia/ Incompetent/ Social issues	6
Nursing home patients	4
New Clinic Patient - Less than 3 appointments	11
Lost to Followup -Not seen >2yrs	7

% Completed	79%
	(37/47)

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.
- 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
- Pathophysiology and management of taste changes in CKD
- Nocturia Study: Determine the frequency, severity and characteristics of nocturia in patients with CKD

Publications

- **Brennan** FP, Dutton M, Magann L. **Skin Symptoms** Textbook of Palliative Care. Springer International Publishing AG 2018 https://doi.org/10.1007/978-3-319-31738-0_18-1
- **Brennan F. "The Poor Mystery of My Body": The Sanctity of the Human in Illness and Death**. Journal of Palliative Care 2018; 20(10): 1-8.
- Morton R, **Hoffman A, Josland E,** Couchoud C, Smith S, **Brennan F, Brown M**. **Symptom burden and EUROQOL EQ-5D-5L utility-cased quality of life for Australian patients with end-stage kidney disease receiving renal supportive care. Preliminary results from a prospective state-wide cohort analysis**. Nephrology Dialysis Transplantation, Volume 33, Issue suppl_1, 1 May 2018, Pages i271, https://doi.org/10.1093/ndt/gfy104.FP668
- Urban K, Foote C, **Brennan F, Brown MA**, Lee B. **Quality of death of renal patients dying in an acute hospital setting - does Renal Supportive Care lead to better deaths?** Nephrology 2018
- Wainstein M, Menzies AR, **Brennan F, Brown MA**. T**he legal doctrine of informed consent and renal dialysis – do patients really consent?** Journal of Law and Medicine 2018; 25: 992- 1008.

Education Days and Teaching

- The 9th Renal Supportive Care Symposium took place in July 2018 with sponsorship provided by Amgen and Roche.
- **RSC Dietitian Education Day:** 10 December 2018 at Blacktown Hospital – co-ordinated by Su Bahceci

Presentations

- Prof Brown gave multiple presentations on RSC at the RSC Symposium, Hub mentoring sessions and overseas conferences
- Dr Frank Brennan gave 44 presentations in 2018, including national and international conferences, lectures, panel discussions, teaching sessions and education days.
- Dr Brennan gives a series of half-hour tutorials on all aspects of RSC to the junior doctors in the Renal Department. In addition, Dr Brennan gives a one hour tutorial summarising RSC (four times a year) to each new group of junior doctors at Calvary Hospital, Kogarah.
- Elizabeth Josland and Alison Smyth participated in 8 presentations, throughout 2018 including a virtual forum, mentored multiple visitors and were part of the coordinating committee for the RSC symposium 2018.
- Anna Hoffman presented at the *POS Workshop 2018* at the King's College London, Cicely Saunders Institute, February 2018, as well as at the Health Services Research Association of Australia and New Zealand (HSRAANZ), Sydney University in November 2018.
- Hannah Burgess provided education and mentoring to RSC SW across the STG Hub.
- Jessica Stevenson presented at the St George RSC Symposium, and Su Bahceci at the 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 2018

- Dr Brennan ran International workshops on renal supportive care and symptom management in ESKD in Malaysia, India, South Africa and Thailand
- The service hosted multiple doctors, nurses and allied health professionals from across Australia and overseas.
- Dr Brennan continues to revise our local symptom management guidelines using the latest evidence based literature.
- Professor Mark Brown was appointed a Member of the Order of Australia that acknowledged his contribution to Nephrology and medical research

Performance indicators and outcomes for 2018

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.
   - 79% of patients (conservative and dialysis) had an improvement or maintained their total symptom score between first and most recent visit to the RSC clinic
   - 65% of patients (conservative and dialysis) had an improvement or maintained their functional status between first and most recent visit to the RSC clinic

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.
     Patients with severe or overwhelming symptoms have automatic referral to the renal supportive care service. Patients can be seen on dialysis or are called to arrange 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.*
   - 79% of competent NFD patients who are seen in the RSC clinic have an ACP. ACP discussions have been held with an additional 2 patients who are currently waiting or not keen to proceed.
   - 58% of dialysis patients identified as requiring an ACP in 2018 (n=45) had an ACP completed. Each year nephrologists are sent a list of their current dialysis patients to identify those requiring an ACP 2018 (identified using the "Surprise Question").

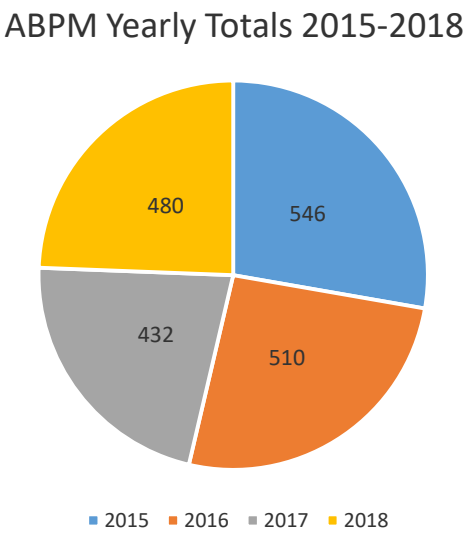
4. **Nutritional assessment**
   - 64% of RSC dietetic consultations were for patients attending for conservative management, with 79% of conservative patients being reviewed one or more times in clinic
   - 36% of RSC dietetic consultations were for patients attending for symptoms support (e.g. pre-dialysis, dialysis-dependent, transplant), with 68% of symptom support patients being reviewed one or more times in clinic

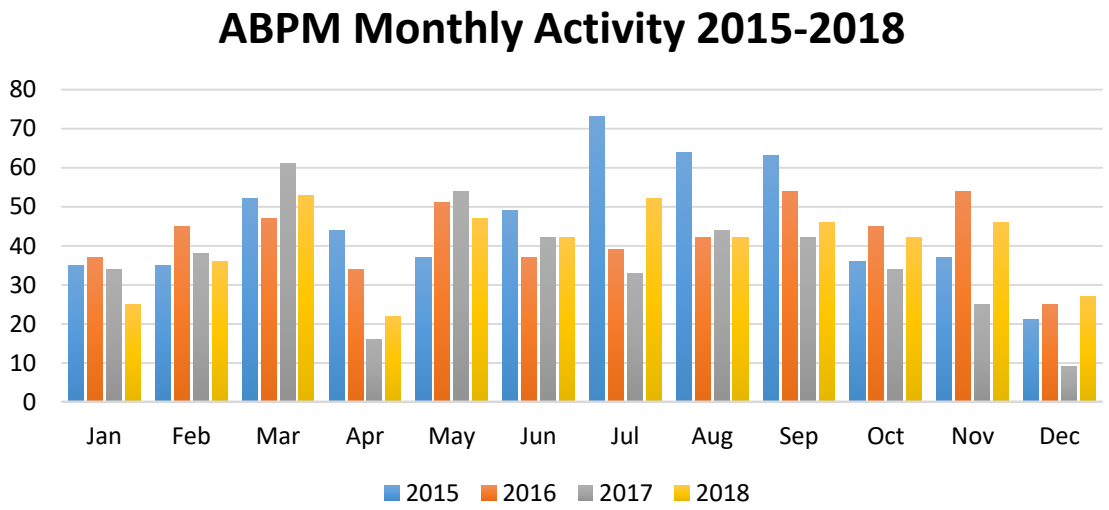
11. Hypertension

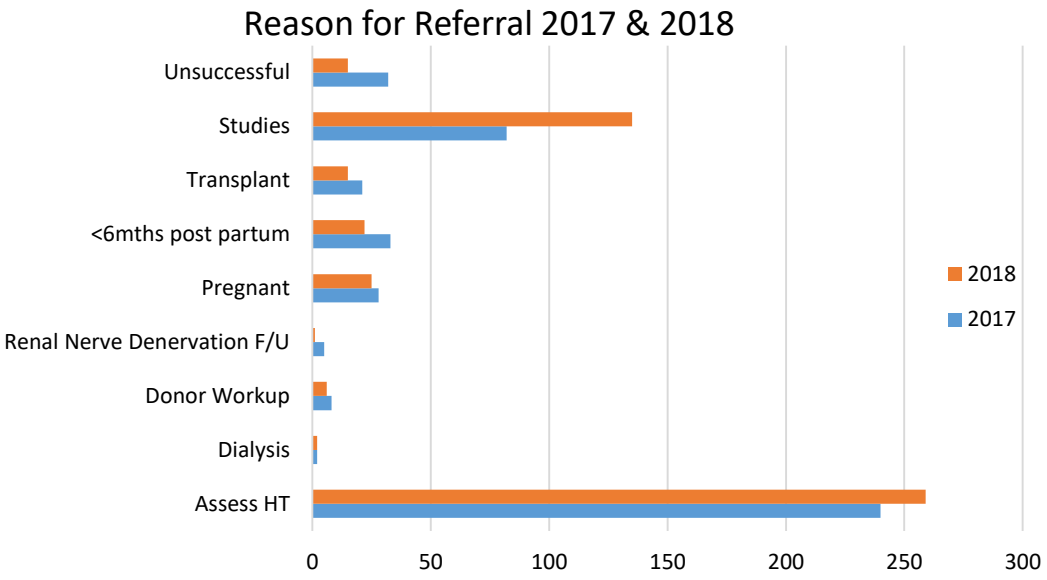
George Mangos and Jennifer Beddoe

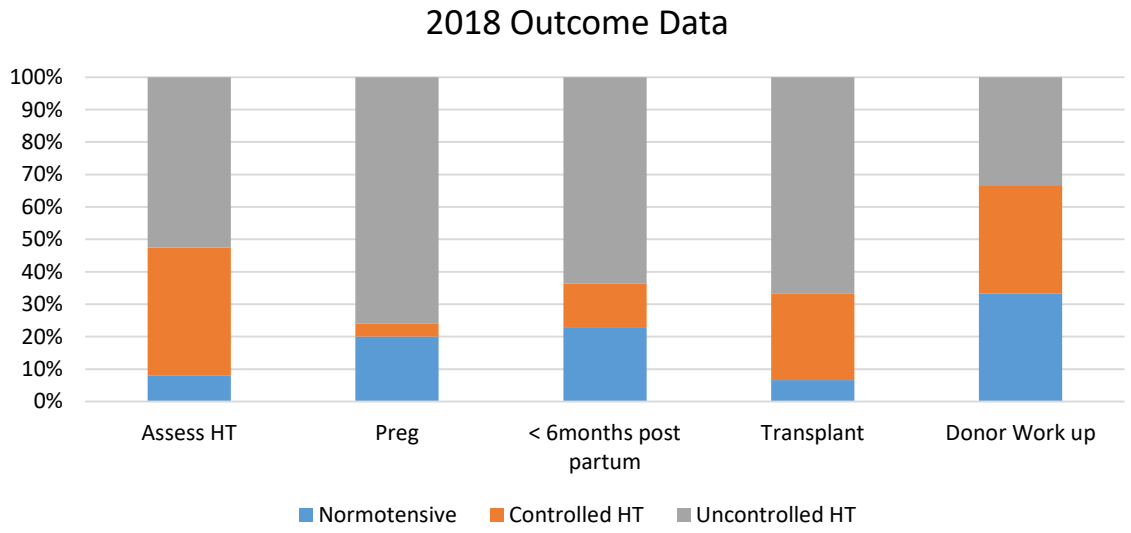
Twenty four hour BP monitoring

2018 saw an increase in the demand of monitors from four hundred and thirty two in 2017 to four hundred and eighty in 2018. In 2018 one hundred and thirty five studies were for research purposes and fifteen studies were unsuccessful. The remaining three hundred and thirty were for clinical purposes. Fifty four home monitor checks were also completed during 2018 compared to forty eight in 2017.









Renal Denervation Program

This remains "dormant" until new studies demonstrate benefit. We continue to follow up the 15 patients denervated here at STGH in accordance with the International Registry.

12. Hypertension in Pregnancy

Franziska Pettit and Jennifer Beddoe

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

Activity

- In 2018 there were 2307 pregnancies at St George Hospital down from 2435 in 2017. 198 (9%) of these were complicated by a hypertensive disorder. 12 of these were twin pregnancies & 3 were women who presented with a hypertensive disorder within 2 weeks of delivery, and were not included in this analysis.
- Of the 183 singleton pregnancies 153 (84%) were consulted to the renal team. The remaining 30 were managed by the obstetric team.
- There were no episodes of pulmonary oedema, dialysis or maternal deaths here at St George in 2018.
- One neonatal death occurred at 10hrs of age. Baby was born at 24+6/40 with a neural tube defect. Mother had Essential hypertension.
- One pregnancy was terminated at 17/40 due to renal disease with super imposed severe Preeclampsia.
- While the number of women seen in Day Assessment Unit (DAU) fell slightly, the number of women seen in Obstetric Medicine (OMC) continues to rise.

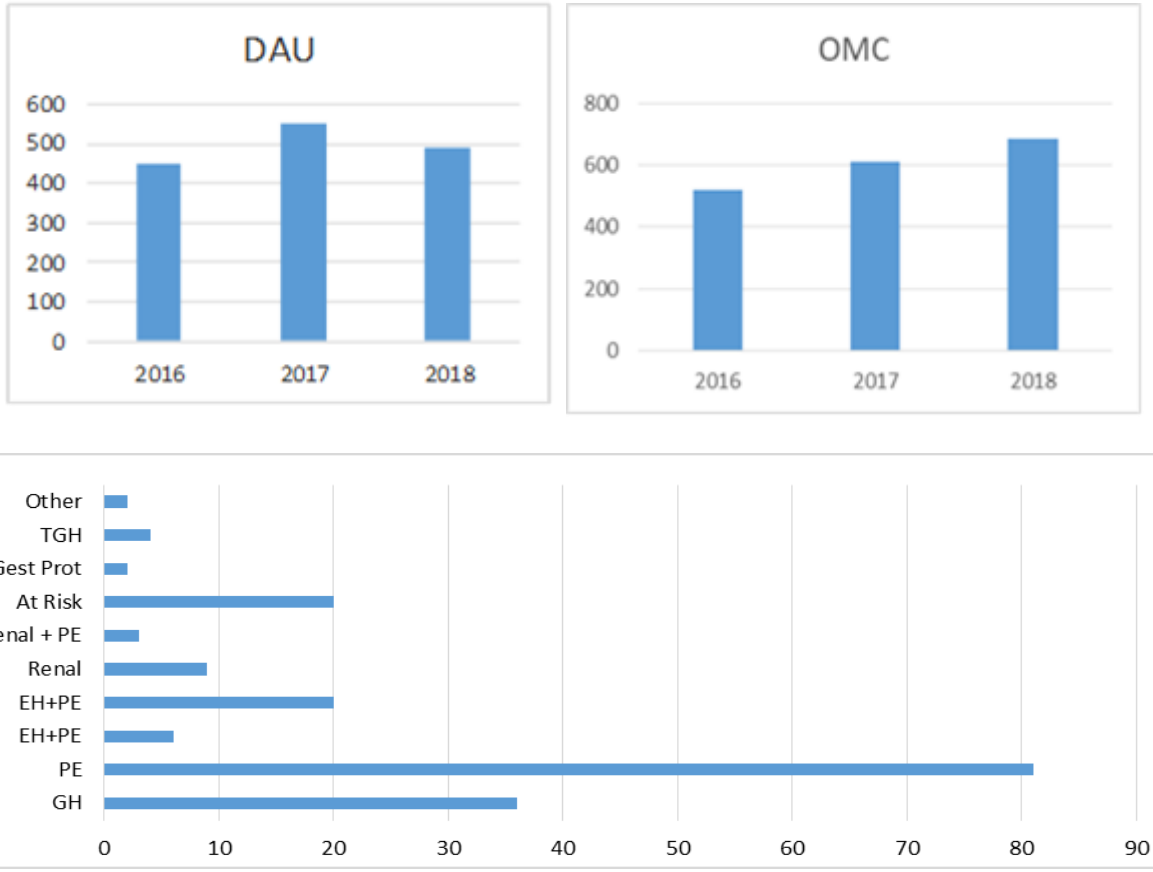


Figure 63. Diagnosis of women with Singleton Pregnancies in 2018

GH=Gestational Hypertension; PE=Preeclampsia; EH+PE=Essential hypertension + Preeclampsia; EH= Essential hypertension; TGH=Transient gestational hypertension; Gest Prot=Gestational proteinuria

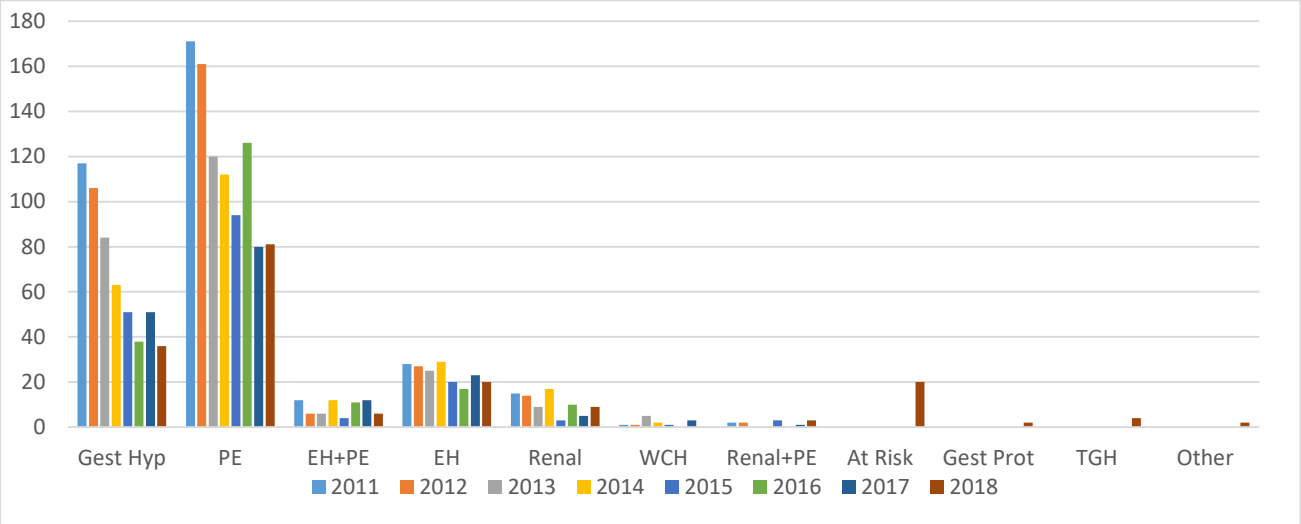


Figure 64. Diagnosis of women with singleton pregnancies 2011-2018

	No	Severe HT	Neuro	AntiC	Eclampsia	Liver	Renal	Platelets<150	SGA<10	NICU	PNM	CS	ICU
Gest Hyp	36	10 (28%)	-	-	-	1 (3%)	-	-	4 (11%)	-	-	17 (47%)	-
PE	81	35 (43%)	8 (10%)	9 (11%)	-	19 (23%)	5 (6%)	9 (11%)	19 (23%)	7 (9%)	-	41 (51%)	10 (12%)
EH+PE	6	5 (83%)	-	-	-	2 (33%)	-	-	3 (50%)	-	-	5 (83%)	-
EH	20	-	-	-	-	-	-	-	2 (10%)	-	1 (5%)	12 (60%)	-
Renal	9	1 (11%)	-	-	-	-	2 (22%)	1 (11%)	-	-	-	4 (44%)	-
Renal + PE	3	2 (67%)	-	-	-	1 (33%)	3 (100%)	1 (33%)	-	1 (33%)	1 (33%)	1 (33%)	-
At Risk	20	-	-	-	-	1 (5%)	-	-	-	1 (5%)	-	11 (55%)	-
Gest Prot	2	-	-	-	-	-	-	1 (50%)	-	-	-	1 (50%)	-
TGH	4	-	-	-	-	-	-	-	1 (25%)	-	-	1 (25%)	-
Other	2	-	-	-	-	1 (50%)	-	-	-	-	-	2 (100%)	1 (50%)
Grand Total	**183**	**53 (29%)**	**0**	**9 (5%)**	**0**	**25 (14%)**	**0**	**12 (7%)**	**29 (16%)**	**9 (5%)**	**2 (1%)**	**95 (52%)**	**11 (6%)**

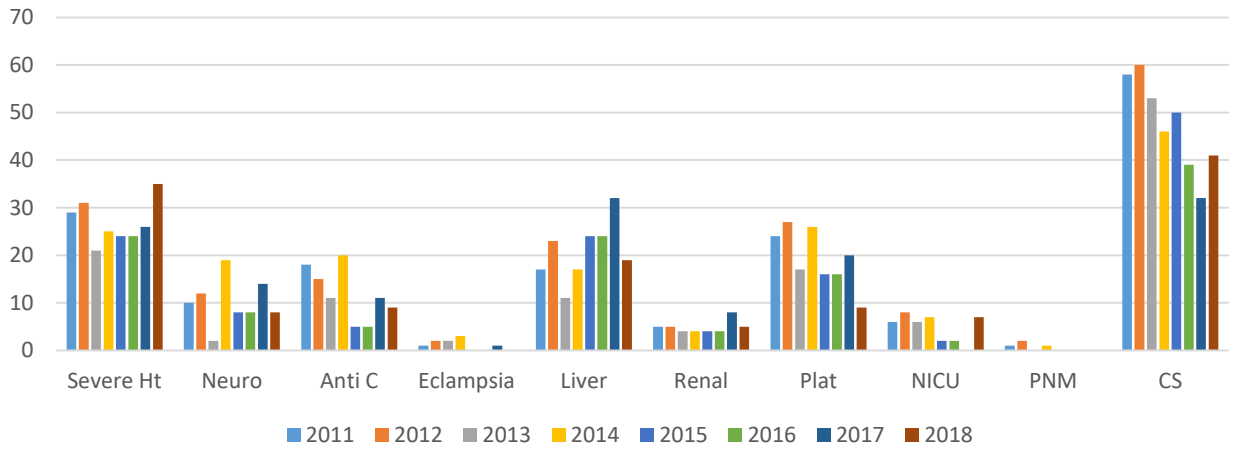


Figure 65. Outcomes of PE for singleton pregnancies 2011-2018

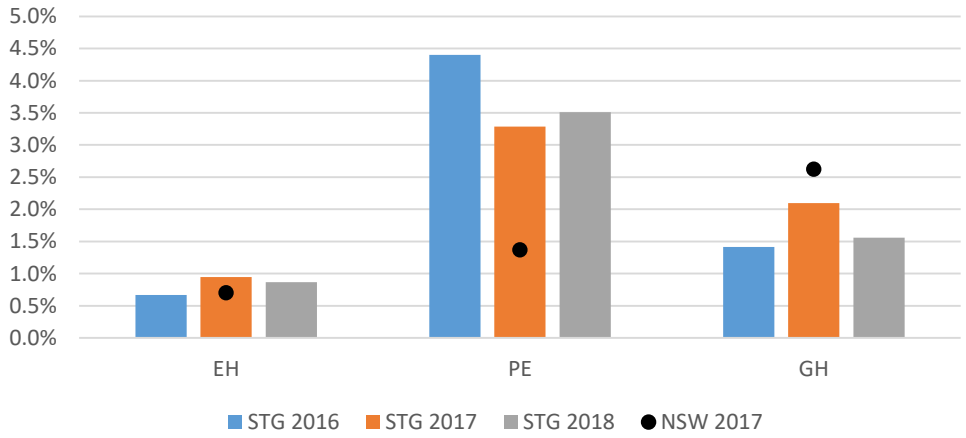


Figure 66. Comparison of all pregnancies at St George Hospital, 2018, complicated by PE, GH or EH against NSW health data, 2017.

Conclusions

- There was a further small decline in the number of pregnancies at St George in 2018 but the percentage complicated by a hypertensive disorder remained the same at 9%

13. St George Renal Biopsy Review – Audit of Complications

Partha Shanmugasundaram

	Total	Transplant biopsies
Number	127	52
Total complications	5(3.9%)	1 (1.9%)
Macroscopic haematuria	4(3.1%)	None
Symptomatic Perinephric haematoma	1(0.8%)	None
Transfusion	None	None

Comparison of total complication rates from previous years

	2011	2012	2013	2014	2015	2016	2017	2018
Total Number	109	86	118	123	98	134	126	127
Complication rate	10%	7.2%	5.1%	6.5%	12.2%	5.2%	7.1%	3.9%

Comparison of specific complication rates expressed as percentage (number)

Year N	2014 N=123	2015 N=98	2016 N=134	2017 N=126	2018 N=127	Last 5 years N=599
Total complications	6.5(8)	12.2(12)	5.2(7)	7.1(9)	3.9(5)	7(42)
Macroscopic Haematuria, %(n)	6.5(8)	9.2(9)	3(4)	2.3(3)	3.1(4)	4.7(28)
Perinephric Haematoma, %(n)	0.8(1)	3.1(3)	1.5(2)	3.2(4)	0.8(1)	2(12)
Perinephric bleed – angioebolisation, %(n)	0(0)	0(0)	0(0)	0(0)	0(0)	0(0)
Required blood transfusion	0(0)	6.1(5)	0(0)	0(0)	0(0)	1(6)

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 all complications over the last 5 years was 6.5%. The benchmarks for all the above three parameters were met in 2018 as was with the last 3 years.

14. Nutrition Services

Maria Chan, Su Bahceci and Jessica Young (TSH), Renal Dietitians

Dietitian activity in patient care (SGH):

Occasion of service (occ)	2017		2018	
	new	total	new	total
Inpatient (wards and 4W day-stay HDx)	224	772	149	654
Outpatient (CKD, Home Dx–HD & PD, TP)	117	413	115	257
Total (in- and outpatient)	341	**1185**	264	**911**

Comment:

- Total occasion of services was decreased in 2018 due to (1) delay in recruitment for dietetic service causing reduced intervention, esp. follow-up for outpatients and day-stay haemodialysis, (2) "blanket referral" for inpatient was abolished as per new Nutrition and Dietetics Dept. policy implemented in December 2017, and (3) a much lower number of patients commencing haemodialysis in 2018 vs 2017 (home HDx 2 vs. 10 and 4W HDx 20 vs 72)

Service type, St. George Hospital:

2018		Non-dialysis dependent CKD	RRT				Total	Current Staffing (FTE)
			Home HD	In-centre HD	PD	TP		
Outpatient/day-stay patient	New	111 = 91 (pre-dialysis assessment clinic) + ~25 (direct referral to Renal nutrition Clinic, Dept. of Nutrition & Dietetics)	2	20	21	19	173	1.0
	* Total at any time point	~165	29	119	43	236	600	
	Short term & *ad hoc* intervention (e.g., stones, HT)	~15					15	
Inpatient (new admissions)							Data not collected	0.6

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

- Current dietitian for non-admitted (outpatient) + day stay HDx, dietitian: patient ratio – 1:600 (MC) or ~ 1.0 FTE at SGH for the estimated clinical load of ~ 3.0 FTE dietitian according to the Dietitians Association Renal Dietitians Workforce Recommendation: \\sesahs\chn\STG\Renal RISCDOC\Nutrition and Dietetics\Resources\Renal-Dietitians-Workforce-Recommendations 2018.pdf
- There was a large discrepancy of the calculated staffing level required for out- and day-stay patient services from 2017 (4.0 FTE) to 2018 (3.0 FTE) partly due to the much lower number of patient commenced Haemodialysis in 2018

Comments: Dietitian staffing level continues to be inadequate to allow best practice to be implemented

Chronic Kidney Disease (non-dialysis dependent):

- **Pre-Dialysis assessment clinic**

Nutrition characteristics of patient attending the pre-dialysis assessment clinic

Parameter	2018
Number	n=42/91* (new) 46.1 % seen by dietitian
Malnutrition, mildly – moderately and severely, SGA B &C (%)	37.7

* Total number of new patients seen by CNC was 91.
49/91 patients were not counted due patients were seen by CNC as inpatients, or expecting to start dialysis within a month, or dietitian n/a for clinic.

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	2018
Number	176	324	49	56	69	**42***
Age (yr)	65.2±13.8	66.4±15.2	66.8±15.9	65.7±14.5	66.0±13.3	**n/a**
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	**16**
Malnutrition, SGA B &C (%)	39.7	42.0	36.5	35.7	49.3	**37.7**

Comments:

- > 95% of patients did not receive nutrition intervention for CKD prior to the clinic
- Prevalence of malnutrition continued to be high, ~ 37.7% in 2018

Recommendation:

- Early referral to dietitians is recommended, preferably prior to needing to attend pre-dialysis assessment clinic to prevent malnutrition and onset of symptoms, as well as managing 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. Table 5 indicated results of routine review

6 monthly Nutrition review for HD

2018	SGH		TSH	
	April	October	April	October
Total number of patient in the unit during review period	~120	~110	n/a	47
No. of patient assessed n & (% compliance)	108 (90.0%)	42* (38.2%)	37	40 (85%)
Prevalence of Malnutrition % (SGA score B and C)	43.5	50	n/a	30

* 42% (low) compliance due to short dietetic staff level

Comments:

- Prevalence of malnutrition is high. Nutritional support was offered to these patients and majority of them responded to nutritional support.

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):***

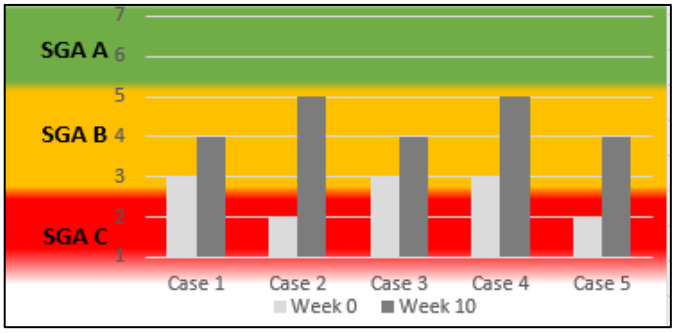
We re-visited the use of supplemental Intra-dialytic Parenteral Nutrition (IDPN) to meet nutritional requirements of malnourished patients since 2017

A literature search was conducted, and protocol was evaluated. Results of a case series from 5 patients indicate:

Change of nutritional parameters in patients receiving IDPN

Case no.	Weight %	BMI %	Albumin %	Pre-dialysis Urea %	HGS %	Oral caloric intake%	Total caloric intake%	Oral protein intake%	Total protein intake%
1	-2.4	-2.4	16.0	94.9	16	0	27	0	31
2	7.9	7.9	18.5	18.7	13.8	30	83	33	88
3	9.7	9.2	10.0	26.1	-16.5	20	81	40	140
4	4.9	5.3	10.7	0.2	15.0	25	100	14	85
5	1.6	1.7	26.1	71.8	3.5	64	118	27	73
Total % change	**4.3%**	**4.3%**	**16.3%**	**42.3%**	**6.4%**	**27.8%**	**81.8%**	**22.8%**	**83.4%**

Change of Subjective Global Assessment (SGA) score pre and post 10 weeks of intervention:



SGA A= well nourished
SGA B = mildly to moderately malnourished
SGA C = severely malnourished

Comments:

- This study clearly measured and monitored all aspects of nutrition support, both parenteral and oral, extending beyond current literature
- Our study demonstrated an improvement in all nutritional outcomes for malnourished HD patients receiving supplemental IDPN in conjunction with oral nutrition support
- Spontaneous oral intake improved after commencing IDPN and therefore IDPN did not increase satiety yet had positive effects on appetite
- This case series therefore justify the usefulness and effectiveness of IDPN. Results have been presented at local and international congresses e.g. ANZSN ASM, AuSPEN

Recommendation:

- Finalise and establish protocols for the use of IDPN at SGH.
- Publish a case series report.

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. Data collected for nutrition intervention vs. no intervention e.g. time to initiation of dialysis, change of nutritional status etc.
- Development of eHealth e.g. using SKYPE to improve follow-up.

Publications and invited lectures:

- Please see Research Report for details. These included there invited lectures, one peer reviewed publications and 6 conference abstracts and oral /poster presentations.

Visiting dietitian/shadowing:

- Three renal dietitians from Hong Kong and one from Singapore received stipend from their Ministry of Health to up-skill their renal nutrition practice for two weeks in 2018. Honorarium was provided to SGH.

Education/consultation (provision of):

- Maria continues to be on steering committee on the Council of Renal Nutrition, NKF USA to develop international renal specialist dietitians training –GRICD (*Global Renal Internet Course for Dietitians*).

Multidisciplinary team (MDT) case conference:

- Needs and feasibility assessment were performed and submitted to Pof. Mangos and team for consideration

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 develop and implement more cost effective renal nutrition management strategies, including better referral and follow-up strategies to achieve structured care for all pathways.

Appendix 1- HD

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.

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.

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.

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 39% similar to 2016 ANZDATA (40%). 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 64%. 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 (43%) continue to have iPTH levels <20pmol/L. Parathyroid hormone levels are not reported in ANZDATA.

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. 70% versus 57%. 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.

Serum Phosphate targets

Target serum phosphate 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.

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.

Diabetes Control measured by HbA1c

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.