Global dialysis perspective: Argentina

Marcelo Orias¹ and Guillermo Javier Rosa Diez²

1. Sanatorio Allende, Universidad Nacional de Córdoba. Córdoba Argentina
2. Hospital Italiano, Buenos Aires, Argentina.

Corresponding Author:
Marcelo Orias
marcelo.orias@gmail.com
Introduction:

Argentina is the third most populated country in South America with an estimated population of 44,494,502. Despite having an area of 2,780,400 km² (8th largest in the world), 90% of the population resides in urban areas, with the majority concentrated in and around Buenos Aires. Life expectancy is 79.7 years in women and 73.6 years in men, with cardiovascular disease as the leading cause of mortality. Argentina spends approximately 10% of its gross domestic product on healthcare.¹ There are 3.94 physicians and 4.5 hospital beds per 1,000 inhabitants in Argentina.² The physician-patient ratio is similar to that of Australia, Italy, Spain, and Switzerland. double that of Brazil, and almost four times that of Chile and Peru.

Argentina has a multitiered, decentralized healthcare system that is plagued by fragmented management and financing. There are national, provincial, and municipal government sponsored healthcare insurances, which together with union-sponsored insurances, provide healthcare coverage to nearly 22 million people. An additional ~10% of the population have private health insurance, leaving nearly 36% of the population without healthcare coverage, nor the financial means to pay for private insurance. These individuals are cared for at cost-free public hospitals and community facilities.¹,²

The first hemodialysis treatment in Argentina dates back to 1955. Five years later in 1960 the Argentine Society of Nephrology was founded³.

Epidemiology

The incidence and prevalence of chronic kidney disease (CKD) and end-stage kidney disease (ESKD) has been growing steadily, most likely because of an increasing rate of diabetes and obesity, as well as an ageing population. Indeed, CKD is now the seventh leading cause of mortality in Argentina and CKD-related deaths have increased by 15% between 2007 to 2017⁴.

The National Transplantation Institute (INCUCAI) supports a National Dialysis and Transplant Registry⁵,⁶. Patient reporting is obligatory, therefore national data are valid and representative. Reporting is responsibility of the dialysis center director and is provided online. Patient identity is preserved by data security systems.

The annual incidence of ESKD is 160 patients per million population, with diabetes and hypertension as the most common etiologies (Table 1). At the end of 2018, there were 29,929 ESKD patients on chronic dialysis, representing a prevalence rate of 673 patients per million population (Figure 1).⁵,⁶ Of these, approximately 93.5% are on in-center hemodialysis (HD),
6.5% on peritoneal dialysis (PD), and none on home hemodialysis. Of the HD patients, 70% receive dialysis via an arteriovenous fistula; 15% via an arteriovenous graft, and 15% via central venous catheters. First year and annual mortality rates on dialysis are 18 and 16.4%, respectively (Table 1), cardiovascular cause being the most common. Annual mortality rate has been above 16% for the last 4 years (Figure 2). Renal replacement therapy in Argentina has incidence and prevalence rates above the mean for Latin America, most likely because dialysis and transplant are readily available in the country (Table 2). Nevertheless, peritoneal dialysis is relatively less utilized compared to the rest of Latin America. 

**Structural Organization and Logistics of Dialysis**

Argentina has dialysis units in both hospital and private settings. There are a total number of 597 dialysis centers in the country. Eleven percent (68 centers) of these centers are government owned, 377 (63%) are independent dialysis centers and the rest (152 centers; 26%) are owned by foreign dialysis companies. One hundred and 187 dialysis units are in the province of Buenos Aires and the rest are located throughout the rest of the country. Dialysis is covered by the patients’ union health system or health insurance; ultimately government pays if the patient does not have insurance. Government coverage is universal if a patient does not have union or health insurance. This includes illegal immigrants or non-citizens or refugees.

Payment for HD and PD is capitated at approximately 700 USD per month, or 55 USD per HD session. Physicians across the country are paid by monthly salaries and some also have private practice. PD solutions are not manufactured in the country and therefore imported. Bundle HD and PD payment includes vascular access confection and maintenance, erythropoietin, appropriate vaccination, and transfer to and from the dialysis unit. Monthly reimbursement is irrespective of procedure number.

Average HD sessions last for 240 minutes with 95% of patients receiving 3 or more dialysis sessions per week. On line hemodiafiltration has been recorded since 2015. Approximately 20% of HD centers have this technology.

Although 70% of incident dialysis patients start with a temporary catheter as their vascular access, at 6 months into treatment most have permanent vascular access. Seventy percent of prevalent patients have AV fistula. Nephrologists insert all temporary catheter access. Permanent HD catheters are placed by nephrologists also, but mostly by vascular surgeons. AVFs are 100% done by vascular surgery. Interventional nephrologists do not perform AVF.
Almost 87% of the patients are on erythropoietin or similar agents and synthetic HD membranes are most commonly used. (Table 1)\textsuperscript{5,6}

The advent of technological advancement, biosecurity implementation and specific treatment has decreased the prevalence of hepatitis B, C and HIV in the dialysis population (0.2%, 1% and 0.8% respectively). Hepatitis B patient isolation is mandatory.

No formal end-of-life care support programs are available in Argentina.

**Staffing of Dialysis Units.** Argentina is third among Latin American countries considering nephrology physicians per million inhabitants (Table 2)\textsuperscript{7,8}. There is one nephrologist for every 40 patients and a nephrologist must be present in the dialysis unit at all times. There are approximately 80 renal fellows in training per year. Most patients are seen daily or at least 4 times a month. In CAPD, they are seen once a month. Historically, non-nurse technicians accounted for the majority of dialysis personnel, but this has progressively decreased to approximately 5%. Nurses now provide the lion’s share of dialysis care. The main driving force for this change occurred 10 years ago when regulations were changed to increase the number of dialysis nurses taking care of these patients. The nurse to patient ratio is 4-5 adult patients per nurse in HD and 2-3 children per nurse in pediatric units. In PD, the ratio is 20 adult and 15 pediatric patients per nurse\textsuperscript{5,6}. No formal dialysis nurse certification is in place in the country.

**Transplantation in Argentina**

The International Registry of Organ Donation and Transplantation reports that in 2019, there were approximately 1674 kidney transplants (1325 from deceased and 349 from living donors) in Argentina. Simultaneous kidney-pancreas was 69, kidney-liver 19 and kidney-heart transplants 5. More men (62%) were transplanted than women. The availability of kidney transplants differs regionally around Argentina, with approximately 6546 patients with ESKD currently on the transplant list waiting for a new kidney. Average waiting time on transplant list is over 4 years. Swap living kidney transplants have occurred, but very few cases.\textsuperscript{5} Transplantation is regulated by the National Transplantation Institute (INCUCAI)\textsuperscript{5,6}. Since 2004, INCUCAI has supported a National Dialysis and Transplant Registry. Patient reporting is obligatory, so national data are valid and representative. INCUCAI, in conjunction with the Argentine Society of Nephrology, analyzes and reports the data of the National Dialysis and Transplant Registry.\textsuperscript{5,6} INCUCAI, Argentine Society of Nephrology and the Argentine Transplant Society promote organ donation campaigns regularly. A recent
law has declared the general population as presumed donors and has increased donation by 20-25%. There are barriers to donation, but none are due to social or cultural barriers. Some of these barriers include logistics of organ harvesting and transportation in a large country, insufficient organ harvesting teams in some regions, etc.

**Future Directions and Challenges**

Renal replacement therapies are accessible and available in Argentina and utilization rates are acceptable compared to other countries in the region. It will be challenging to improve what’s currently available with limited economic resources. An advanced kidney care program is not available nationwide and needs to be designed and implemented to guarantee early and programmed dialysis initiation and preemptive transplant when possible. Peritoneal dialysis is underutilized in Argentina for many reasons: peritoneal solutions are not manufactured in the country and are expensive, most nephrologists have not been trained in PD as HD has been the predominant form of dialysis historically. And as many patients still begin dialysis without previous planification, the preferred dialysis modality used in urgent situations is HD through temporary catheter access. Training and economic incentives will help develop PD further. Home hemodialysis will most likely be set-aside for some time. This technology is not available yet and no reimbursement plans are underway for this dialysis modality.

**Author Contributions**

M Orias: Supervision; Validation; Writing - review and editing  
G Rosa Diez: Supervision; Writing – original draft; Writing - review and editing

**Disclosures**

G Rosa Diez is employed by Fresenius. The authors have nothing else to disclose.
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| Table 1 Dialysis patient characteristics in Argentina. |
|-----------------------------------------------|
| **Country population**                         | 44,494,502 |
| **Hemodialysis Patients**                      | 29,929     |
| **Peritoneal Dialysis Patients**               | 1,945      |
| **Patients with functioning kidney transplant**| 11,486     |
| **Prevalence of Hepatitis B**                   | 0.2%       |
| **Prevalence of Hepatitis C**                   | 1%         |
| **Prevalence of HIV**                          | 0.8%       |
| **Prevalence of Diabetes**                     | 28%        |
| **Membrane Dialyzer (Reuse)**                  |            |
| % Synthetic/ % Substituted cellulose/% Cellulose| 83%/14%/4%  |
| **Type of vascular access**                    |            |
| Native AVF/Prosthetic AVF/Catheter              | 70%/15%/15% |
| **Prevalence of patients with ESA**            | 87%        |
| **Number of Hemodialysis Centers**             | 597        |
| **Hospital based dialysis units**              | 25%        |
| **Non profit dialysis units**                  | 11%        |
| **Number of Peritoneal Dialysis Centers**      | 79         |
| **Dialysis covered by insurance**              | 100%       |
| **Out of pocket expenses**                     | 0%         |
| **Dialysis unit staffing (nurses/techs)**      | 95%/5%     |
| **Payment per HD session**                     | 55 USD     |
| **Patient Nurse Ratio in HD units(adult/Peds)**| 4-5/2-3    |
| **Average length of dialysis session**         | 4 hs       |
| **Minimum patient evaluation by physician (per month)** | 4 |
| **Number of Transplant Centers**               | 55         |
| **Adjusted Annual Mortality Dialysis Rate**    | 16.48%     |
| **Etiology of ESRD**                           |            |
| Diabetes                                       | 36.5%      |
| Nephroangiosclerosis                           | 20%        |
| Unknown cause                                  | 17%        |
| Glomerulonephritis                             | 9%         |
| Myeloma and Amyloidosis                        | 1%         |
| Obstructive Uropathy                           | 6%         |
| Polycystic Kidney Disease, adult type          | 5%         |
| Epidemic Uremic Hemolytic Syndrome             | 0.5%       |
| Other                                          | 5%         |
| **Cause of Death**                             |            |
| Cardiovascular                                 | 50%        |
| Infection                                      | 25%        |
| Neoplasia                                      | 6%         |
| Other                                          | 19%        |

Source: Argentinean Registry of Dialysis and Transplantation. (5,6)
### Table 2. Comparison of Renal Replacement Therapy between Argentina and Latin America

|                                | Argentina | Latin America |
|--------------------------------|-----------|---------------|
| Prevalence of patients with ESRD under RRT (Dialysis and Transplant) * | 976       | 805           |
| Dialysis Incidence Rate*       | 160       | 154           |
| Kidney Transplant Rate*        | 30        | 21            |
| Percent of Dialysis Patients on Peritoneal Dialysis | 6.5%      | 11.5%         |
| Nephrologist*                  | 30        | 18            |

*Rates are expressed per million population. Source Latin American Registry of Dialysis and Transplantation (7)
Figure 1. Prevalence of dialysis patients yearly since 2004 (Number of patients alive by 31st December of each year in Argentina). (5,6)
Figure 2. Annual Mortality Dialysis Rate (adjusted by age, gender, ESRD etiology and diabetes) Rate is expressed in deaths per 100 patients at risk, with a 95% confidence interval bars. Source: Argentinean Registry of Dialysis and Transplantation. (5,6)