



كمنتريِن كصِحتِن

KEMENTERIAN KESIHATAN  
MINISTRY OF HEALTH  
NEGARA BRUNEI DARUSSALAM

# BDTR

BRUNEI DIALYSIS & TRANSPLANT REGISTRY

11<sup>TH</sup> EDITION 2021



*A Transplant Surgeon holding a fresh new transplant kidney and an old, diseased kidney  
Picture drawn by: Mr. Chua Hock Beng*



TO PROMULGATE KIDNEY DISEASE  
AWARENESS, ESTABLISH WORLD-CLASS  
SERVICES AND ENHANCE PATIENTS'  
QUALITY OF LIFE.

# **FOREWORD**



2021 has been an eventful pandemic year that has caused major disruptions to the health services and given immeasurable grief to the population. The department is still grappling with the repercussions of the pandemic and establishing norms through the reorganization of defragmented services. The endemicity of COVID-19 may have provided much needed respite to the healthcare community, but will continue to serve as a stark reminder of our vulnerability in the face of future resurgence.

Amongst the important policy changes that were endorsed during the pandemic were the introduction of twice weekly haemodialysis (HD) and the proliferation of Peritoneal Dialysis (PD) preference policy. Short-term twice weekly HD was deemed necessary during the second wave of the pandemic (August to October 2021) to enable preparedness efforts from the Department and to enhance patients' safety during the curfew phase imposed by the government. These efforts have minimized the expected mortality rates from COVID-19 infections through reducing non-essential contacts with patients and staff, whilst enabling the department to focus on essential preventative strategies like mass vaccinations of the kidney failure population and bolstering fire-fighting pandemic services in isolation facilities across the country.

The silver lining from the aftermath of the second wave of the pandemic has been the record number of new PD recruits in 2021, propelling national PD penetration to a record-high of 13%. The main objective of the PD initiative was to expedite PD tube insertions (despite closure of operating theatres for elective operations in RIPAS Hospital), in an attempt to reduce reliance on HD and to keep patients safe at home during the pandemic. Over the course of two months, nearly 40 PD tube insertion operations were performed through the co-operation of nephrologists, surgeons, anaesthetists and nursing staff from RIPAS Hospital, Jerudong Park Medical Centre and Department of Renal Services.

Amidst the chaos inflicted by the pandemic, we have been able to notch another important milestone in our department history through the inauguration of the first privatized Dialysis Centre in the country, Jerudong Park Renal Dialysis Unit (JRDU). The commencement of services in JRDU has serendipitously coincided with the period when Dialysis isolation centres were needed to mitigate contagion of infection, which enabled the department to broaden options for containment strategies. It is hoped that the success of this centre can paved the way for future departmental collaborations with private-public-partnership enterprises, not just for HD services but other aspects of nephrology care.

Growth can only come from chaos, not order. Through these emergency changes and upheaval, the department has learnt valuable lessons through the regrouping of priorities, which can hopefully serve the department in good stead for future emergency situations in the country. Lastly, I will like to extend my well wishes and gratitude to all the healthcare personnel in the department who have made tremendous sacrifice to commit and contribute to our services during this difficult time.

May you all receive the blessings that you deserve for the selfless acts of services to our community.

***Professor Dr Jackson Tan***

***Chief of Clinical Specialist Services (Renal)  
Ministry of Health  
Brunei Darussalam***

# TABLE OF CONTENTS

Chapter 1	Background	Page 6
Chapter 2	Methodology and Population <i>2.1 Methodology</i> <i>2.2 ESKF Registry population</i>	Page 7-8
Chapter 3	Prevalence and Incidence trends (2011-2020) <i>Table 1 Total number of kidney replacement therapy (KRT) patients from 2012 to 2021</i> <i>Figure 1 Ten-year bar chart trend of KRT in Brunei</i> <i>Table 2 Prevalence and incidence of KRT(2012-2020)</i> <i>Figure 2 Bar chart showing ten-year trend of prevalence and incidence (2012-2021)</i>	Page 9-11
Chapter 4	Incidence <i>Figure 3 Monthly incidence of new patients and deaths in 2021</i> <i>Table 3 Aetiology of incident ESKF</i> <i>Table 4 Demographics of incident patients in 2021</i>	Page 12-15
Chapter 5	Demographics <i>Table 5 Distribution of patients by Dialysis Centres and KRT modalities</i>	Page 16-17
Chapter 6	Mortality <i>Table 6 Ten-year trend of total number of deaths in Dialysis Centres and across Dialysis modalities</i> <i>Table 7 Mortality percentage of all centres and modalities (number of deaths in centre / total number of patients + deaths in centre)</i> <i>Table 8 Demographics of patients who died in 2021</i> <i>Figure 4 Monthly deaths of ESKF patients in 2021</i> <i>Figure 5 % of deaths by KRT modality (2012-2021)</i>	Page 18-21

# TABLE OF CONTENTS

Chapter 7	Anaemia	Page 22-23
	<i>Table 9 Serum haemoglobin levels across different HD centres and Dialysis modalities</i>	
	<i>Table 10 Serum haemoglobin levels of KRT patients from 2012 to 2021</i>	
Chapter 8	Mineral Bone Disease	Page 24-27
	<i>Table 11 Serum phosphate levels across all HD centres and Dialysis modalities</i>	
	<i>Table 12 Serum phosphate levels of KRT patients from 2012 to 2021</i>	
	<i>Table 13 Serum PTH levels across all HD centres and Dialysis modalities</i>	
	<i>Table 14 Serum PTH levels of KRT patients from 2012 to 2021</i>	
	<i>Table 15 Serum calcium levels across all HD centres and Dialysis modalities</i>	
	<i>Table 16 Serum calcium levels of KRT patients from 2012 to 2021</i>	
Chapter 9	Hepatitis B and Hepatitis C in HD Patients	Page 28
Chapter 10	Systolic and Diastolic Blood Pressure	Page 29-32
	<i>Table 17 Dialysis adequacy across all HD centres and Dialysis modalities</i>	
	<i>Table 18 Dialysis adequacy and HD blood flow rates from 2012 to 2021</i>	
	<i>Table 19 HD blood flow rates across all HD centres</i>	
	<i>Table 20 % of HD patients with AVF in all HD centres</i>	
	<i>Figure 6 % of HD patients with AVF from 2012-2021</i>	

# TABLE OF CONTENTS

Chapter 11	Systolic and Diastolic Blood Pressure	Page 33-35
	<i>Table 21 Systolic Blood Pressure (SBP) across all HD centres and Dialysis modalities</i>	
	<i>Table 22 Diastolic Blood Pressure (DBP) across all HD centres and Dialysis modalities</i>	
	<i>Table 23 SBP and DBP of all patients from 2012 to 2021</i>	
Conclusion		Page 36-38
References	Appendix 1-3 <i>Brunei Dialysis &amp; Transplant Registry Form</i>	Page 39-41
Editorial Committee and Members		Page 42-44
Acknowledgements		Page 45
Notes		Page 46-47



# CHAPTER 1

## Background



The Brunei Dialysis and Transplant Registry (BDTR) collates data from all the Dialysis centres to improve the care of patients with kidney disease in the country. Established by the Department of Renal Services in 2011, the BDTR was originally limited to patients on kidney replacement therapy (KRT); but recent renditions of the registry have expanded data collection to include cases of non-Dialysis CKD in the adult and paediatric population, and administrative information. Historically, the BDTR was initiated under the auspices and guidance of the Malaysian Dialysis and Transplant Registry team and many of the data collecting, formatting and reporting details were replicated from their set-up. However, the BDTR became an independent entity in 2014 and has evolved to adapt and cater for local needs.

The BDTR enables an organized and standardized method to systematically collect observational data and can be used to describe the natural history, epidemiology and disease burden in the country. End Stage Kidney Failure (ESKF) and its associated morbidities result in substantial socio-economic burden to the country, which require meticulous planning of budget in order to provide the necessary healthcare resources. Most importantly, data from the BDTR can be used to benchmark the quality and standards of the services against those with established registries; allowing alignment with best practices from other countries.

The main motivation and impetus behind the establishment of a national registry remains unchanged since inception. The objectives are described below:

1. To describe the state of CKD in the country
2. To determine the disease burden attributable to ESKF
3. To determine factors influencing the outcomes of RRT
4. To evaluate the KRT program and benchmark against other practices
5. To stimulate and facilitate research on KRT and ESKF

# CHAPTER 2

## Methodology and Population



### **2.1 Methodology**

The research methodology is through primary data collection of a prospective multicentre cohort, designed to collect efficient and accurate information from ESKD patients undergoing treatment in participating Dialysis centres and hospitals.

As in previous years, the format of collection remains the same with each Dialysis centres contributing quarterly pre-determined blood parameters through their respective registry focal person, who will organize and validate the data for submission to the central registry office. Baseline demographic data of patients were usually established upon entry into KRT program by the admission team in the parent hospital. Future outcomes of patients including transfer to new centres, transfer to different modalities, deaths and loss to follow up were recorded and submitted on a monthly basis through pre-designed proformas to the registry office. In addition, information from the transplant and clinic cohorts are provided by the transplant and clinic coordinators at the same pre-determined times and stages.

The participating centres are as follow:

1. Rimba Dialysis Centre, Brunei-Muara District
2. Renal Dialysis Unit RIPAS Hospital, Brunei-Muara District
3. Kiarong Dialysis Centre, Brunei-Muara District
4. Jerudong Park Medical Centre Renal Dialysis Unit, Brunei-Muara District
5. Kuala Belait Dialysis Centre, Belait District
6. Tutong Dialysis Centre, Tutong District
7. Renal Dialysis Unit Pengiran Isteri Hajjah Mariam Hospital, Temburong District
8. Peritoneal Dialysis Unit, Rimba Dialysis Centre, Brunei Muara District
9. Brunei Renal Transplant Unit, Rimba Dialysis Centre, Brunei-Muara District

## **2.2 ESKF REGISTRY POPULATION**

### **INCLUSION CRITERIA**

The Registry population comprised of all ESKF patients treated at MOH facilities in Brunei Darussalam. This population covered all ESKF patients in Brunei as there was currently no other Dialysis provider in the country.

Non-Brunei citizens and residents who dialysed permanently in Brunei or had a functioning transplant grafts under long term follow up in Brunei were also included in the registry.

### **EXCLUSION CRITERIA**

- A. Patients who underwent temporary acute hemodialysis (less than 2 weeks) are not included in the registry
- B. Patients who died within 2 weeks of starting KRT
- C. Foreign Nationals who had short-term (less than 4 weeks) KRT in Brunei
- D. Foreign Nationals who had short-term renal transplant follow up in Brunei
- E. Intensive Care patients who required slow low efficiency Dialysis (SLED), continuous veno-venohaemofiltration (CVVHF), continuous veno-veno hemodiafiltration (CVVHDF) or single pass albumin Dialysis (SPAD)
- F. Patients who had KRT in private institutions (not applicable in this cohort)

# CHAPTER 3

## Prevalence and Incidence trends (2011-2020)



The treated point prevalence of ESKF on 31/12/2021 was 2077 per million population (pmp), which corresponded to 893 patients. The 1.3% annual increment rate was modest compared to the 12.1% increment recorded in the preceding years, likely as a result of higher-than-average death rates from the pandemic. The treated annual incidence rate of ESKF was 506 pmp, which corresponded to 218 new patients. Consistent with previous annual trends, the prevalence and incidence rates of ESKF in the country continue to increase year-on-year over the past decade. To enable comparison with international registries and studies, ESKF patients who were dialysed for less than 3 months were not eligible to be included as incident patients.

One noticeable change in pattern has been the increase in Peritoneal Dialysis (PD) patients, as a result of the PD initiative instigated during the pandemic. There is a 41% increase in PD patients (81 to 114) in 2021, compared to a 3% decline (752 to 732) in HD numbers. HD, PD and transplant accounted for 82%, 13% and 5% of the ESKF population respectively in 2021.

**Table 1-Total number of kidney replacement therapy (KRT) patients from 2012 to 2021**

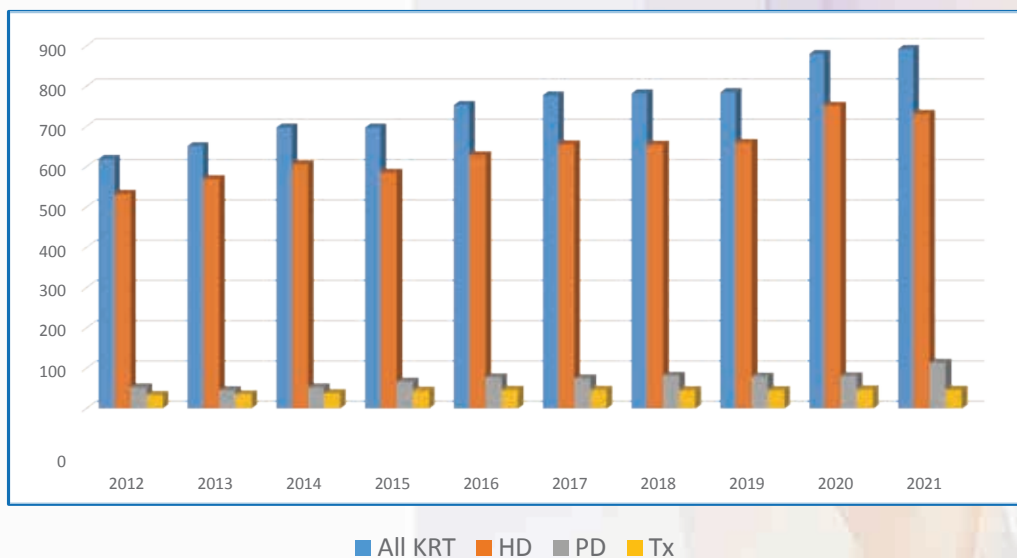
Year	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021
All	620	652	698	698	754	778	783	786	881	893
HD	533	570	606	586	629	656	655	660	752	732
PD	53	46	53	67	78	75	82	80	81	114
TX	34	36	39	45	47	47	46	46	48	47

LEGEND: HD - Hemodialysis

PD - Peritoneal Dialysis

TX - Transplant

**Figure 1 - Ten-year bar chart trend of KRT in Brunei**

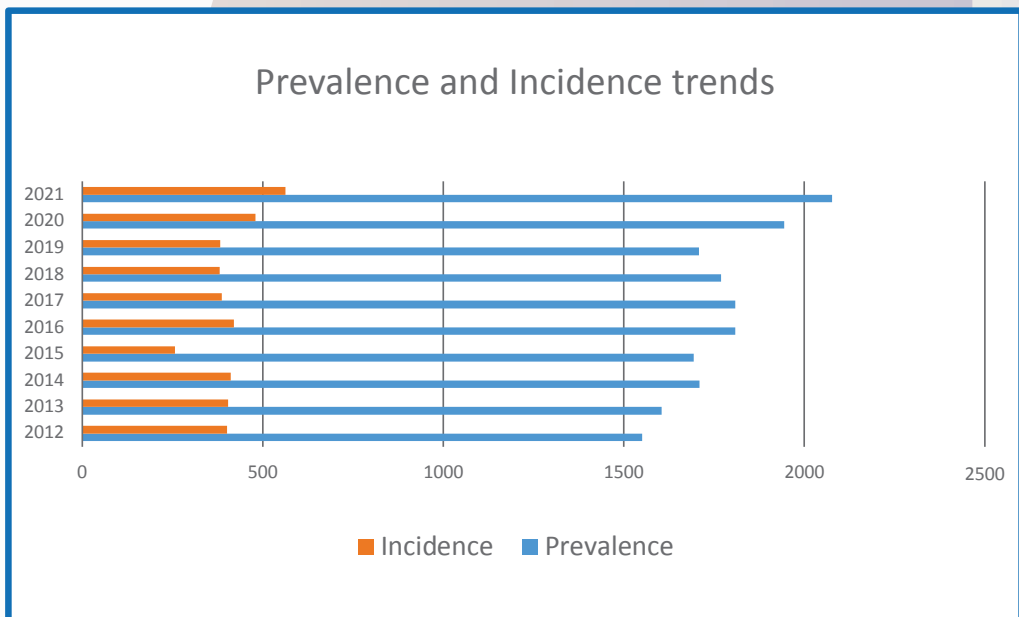


**Table 2- Prevalence and incidence of KRT (2012-2020)**

Year	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021
<b>KRT prevalent population</b>	620	652	698	698	754	778	783	786	881	893
<b>KRT incident population</b>	160	164	168	105	175	166	168	176	217	218
<b>National population (1,000)</b>	400	406	408	412	417	430	442	460	453	430
<b>Prevalence ppm</b>	1550	1605	1710	1694	1808	1809	1769	1708	1944	2077
<b>Incidence ppm</b>	401	404	411	256	420	387	380	382	479*	506*



**Figure 2 – Bar chart showing ten-year trend of prevalence and incidence (2012-2021)**





# CHAPTER 4

## *Incidence*



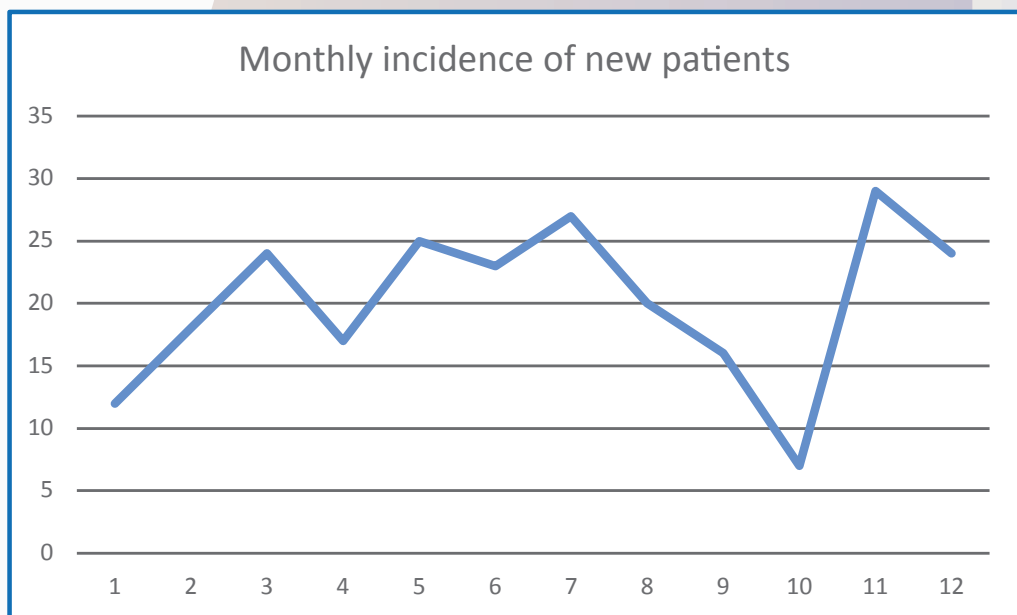
A total of 244 patients fulfilled the registry criteria for commencing Dialysis, for at least 2 weeks, in 2021. Of the 244 patients, 25 were excluded from the incidence calculation because they were on Dialysis for less than 3 months. There was an unusual sharp dip in incidence in October 2021, which coincided with the second wave (delta variant) of the COVID-19 pandemic.

The mean and median age of Dialysis start were  $55.58 \pm 13.93$  and 57 years respectively, with a male preponderance (57%). The majority (85%) of new patients were initiated in RIPAS Hospital, with the remainder in Suri Seri Begawan Hospital. 11 patients were started directly on PD.

Diabetes Mellitus remained the most common cause of ESKF, accounting for up to 73% of all cases of incident patients. As most patients would not have renal biopsies to confirm the exact renal pathology, the diagnosis of Diabetic Kidney Disease was based on ICD-10 coding by clinical staff. The incident % was similar to the results from the past 3 years (76-79%). Glomerulonephritis (12%) and Hypertension (9%) were the second and third most common causes of kidney disease.



**Figure 3 – Monthly incidence of new patients and deaths in 2021**





**Table 3 - Aetiology of incident ESKF**

Incident		2021	2020	2019	2018
All		244	229	176	130
Data Recorded		244 (100%)	229 (100%)	176 (100%)	130(100%)
Diabetes Mellitus		177 (73%)	180(79%)	134 (76%)	100 (77%)
Hypertension		22 (9%)	18 (8%)	16 (9%)	16(12%)
Glomerulonephritis	All	29 (12%)	21 (9%)	14 (8%)	12 (9%)
	FSGS	3 (1%)	10 (4%)	4 (3%)	3 (2%)
	IgAN	4 (2%)	1 (0%)	1 (1%)	0
	MPGN	0	2 (1%)	0	0
	IgMN	0	0	1 (1%)	0
	MN	3 (1%)	0	0	1 (1%)
	Others	1 (0%)	0 (0%)	1 (1%)	0
	Unspecified	0	8 (3%)	7 (4%)	9 (7%)
Interstitial Nephritis		1 (0%)	0 (0%)	3 (2%)	0
Obstructive		4 (2%)	4 (2%)	2 (1%)	0
SLE		1 (0%)	2 (1%)	1 (1%)	0
APKD		1 (0%)	0	0	1 (1%)
Others		1 (0%)	2 (1%)	4 (3%)	0
Unknown		3 (1%)	2 (1%)	2 (1%)	1 (1%)



**Table 4 – Demographics of incident patients in 2021**

		<b>N (%)</b>
<b>All</b>	–	244
<b>Mean Age (years)</b>	55.58 ± 13.93	–
<b>Median Age (years)</b>	57	–
<b>Gender</b>	Male	139 (57%)
	Female	105 (43%)
<b>Race</b>	Malay	220 (90%)
	Chinese	13 (5%)
	Indigenous	7 (3%)
	Foreigners	4 (2%)
<b>Hospital</b>	RIPAS Hospital	208 (85%)
	Suri Seri Begawan Hospital	36 (15%)
<b>Initial KRT Modality</b>	Haemodialysis	233 (95%)
	Peritoneal Dialysis	11 (5%)

# CHAPTER 5

## *Demographics*



During the second wave of the pandemic (September to October 2021), HD patients have been moved constantly to different Dialysis centres in the country. This was dictated by the COVID-19 infection status of patients and the capacity of their parent centres.

As a result, there has been a lot of confusion with the ownership of certain group of patients.

Unfortunately, during the time of data collection, some patients have 'returned' to their parent centres and this has affected the tally across the Dialysis centres.

PD patients have increased, as a result of the PD initiative, reaching a record-high of 114 patients on the 31<sup>st</sup> December 2021. There was minimal transplant activity in the country in 2021, with only one case performed locally and no case being sent abroad. There was also no commercialized foreign transplant case in 2021.

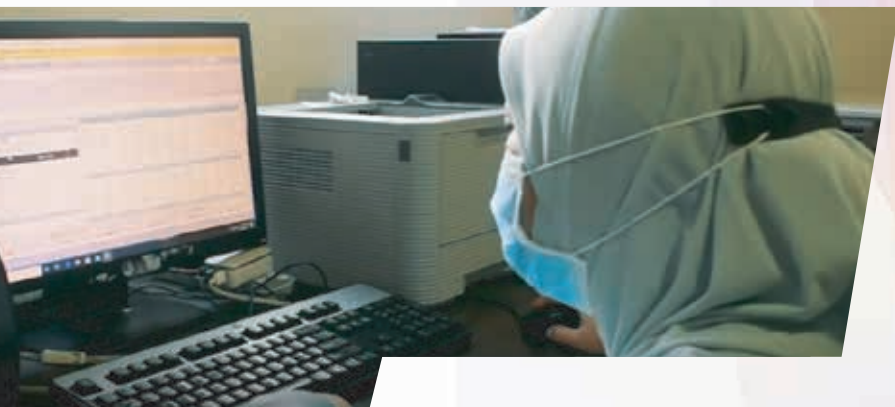


**Table 5 – Distribution of patients by Dialysis Centres and KRT modalities**

Year	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021
Rimba Dialysis Centre	256	240	246	244	263	290	294	292	298	279
Kiarong Dialysis Centre	58	64	60	60	60	58	57	60	64	65
Renal Dialysis Unit RIPASH	70	105	134	112	131	130	119	121	165	119
JPMC Renal Dialysis Unit	NA	NA	NA	NA	NA	NA	NA	NA	NA	45
Tutong Dialysis Centre	27	38	51	60	61	63	62	60	77	76
Kuala Belait Dialysis Centre	93	93	85	83	93	93	98	104	112	121
Temburong Dialysis Unit	29	30	30	27	21	22	25	23	36	27
<b>HD</b>	<b>533</b>	<b>570</b>	<b>606</b>	<b>586</b>	<b>629</b>	<b>656</b>	<b>655</b>	<b>660</b>	<b>752</b>	<b>732</b>
<b>PD</b>	<b>53</b>	<b>46</b>	<b>53</b>	<b>67</b>	<b>78</b>	<b>75</b>	<b>82</b>	<b>80</b>	<b>81</b>	<b>114</b>
<b>Tx</b>	<b>34</b>	<b>36</b>	<b>39</b>	<b>45</b>	<b>47</b>	<b>47</b>	<b>46</b>	<b>46</b>	<b>48</b>	<b>47</b>
<b>All Dialysis</b>	<b>620</b>	<b>652</b>	<b>698</b>	<b>698</b>	<b>754</b>	<b>778</b>	<b>783</b>	<b>786</b>	<b>881</b>	<b>893</b>

# CHAPTER 6

## Mortality



There were 235 deaths in 2021. Many of the deaths had occurred during the second wave of the pandemic (September and October 2021), mostly directly related to COVID-19. It was estimated that between 15-20% of all infected COVID-19 ESKF patients died as a direct consequence of the infection.

The mean and median age of deaths were  $61.55 \pm 11.51$  and 62 years. The most common causes of deaths were sepsis (33%), cardiac (13%) and CVA (9%), but admittedly, it has been difficult to be completely certain about the cause of deaths in the vast majority of patients. COVID-19 infections were directly attributable to 7% of all deaths.

The overall annual death rate of the KRT cohort was 21%. HD patients had a death rate of 23%, whilst PD death rate was 10%. HD death rates were highest amongst patients in RIPAS Hospital (34%) and Temburong (33%). However, these rates must be interpreted with caution as there were poor Dialysis centre's 'ownership' of patients during the second half of the year because of the pandemic.



**Table 6 - Ten-year trend of total number of deaths in Dialysis Centres and across Dialysis modalities**

Year	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021
Rimba Dialysis Centre	21	29	32	37	30	52	56	60	44	63
Kiarong Dialysis Centre	7	2	5	4	2	5	9	10	5	23
Renal Dialysis Unit RIPASH	32	53	47	76	41	36	48	37	38	62
JPMC Renal Dialysis Unit	NA	NA	NA	NA	NA	NA	NA	NA	NA	10
Tutong Dialysis Centre	2	6	2	7	9	12	10	10	13	20
Kuala Belait Dialysis Centre	20	20	26	21	21	29	23	30	28	30
Temburong Dialysis Unit	4	4	6	9	6	4	3	5	2	13
HD	86	114	118	154	109	138	149	152	131	221
PD	10	9	4	3	13	12	9	11	7	13
Tx	2	0	0	1	0	1	1	2	1	1
All Dialysis	98	123	122	158	122	151	159	165	138	235

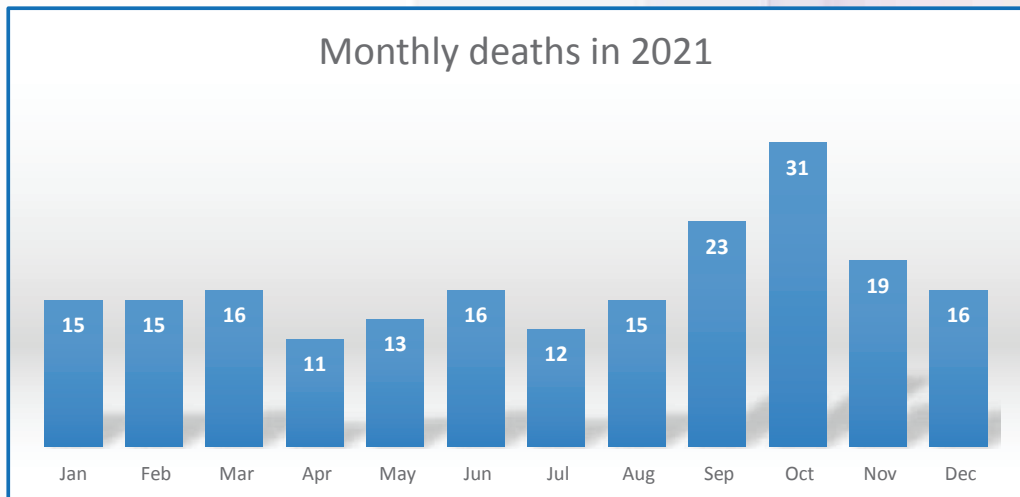
**Table 7 - Mortality percentage of all centres and modalities  
(number of deaths in centre / total number of patients + deaths in centre)**

Year	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021
Rimba Dialysis Centre	8	11	12	13	10	15	16	17	13	18
Kiarong Dialysis Centre	11	3	8	6	3	8	14	14	7	26
Renal Dialysis Unit RIPASH	31	34	26	64	24	22	29	23	19	34
JPMC Renal Dialysis Unit	-	-	-	-	-	-	-	-	-	18
Tutong Dialysis Centre	7	14	4	10	13	16	14	14	14	21
Kuala Belait Dialysis Centre	17	23	23	20	18	24	19	22	20	20
Temburong Dialysis Unit	12	12	17	25	22	15	11	18	5	33
<b>HD</b>	<b>14</b>	<b>17</b>	<b>16</b>	<b>21</b>	<b>15</b>	<b>17</b>	<b>19</b>	<b>19</b>	<b>15</b>	<b>23</b>
<b>PD</b>	<b>16</b>	<b>16</b>	<b>7</b>	<b>4</b>	<b>14</b>	<b>14</b>	<b>10</b>	<b>12</b>	<b>8</b>	<b>10</b>
<b>Tx</b>	<b>5</b>	<b>0</b>	<b>0</b>	<b>2</b>	<b>0</b>	<b>2</b>	<b>2</b>	<b>4</b>	<b>2</b>	<b>2</b>
<b>All Dialysis</b>	<b>14</b>	<b>16</b>	<b>15</b>	<b>18</b>	<b>14</b>	<b>16</b>	<b>17</b>	<b>17</b>	<b>14</b>	<b>21</b>

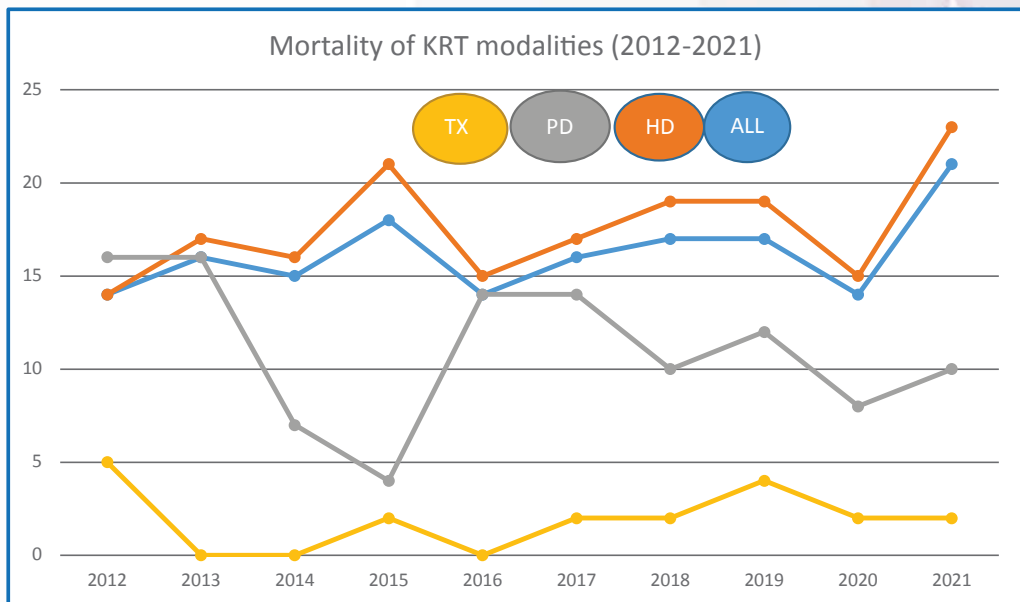
**Table 8 - Demographics of patients who died in 2021**

		<b>Total</b>
<b>All</b>	-	201 (100%)
<b>Mean Age (years)</b>	61.55± 11.51	-
<b>Median Age (years)</b>	62	-
<b>Gender</b>	Male	114 (57%)
	Female	87 (43%)
<b>Cause of deaths</b>	Sepsis	67 (33%)
	Cardiovascular	26 (13%)
	Cerebrovascular	19 (9%)
	COVID-19	17 (8%)
	Others	19 (9%)
	Not specified	50 (25%)
	Malay	174 (87%)
<b>Race</b>	Chinese	17 (8%)
	Indigenous	9 (4%)
	Foreign	1 (0%)

**Figure 4 - Monthly deaths of ESKF patients in 2021**



**Figure 5 - % of deaths by KRT modality (2012-2021)**





# CHAPTER 7

## Anaemia



There was a drop in haemoglobin (Hb) level across all the Dialysis modalities. This is related to the way that the registry has been reported this year. Centres were asked to report their Hb levels with no decimal places.

For example, Hb of 10.1 g/dl or 10.8 g/dl will be reported as 10.0 g/dl. This will have affected the mean Hb level for the year and will invalidate comparisons with previous years.

Nevertheless, most of the centres were still able to record Hb levels within the recommended KDIGO Clinical Practice Guideline target level of 10.0 to 12.9 g/d. PD patients have a slightly higher mean Hb levels compared to HD patients (10.78 vs 10.53).

**Table 9 - Serum haemoglobin levels across different HD centres and Dialysis modalities**

Dialysis Centre	N	% data recorded	Mean (g/dl)	SD	Under 10 g/dl (%)	10.1-12.9 g/dl (%)	Over 13 g/dl (%)
Rimba Dialysis Centre	279	92%	10.54	1.86	31	55	14
Kiarong Dialysis Centre	65	75%	11.43	1.70	12	66	22
Renal Dialysis Unit RIPASH	119	91%	9.25	1.46	63	34	3
JPMC Renal Dialysis Unit	45	100%*	11.05	1.82	27	56	17
Tutong Dialysis Centre	76	100%**	11.05	1.66	18	67	15
Kuala Belait Dialysis Centre	121	100%***	10.67	1.51	23	63	14
Temburong Dialysis Unit	27	93%	10.52	1.76	28	54	18
HD	732	97%	10.53	1.80	31	54	15
PD	114	92%	10.78	1.25	13	74	13
All Dialysis	846	95%	10.56	1.74	29	56	15

\* 63 patients captured    \*\* 84 patients captured    \*\*\* 125 patients captured

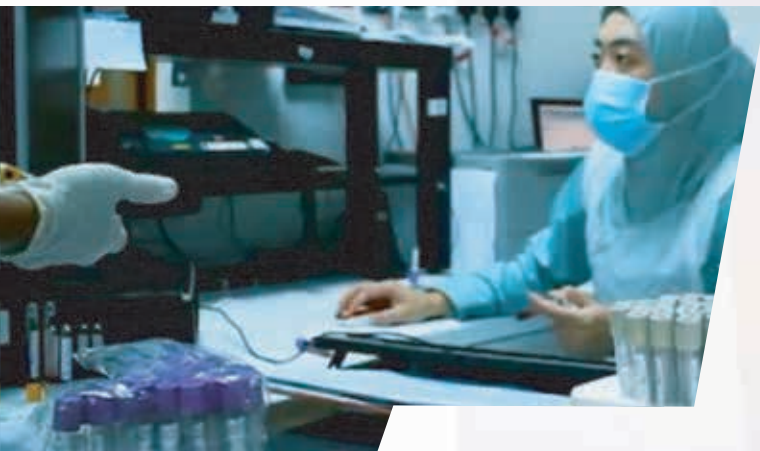
**Table 10 - Serum haemoglobin levels of KRT patients from 2012 to 2021**

Year	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021
Mean Hb	11.78	11.25	10.85	11.18	10.71	10.60	10.80	11.15	11.57	10.56*
% in target range	-	-	-	-	-	-	-	-	57	56

\* All centres report their haemoglobin levels with no decimal place

# CHAPTER 8

## Mineral Bone Disease



There was a good improvement in mean serum phosphate levels in 2021. The mean level of 1.75 mmol/l was the best level achieved in the past ten years. However, only 39% of patients achieving the desired range of 1.13 to 1.78 mmol/l (KDOQI guideline), with HD patients more likely to do so than PD patients (40% vs 35%). RIPAS Hospital, which offers twice weekly HD to new KF patients (presumably with significant residual function), has comparable serum phosphate levels to other centres.

In keeping with previous years, serum parathyroid hormone levels were poor. Only 17% of HD patients and 13% of PD patients were able to achieve KDOQI guideline level of 16.5-33 pmol/l. Due to limited operating theatre slots during the pandemic, many parathyroidectomy surgeries were also delayed and postponed. There is a trend towards increasing PTH levels over the decade.

**Table 11 - Serum phosphate levels across all HD centres and Dialysis modalities**

Dialysis Centre	N	% data recorded	Mean (mmol/l)	SD	Median (mmol/l)	% Between 1.13 to 1.78 mmol/l
Rimba Dialysis Centre	279	96	1.80	0.64	1.72	41
Kiarong Dialysis Centre	65	75	1.76	0.53	1.77	41
Renal Dialysis Unit RIPASH	119	93	1.69	0.66	1.54	39
JPMC Renal Dialysis Unit	45	60	2.05	0.66	1.76	44
Tutong Dialysis Centre	76	100*	1.75	0.62	1.73	33
Kuala Belait Dialysis Centre	121	100*	1.81	0.61	1.75	39
Temburong Dialysis Unit	27	96	1.68	0.49	1.70	35
<b>HD</b>	<b>732</b>	<b>95</b>	<b>1.78</b>	<b>0.63</b>	<b>1.72</b>	<b>40</b>
<b>PD</b>	<b>114</b>	<b>82</b>	<b>1.93</b>	<b>0.70</b>	<b>1.94</b>	<b>35</b>
<b>All Dialysis</b>	<b>846</b>	<b>93</b>	<b>1.80</b>	<b>0.64</b>	<b>1.75</b>	<b>39</b>

\*122 patients captured

\*84 patients captured

**Table 12 - Serum phosphate levels of KRT patients from 2012 to 2021**

Year	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021
Mean Ph	2.11	2.05	1.92	1.94	1.92	1.93	1.79	1.85	1.87	1.75
% in target range	-	-	-	-	-	-	-	-	39	39

**Table 13 – Serum PTH levels across all HD centres and Dialysis modalities**

Dialysis Centre	N	% data recorded	Mean (pmol/L)	SD	Median (pmol/L)	% Between 16.5 to 33 pmol/L*
Rimba Dialysis Centre	279	90	83.76	76.31	60.0	16
Kiarong Dialysis Centre	65	75	76.83	67.67	51.3	16
Renal Dialysis Unit RIPASH	119	69	56.47	51.63	37.5	23
JPMC Renal Dialysis Unit	45	100*	55.36	43.51	45.1	18
Tutong Dialysis Centre	76	100**	73.13	57.88	50.1	26
Kuala Belait Dialysis Centre	121	95	82.02	72.38	54.0	14
Temburong Dialysis Unit	27	93	76.74	50.73	70.8	16
<b>HD</b>	<b>732</b>	<b>91</b>	<b>75.22</b>	<b>71.14</b>	<b>59.0</b>	<b>17</b>
<b>PD</b>	<b>114</b>	<b>77</b>	<b>74.65</b>	<b>61.32</b>	<b>58.0</b>	<b>13</b>
<b>All Dialysis</b>	<b>846</b>	<b>89</b>	<b>75.15</b>	<b>69.85</b>	<b>60</b>	<b>16</b>

\* 62 patients recorded

\*\* 84 patients recorded

**Table 14- Serum PTH levels of KRT patients from 2012 to 2021**

Year	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021
<b>Median PTH</b>	NA	NA	50	47	52	50	40	39	43	59
<b>% in target range</b>	-	-	-	-	-	-	-	-	21	26

**Table 15 - Serum calcium levels across all HD centres and Dialysis modalities**

Dialysis Centre	N	% data recorded	Mean (mmol/l)	SD	Median (mmol/l)	% Between 2.1 to 2.37*
Rimba Dialysis Centre	279	89	2.18	0.25	2.16	43
Kiarong Dialysis Centre	65	72	2.13	0.23	2.13	43
Renal Dialysis Unit RIPASH	119	86	2.20	0.21	2.20	53
JPMC Renal Dialysis Unit	45	60	2.13	0.20	2.14	52
Tutong Dialysis Centre	76	100*	2.19	0.29	2.17	44
Kuala Belait Dialysis Centre	121	99	2.27	0.18	2.28	53
Temburong Dialysis Unit	27	96	2.18	0.20	2.20	62
HD	732	88	2.20	0.25	2.17	46
PD	114	88	2.25	0.39	2.20	49
All Dialysis	846	88	2.21	0.28	2.17	47

\*84 patients recorded

**Table 16 - Serum calcium levels of KRT patients from 2012 to 2021**

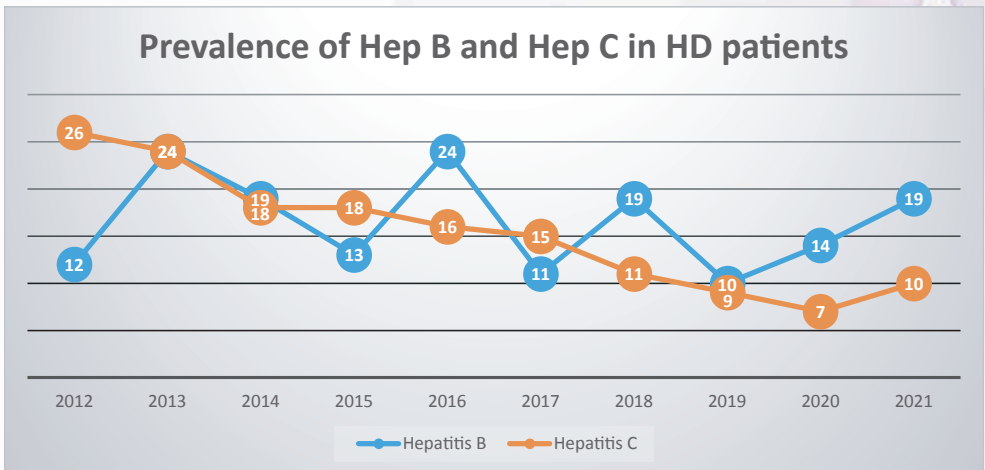
Year	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021
Mean Ca	2.20	2.21	2.19	2.25	2.26	2.26	2.32	2.26	2.19	2.21
% in target range	-	-	-	-	-	-	-	-	49	47

# CHAPTER 9

## Hepatitis B and Hepatitis C in HD patients



The number of Hepatitis B patients have remained constant over the past decade, but hepatitis C patients have decreased. The reduction in Hepatitis C infections is likely to be the results of the wider availability of direct-acting antiviral (DAA) drugs, alongside better infection control measures and blood product safety. Hepatitis patients are currently dialysed in all the dialysis facilities except Kiarong and JRDU.





# CHAPTER 10

## *Dialysis Adequacy, HD Blood flow and HD AVF Rate*



Dialysis adequacy for HD and PD patients were similar to levels in 2020. 45% of HD patients and 56% of PD patients were able to achieve target adequacy levels (URR of 0.7 for HD and  $Kt/V$  of  $> 1.7$  for PD). Mean blood flow for HD patients have continued to improve slightly over the years, with current mean rate of 282 mls / min being the best ever in BDTR records.

Due to the cancellation of elective operations in 2020 and 2021, the AVF % rate has dropped to 59%, the lowest % in BDTR records. As a result, more patients were initiated and maintained on long-term HD through temporary lines which had often resulted in catheter-related blood stream infections. AVF rates were particularly low in Ripas Hospital and Suri Seri Begawan Hospital, which initiated all the new HD patients in the country.



**Table 17 - Dialysis adequacy across all HD centres and Dialysis modalities**

Dialysis Centre	N	% data recorded	Mean URR (HD) or Kt/V (PD)	SD	Median URR (HD) or Kt/V (PD)	% with URR > 0.7 (HD) or Kt/V > 1.7 (PD)
Rimba Dialysis Centre	279	95	0.70	9.63	0.70	49
Kiarong Dialysis Centre	65	75	0.68	9.53	0.67	37
Renal Dialysis Unit RIPASH	119	69	0.57	16.37	0.57	23
JPMC Renal Dialysis Unit	45	60	0.75	7.07	0.73	62
Tutong Dialysis Centre	76	100*	0.73	10.51	0.75	65
Kuala Belait Dialysis Centre	121	100	0.65	11.07	0.66	32
Temburong Dialysis Unit	27	88	0.74	7.45	0.74	75
<b>HD</b>	<b>732</b>	<b>89</b>	<b>0.64</b>	<b>10.98</b>	<b>0.67</b>	<b>45</b>
<b>PD</b>	<b>114</b>	<b>72</b>	<b>1.79 (kt/v)</b>	<b>0.33</b>	<b>1.74</b>	<b>56</b>

\*84 patients captured

**Table 18 - Dialysis adequacy and HD blood flow rates from 2012 to 2021**

Year	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021
Mean URR (HD)	0.65	0.69	0.70	0.67	0.67	0.60	0.66	0.64	0.66	0.64
Mean kt/V (PD)	MA	NA	1.89	1.86	1.84	1.79	1.77	1.75	1.74	1.74
Mean Blood flow (HD)	235	234	259	246	253	248	255	280	278	282

**Table 19 - HD blood flow rates across all HD centres**

Dialysis Centre	N	% data recorded	Mean (ml/min)	SD	Median (ml/min)	≥ 300mls/min (%)
Rimba Dialysis Centre	279	92	280.00	46.87	300	76
Kiarong Dialysis Centre	65	75	288.78	34.25	300	87
Renal Dialysis Unit RIPASH	119	96	280.87	45.68	300	78
JPMC Renal Dialysis Unit	45	100*	267.89	28.83	250	26
Tutong Dialysis Centre	76	82	287.90	43.12	300	81
Kuala Belait Dialysis Centre	121	100**	284.00	41.45	300	83
Temburong Dialysis Unit	27	93	298.00	22.73	300	96
<b>HD</b>	<b>732</b>	<b>94</b>	<b>281.86</b>	<b>42.85</b>	<b>300</b>	<b>76</b>

\*57 patients captured

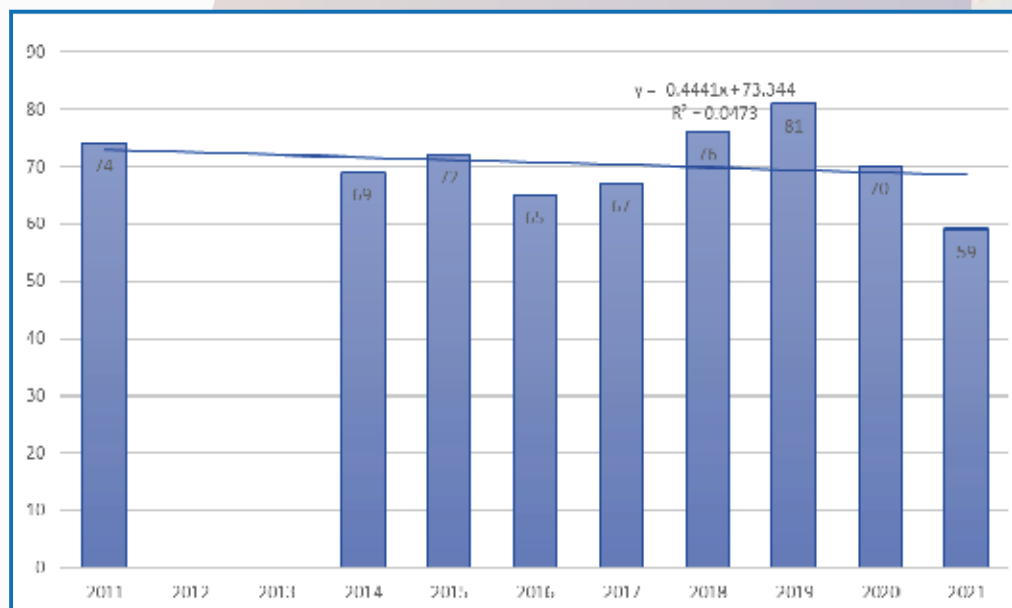
\*\*125 patients captured

**Table 20 - % of HD patients with AVF in all HD centres**

Dialysis Centre	Number of HD patients (2020)	Number of HD patients with AVF (2021)	AVF (%) 2021	AVF (%) 2020	AVF (%) 2019	AVF (%) 2018	AVF (%) 2017
Rimba Dialysis Centre	270	203	75	84	83	86	84
Kiarong Dialysis Centre	49	37	75	83	86	88	83
Renal Dialysis Unit RIPASH	117	44	37	47	53	36	43
Kuala Belait Dialysis Centre	112	44	39	45	52	65	26
Tutong Dialysis Centre	82	58	71	74	86	90	90
Temburong Dialysis Unit	26	16	62	72	83	63	68
<b>HD</b>	<b>722</b>	<b>429</b>	<b>59%</b>	<b>70</b>	<b>81</b>	<b>76</b>	<b>67</b>



**Figure 6 - % of HD patients with AVF from 2012-2021**



# CHAPTER 11

## *Systolic and Diastolic Blood Pressure*



Systolic and diastolic blood pressure rates were consistent with previous year readings. High SBP readings were recorded in JRDU, likely from the acute and abrupt transfer of many unstable patients during the pandemic. The mean BP for HD and PD patients were 141 / 80 and 138/81 respectively.

All BP readings for HD patients were taken pre-HD, hence it is difficult to make direct comparisons with PD patients.

**Table 21- Systolic Blood Pressure (SBP) across all HD centres and Dialysis modalities**

Dialysis Centre	N	% data recorded	Mean SBP	SD	Median SBP
Rimba Dialysis Centre	279	97	135.74	11.76	140
Kiarong Dialysis Centre	65	75	132.86	10.99	130
Renal Dialysis Unit RIPASH	119	97	142.51	19.62	140
JPMC Dialysis Renal Unit	45	80	164.58	22.59	163
Tutong Dialysis Centre	76	100*	142.53	14.63	140
Kuala Belait Dialysis Centre	121	100**	143.37	20.42	140
Temburong Dialysis Unit	27	93	148.84	14.78	150
<b>HD</b>	<b>732</b>	<b>96</b>	<b>140.75</b>	<b>17.35</b>	<b>140</b>
<b>PD</b>	<b>114</b>	<b>82</b>	<b>137.85</b>	<b>15.46</b>	<b>138</b>
<b>All Dialysis</b>	<b>846</b>	<b>94</b>	<b>139.94</b>	<b>17.10</b>	<b>140</b>

\*83 patients captured

\*\*125 patients captured

**Table 22 - Diastolic Blood Pressure (DBP) across all HD centre and Dialysis modalities**

Dialysis Centre	N	% data recorded	Mean DBP	SD	Median SBP
Rimba Dialysis Centre	279	97	79.81	4.91	80
Kiarong Dialysis Centre	65	75	73.24	6.56	70
Renal Dialysis Unit RIPASH	119	97	77.36	9.21	80
JPMC Dialysis Renal Unit	45	80	83.57	14.35	83
Tutong Dialysis Centre	76	100*	81.07	4.92	80
Kuala Belait Dialysis Centre	121	100**	80.04	11.29	80
Temburong Dialysis Unit	27	93	84.40	5.96	80
<b>HD</b>	<b>732</b>	<b>96</b>	<b>79.60</b>	<b>8.50</b>	<b>80</b>
<b>PD</b>	<b>114</b>	<b>82</b>	<b>81.41</b>	<b>9.30</b>	<b>80</b>
<b>All Dialysis</b>	<b>846</b>	<b>94</b>	<b>80.14</b>	<b>8.77</b>	<b>80</b>

**Table 23 – SBP and DBP of all patients from 2012 to 2021**

Year	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021
<b>Mean SBP</b>	143	144	146	148	152	143	140	141	139	140
<b>Mean DBP</b>	82	81	83	83	84	82	84	82	80	80



# Conclusion

***“Declare the past, diagnose the present, foretell the future.”  
- Hippocrates***

Through the identification of deficiencies from the current registry, tailored goals were formulated to address and rectify specific weaknesses for the coming year. Under the auspices of the Ministry of Health, the department has embarked on a reformative project that aspires to transform the services to rival the best in South East Asia. **Project One**, leveraging on the strength of the BDTR, focusses on tangible and quantifiable objectives through a three - pronged approach on transplantation, PD and HD.

Firstly, as a matter of urgency, we will like to address the poor AVF prevalence in the country. Due to the cessation of elective surgical activities for nearly two years, the national AVF prevalence has plummeted to 59%. This has direct implications on mortality and morbidity, leading to more deaths from CRBSI and hospital admissions. As such, we have augmented the national surgical capacity for AVF creations through collaborations with surgeons and hospital managers; to enable AVF surgeries to be performed on most working days and in numerous hospitals simultaneously across the country. It is hoped that we can achieve an overall AVF prevalence of 85%, through performing 100 surgeries per month, by the end of 2022. As a secondary objective, we also hope to achieve 30% AVF rate for incident HD patients in the near future.

Secondly, we will like to capitalize on the PD initiative momentum started during the pandemic to push PD penetration further to at least 20%. In line with the PD preference policy adopted by the department, patients will be preferentially counselled towards taking up PD, through the propagation of evidence that supports improvement in quality of life and life expectancy.

This is achieved through the engagement of different methods of PD tube insertions: Seldinger, peritoneoscopic, laparoscopic and open technique of surgery. The availability of these options of surgery can shorten PD waiting list and prevent patients from crash-landing into HD. In the long run, it will also reduce long term KRT costs and reduce reliance on nursing manpower.

The third initiative is to proliferate kidney transplantation numbers in the coming years. Transplantation activities have slowed during the pandemic due to risk of infections, shortage of operating theatre slots and lack of manpower. The department has set preliminary targets of performing 4-5 local operations per year, with possible expansion to the private sector. To complement the local program, complicated patients will continue to be sent abroad to allied foreign transplant centres but with shortened overseas stay. Major plans are afoot to widen the scope of the program, to include ABO incompatible and cadaveric transplantations, in line with an immediate ambition of achieving an annual output of 20 transplants per million population.

The carefully-crafted aspirations of **Project One** stem from the vision that was exemplified by Wawasan 2035 (WB35), which aims to transform Brunei to become a nation that will be recognized for three goals: *highly-educated and accomplished local population, high quality of life and dynamic and sustainable economy*.

We believe that the department's vision is congruent with expectations from WB35; through achieving medical excellence in South East Asia, transfiguring a platform for medical tourism to invigorate the economy and provision of clinical services that are fundamentally attuned to improve and prolong life.

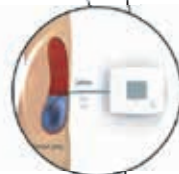
Lastly, the BDTR team will like to take the opportunity to thank everyone who have been involved in making this registry endeavor viable and realizing the ambitions and expectations laid out by **Project One**.



# PROJECT ONE



**Tx rate of  
20 per million  
population**



**PD penetration  
of 20%**



**HD AVF rate  
of 85%**

# REFERENCES

## Appendix 1 - Registry Form 1/3

10/15/22, 8:30 AM

BRUNEI DIALYSIS & TRANSPLANT REGISTRY, DEPARTMENT OF RENAL SERVICES MINISTRY OF HEALTH

### BRUNEI DIALYSIS & TRANSPLANT REGISTRY. DEPARTMENT OF RENAL SERVICES MINISTRY OF HEALTH

#### DIALYSIS PATIENT NOTIFICATION

Complete this form to notify all Dialysis patient in your Centre/Un

*\*Required*

1. Name: \*

\_\_\_\_\_

2. Bru-HIMS No:

\_\_\_\_\_

3. ID Card No:

\_\_\_\_\_

4. Date of start Dialysis: \*

\_\_\_\_\_

*Example: 7 January 2019*

5. Location: \*

*Mark only one oval.*

- Rimba Dialysis Centre
- Tutong Dialysis Centre
- Kuala Belait Dialysis Centre
- Kiarong Dialysis Centre
- RIPAS Hospital Renal Dialysis Unit
- Temburong Dialysis Unit
- Peritoneal Dialysis Unit
- Transplant Unit
- JPMC Renal Dialysis Unit

# REFERENCES

## Appendix 2 - Registry Form 2/3

10/15/22, 8:30 AM

BRUNEI DIALYSIS & TRANSPLANT REGISTRY, DEPARTMENT OF RENAL SERVICES MINISTRY OF HEALTH

### DIALYSIS ANNUAL RETURN

#### DIALYSIS PARAMETERS

Please complete this form for each patient on Dialysis at your centre for the year 2021.

6. HEMOGLOBIN(HB) LEVEL \*

(Sept-Dec)

---

7. CALCIUM(ADJUSTED)

(Sept-Dec)

---

8. PHOSPHATE LEVEL

(Sept-Dec)

---

9. POTASSIUM LEVEL

(Sept-Dec)

---

10. PTH LEVEL

(Sept-Dec)

---

11. BLOOD FLOW RATE

*Mark only one oval per row.*

	150	200	300	300 - 400	500
(Sept-Dec)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

# REFERENCES

## Appendix 3 - Registry Form 3/3

10/15/22, 8:30 AM

BRUNEI DIALYSIS & TRANSPLANT REGISTRY, DEPARTMENT OF RENAL SERVICES MINISTRY OF HEALTH

12. VASCULAR ACCESS  
(Sept-Dec)

*Mark only one oval per row.*

	Ateriovenous Fistula(AVF)	Permanent Catheter(PC)	Internal Jugular Catheter (IJC)
<b>Left</b>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
<b>Right</b>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

13. UREA REDUCTION RATIO(URR)  
(9mth -12mth)

\_\_\_\_\_

14. SYSTOLIC BLOOD PRESSURE \*  
(Sept-Dec)

\_\_\_\_\_

15. DIASTOLIC BLOOD PRESSURE \*  
(Sept-Dec)

\_\_\_\_\_

COVID-19 VACCINATION STATUS

Please (/) if applicable

16. *Tick all that apply.*

- 1st Dose  
 2nd Dose  
 3rd Dose/Booster  
 None

Your support and cooperation is very much appreciated.

Thank you for your time and contribution

17. Done By: \*

Please state your position in front of your name ie: NO,SN, AN

\_\_\_\_\_

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*Appreciations and thanks to all those who have contributed their time, efforts, ideas and support in the successful publication of this Registry Book.*



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CKD diet tips



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Caring for someone with CKD

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# NOTES

# NOTES



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