Global Perspective

Global Dialysis Perspective: Fiji
Benjamin Talbot and the Fijian Dialysis Registry Collaboration*

Introduction
Fiji is an archipelago in the South Pacific Ocean comprising >300 islands, with an estimated population of around 900,000, making it the largest country in the Pacific Islands region (1). Fiji is classified as an upper-middle-income country, with gross national income per capita of approximately US$6000 (1). It spends 5% gross domestic product on total health expenditure and is considered one of the most developed economies in the Pacific. The life expectancy from birth in Fiji in 2019 was 67 years (1) and, consistent with other countries in the region, the leading causes of death in 2019 were noncommunicable diseases, including cardiovascular disease, diabetes, and chronic kidney disease (CKD) (2).

The Fiji Health Care System
Fiji has a decentralized health system on the basis of a three-tier model that provides an integrated health service at primary, secondary, and tertiary levels administered through divisional and subdivisonal offices (3). Tertiary-level care through the three divisional hospitals (Figure 1) is capable of providing a comprehensive range of services including core specialist services. A small private sector includes two private hospitals and >100 private general practitioners.

Kidney Care in Fiji

CKD

Despite increasing recognition of the contribution of CKD to mortality and morbidity in Fijian Ministry of Health Medical Services Reports (4), very little data exist regarding the prevalence of CKD or the incidence of end stage kidney disease (ESKD) in Fiji. A retrospective cohort study of patients admitted to the regional hospital in Fiji’s capital city, Suva, in 2012 reported age-adjusted rates of ESKD incidence between 753 and 938 per million population (pmp) (5), between four and five times the ESKD incidence reported from nearby Australia in 2013 (6). This retrospective study also represents the first attempt to comprehensively define the incidence of ESKD in Fiji but was limited by incomplete administrative and health records (5). Estimates suggest the overall prevalence of CKD may be the third highest in the Oceania and Southeast Asia region, at 14% (7), but limited data are available on the prevalence of milder stages of CKD in Fiji. Although regular measurement of serum creatinine and creatinine clearance became available in the early 1970s (8), interruptions in the supply of reagents, the use of older assay methods, and uncertainty regarding the accuracy of results in public laboratories continue to be major challenges to reliable CKD detection, monitoring, and clinical research.

KRT

Peritoneal dialysis (PD) was the first dialysis modality used in Fiji in 1966, despite limited previous experience or expertise. This experience is described in several published case reports, including the successful treatment of a 32-year-old woman with acute oliguric renal failure in 1968 (9). Frequent shortages of dialysis fluid, PD catheters, and manpower contributed to early difficulties. Hemodialysis was first introduced to Fiji in 1977 and, through the support of charitable donations, was used to successfully treat a patient with Acute kidney injury (AKI) for the first time in that year (8). In 2014, a partnership between Colonial War Memorial Hospital, Fiji, and Concord Repatriation General Hospital, Australia, was formed through the International Society of Nephrology (ISN) Sister Renal Centers (SRC) Program to establish the first nephrology service in Fiji, and public funding for ≤14 sessions of acute intermittent hemodialysis for AKI became available shortly after. Despite this, an unpublished study from 2015 suggested that only around one quarter of patients with AKI requiring dialysis survived the index admission. Those requiring long-term hemodialysis were referred to the private sector for ongoing treatment.

Although Fiji has universal health coverage for all, this excludes access to chronic KRT, which is limited to those who can afford it, and the predominant modality in 2021 is hemodialysis, with a cost of between 150 and 220 Fijian dollars (FJD) per treatment. The first hemodialysis center was opened in 2008 and despite the costs, demand for treatment has increased such that six standalone dialysis centers (two government-owned public centers and four private) now provide treatment for around 160 patients on a user-pays basis. No unified process for data collection regarding dialysis treatments or outcomes has previously existed in Fiji; however, an unpublished

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A retrospective cohort study suggested that one third of patients commencing hemodialysis in 2017 survived <12 months.

Privately funded living donor transplantation is accessible via referral overseas, generally to India (3), for a small number of patients who can afford it. Very few patients are treated with PD in Fiji.

Funding for KRT
All dialysis centers in Fiji operate on a user-pays basis; however, a government subsidy was introduced in 2018 that is available to patients treated at the two public dialysis centers with a household income of <30,000 FJD, (equivalent to approximately US$14,300) per year, where the cost of each treatment is shared 50:50 between the patient and the government. There is no subsidy for PD treatment at present.

Vascular Access
Historically, access to vascular access surgery has mainly been through visiting overseas surgical teams. However, after a fellowship in New Zealand in 2020, a locally trained surgeon has been performing arteriovenous fistula creation and surgical intervention. Thus far, access to this service for public patients has been limited by elective theater time. Arteriovenous fistula angiography is not available.

A summary of dialysis care in Fiji is presented in Table 1.

Nephrology Workforce
The number of nephrologists in Fiji has increased from one to three in the last 2 years, equating to approximately 3.3 pmp. Although this is more than most neighboring Pacific Islands, it remains below the median nephrology workforce for the Oceania and Southeast Asia region (5.66 pmp; interquartile range, 1.08–16.59) (7). Local and international training, including the ISN Fellowship Program, have supported nephrology in Fiji, but low wages and high migration present challenges to maintaining consistency. The renal nursing and dialysis technician workforce has not been formally assessed but remains another key challenge to ensuring sustainable service delivery.

Renal Biopsy Program
A further achievement of the ISN SRC Program is the development of local renal biopsy procedural skills and some histopathological techniques to facilitate an independent renal biopsy program within two major public hospitals in Fiji, allowing improved understanding of the causes of kidney disease and an opportunity to improve outcomes. International support remains available for more complex patients.

Addressing the Data Challenge in Fiji: The Fijian Dialysis Registry
Consistent across all published and unpublished attempts to study CKD and dialysis in Fiji (5), analyses have been limited by incomplete records and inadequate information. As a result, in April 2019 the Fiji National Health Research and Ethics Review Committee granted approval for the Dialysis Outcomes in Fiji Study (2019.17.NW) to establish the first dialysis registry in Fiji. This collaborative project between local and international investigators, with approval from the Fijian Ministry of Health, used previous experience of establishing dialysis registries in other health care settings (10,11) to introduce a comprehensive and cost-effective dialysis registry to collect clinically important data on all patients treated with dialysis in Fiji. Participation in the registry is voluntary, and all participants provide written informed consent before data collection.

Collaboration
The registry is a collaborative project. Data collection was determined through discussion between local clinicians, international researchers, and with Ministry of Health review. The study team includes an equal number of investigators from within Fiji, to those supporting from outside. Local champions for the registry have been identified and trained from among the nursing staff at each center.

Table 1. Summary of dialysis care in Fiji

| Characteristic of Dialysis Care                                      | Response          |
|--------------------------------------------------------------------|-------------------|
| Total number of patients treated with dialysis                     | 160               |
| Number of patients treated with in-center hemodialysis             | 158               |
| **Number of patients treated with home dialysis**                  |                   |
| Peritoneal dialysis                                                | 2                 |
| Home hemodialysis                                                  | 0                 |
| Number of dialysis centers                                         | 6                 |
| Number of nonprofit dialysis centers                               | 2                 |
| Cost of a dialysis treatment                                       | 150–220 FJD (US$70–100) |
| Reimbursement per dialysis session for eligible patients at public centers | 75 FJD (US$35) |
| Typical nurse to patient ratio for in-center dialysis treatments   | 3:1               |
| Average length of a dialysis session                               | 4 hours           |
| Average frequency patients receiving dialysis treatment is reviewed by a nephrologist | 2 monthly |
| Number of centers where hemodialfiltration is available            | 0/6               |
| Number of centers where high flux dialysis membranes are used      | 6/6               |
| Number of centers where dialysis membranes are re-used             | 1/6               |

FJD, Fijian dollars.
dialysis center, and a volunteer clinician in Fiji has been the Clinical Lead for the registry. Support from The George Institute for Global Health and the ISN SRC Program has allowed establishment of necessary infrastructure including the construction of a secure, dedicated, web-based database for data collection and management. Several members of the study team from within Fiji were also supported to attend the SharE-RR workshop (12) at the World Congress of Nephrology 2019 Meeting in Melbourne, Australia, where representatives dedicated to establishing dialysis surveillance systems from countries all around the world were given the opportunity to share and learn from each other’s experiences, goals, and challenges. There has been no cost to the Fijian health care system other than the time and commitment of those involved.

Data
Data collection began at a single dialysis center in November 2019. Over the next 9 months, two further dialysis centers joined, and by July 2020 these three centers (two private and one public), were recruiting patients and contributing data, representing 50% (three out of six) of the dialysis centers in Fiji. Site initiation is underway at two further centers.

Initial data from the participating centers give some insight into the dialysis population and practice patterns in Fiji (Table 2). This shows a relatively young group of participants, with median age of 54 years (interquartile range, 44–61), and a greater proportion of male participants (39 out of 66, 59% male participants). Almost all participants were Fijian citizens (98%) and of either i-Taukei (15 out of 66, 23%) or Indian (46 out of 66, 70%) ethnicity. Diabetes was the most common cause of kidney disease reported (28 out of 66, 42%); however, less than a fifth of all patients had a kidney biopsy to determine diagnosis. The majority of participants reported a combined annual family income of $24,000 FJD (equivalent to approximately US$11,500) and most participants self-fund their dialysis treatment (21 out of 66, 32%).

Approximately a quarter of participants are supported by the government subsidy (15 out of 66, 23%) or rely on a relative in Fiji to fund their dialysis treatment (16 out of 66, 24%), but only 11% of participants (seven out of 66) have supplemental health insurance to cover the cost. The majority of participants (79%) have a central venous catheter (CVC) as dialysis access and all participants starting dialysis during data collection began with a CVC for dialysis surveillance systems from countries all around the world.

Table 2. Baseline characteristics of the cohort of participants enrolled in the Fijian Dialysis Registry on March 8, 2021

| Characteristics                        | Number (% of cohort) |
|---------------------------------------|----------------------|
| Participants enrolled                 | 66                   |
| Median age, yr, (IQR)                 | 54 (44–61)           |
| Male                                  | 39 (59)              |
| Dialysis center                       |                      |
| 1                                     | 17                   |
| 2                                     | 21                   |
| 3                                     | 28                   |
| Ethnicity                             |                      |
| i-Taukei                              | 15 (23)              |
| Fijian of Indian descent              | 46 (70)              |
| Fijian of other descent               | 4 (6)                |
| Other                                 | 1 (2)                |
| Residency status                      |                      |
| Resident in Fiji                      | 65 (98)              |
| Visitor                               | 1 (2)                |
| Cause of kidney disease               |                      |
| Autoimmune disease                    | 2 (3)                |
| Congenital                            | 1 (2)                |
| Diabetes mellitus                     | 28 (42)              |
| Hypertension                          | 15 (23)              |
| Obstructive uropathy                  | 1 (2)                |
| Polycystic kidney disease             | 2 (3)                |
| Unknown                               | 17 (26)              |
| Reported family monthly income (FJD)  |                      |
| <500                                  | 16 (24)              |
| 500–1000                              | 13 (20)              |
| 1000–2000                             | 13 (20)              |
| 2000–3000                             | 3 (5)                |
| 3000–4000                             | 6 (9)                |
| >4000                                 | 6 (9)                |
| Not stated                            | 9 (14)               |
| Supplemental insurance                 |                      |
| No Insurance                          | 59 (89)              |
| FTU/Police/Dominion                   | 3 (5)                |
| Private                               | 2 (3)                |
| Other                                 | 2 (3)                |
| Dialysis funder                       |                      |
| Self                                  | 21 (32)              |
| Government subsidy                    | 15 (23)              |
| Relative in Fiji                      | 16 (24)              |
| Relative outside of Fiji              | 4 (6)                |
| Supplemental insurance                | 7 (11)               |
| Other                                 | 3 (5)                |
| Dialysis access type                  |                      |
| CVC                                   | 52 (79)              |
| AV fistula                            | 13 (20)              |
| AV graft                              | 1 (2)                |
| Number of hemodialysis sessions/week  |                      |
| 1                                     | 3 (5)                |
| 2                                     | 50 (76)              |
| 3                                     | 13 (20)              |

The numbers presented for each characteristic are presented as total number (% of total cohort). IQR, interquartile range; FJD, Fijian dollars; FTU, Fijian Teachers Union; CVC, central venous catheter; AV, arteriovenous.

The Future
A significant barrier to understanding the burden of kidney disease within Fiji continues to be robust data collection. A first step to improving awareness and monitoring the quality of dialysis service delivery has been the Fijian Dialysis Registry; however, at present only half of the dialysis centers in Fiji are contributing data. For this to be a more meaningful tool, data will need to represent all patients receiving KRT. At present, hemodialysis is the predominant KRT, which excludes all but patients living in three urban areas (Figure 1). Expansion of cost-effective alternative KRT programs, with rural and remote outreach, such as PD and support for patients after transplantation may improve access for more patients to KRT. Improved education regarding kidney disease at all levels of health...
care will support earlier detection, management, and monitoring of affected patients and allow a better understanding of CKD within Fiji. This may also encourage more effective disease progression prevention and resource allocation moving forward.

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Author Contributions
B. Talbot conceptualized the study, was responsible for data curation and data analysis, and wrote the original draft. The Fijian Dialysis Registry Collaboration were responsible for conceptualization, data curation, and reviewing and editing the manuscript.

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Figure 1. | Location of the three divisional hospitals and the six dialysis centers within Fiji (13).