
Dialysis options for kidney disease in Sri Lanka

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INTRODUCTION

Kidney failure, also called end-stage renal disease (ESRD), is the last stage of chronic kidney disease. When the kidneys are failing or become less functioning, patients must go for either dialysis or a kidney transplant for their survival¹. Chronic kidney disease (CKD) has become a worldwide major public health issue in the present day. It is more prevalent in the elderly population. However, while younger patients with CKD typically experience progressive loss of kidney function, 30% of patients over 65 years of age with CKD have stable disease².

In 2017, 697.5 million cases of CKD (all stages) were recorded worldwide, with a global prevalence of 9.1%. From 1990 to 2017, the global all-age prevalence of CKD increased by 29.3%, whereas the age-standardized prevalence remained stable. Globally, 1.2 million people died from CKD in 2017. The global all-age mortality rate of CKD increased by 41.5% from 1990 to 2017. Diabetic nephropathy accounted for almost a third of disability-adjusted life years (DALYs) in CKD. Most of the burden of CKD was concentrated in the lowest three quintiles of the Socio-demographic Index (SDI)². According to Balasubramanya and Stifel, more than 10% of the global population has affected by CKD and it causes 5-10million deaths annually³. Chronic

kidney disease of unknown etiology (CKDu) also contributes in major proportion to this global disaster. It has reported many cases regarding CKDu recently in Nicaragua, El-Salvador, Egypt, Africa, countries in South-East Europe, and many countries in Asia including India and Sri Lanka.

This audit was conducted to understand the CKD situation in Sri Lanka with respect to the global situation and analysis of the treatment modalities available for those patients.

CKD/ CKDu IN SRI LANKA

CKD has caused a considerable impact on the health system in Sri Lanka. Diabetes, hypertension, and the various forms of glomerulonephritis are identified as the factors influencing the issue⁴. The reported characteristics of symptomatic individuals reveal that the incidence of CKD was significantly higher among females (62%) than males (38%). In addition to CKD, about 63% of symptomatic individuals had hypertension and about one-third of them also had diabetes. About 33% of the symptomatic individuals related to CKDu had neither diabetes nor hypertension, so they belong to CKDu⁵.

CKDu is the emerging factor for CKD in rural Sri Lanka for the last two decades. It has been

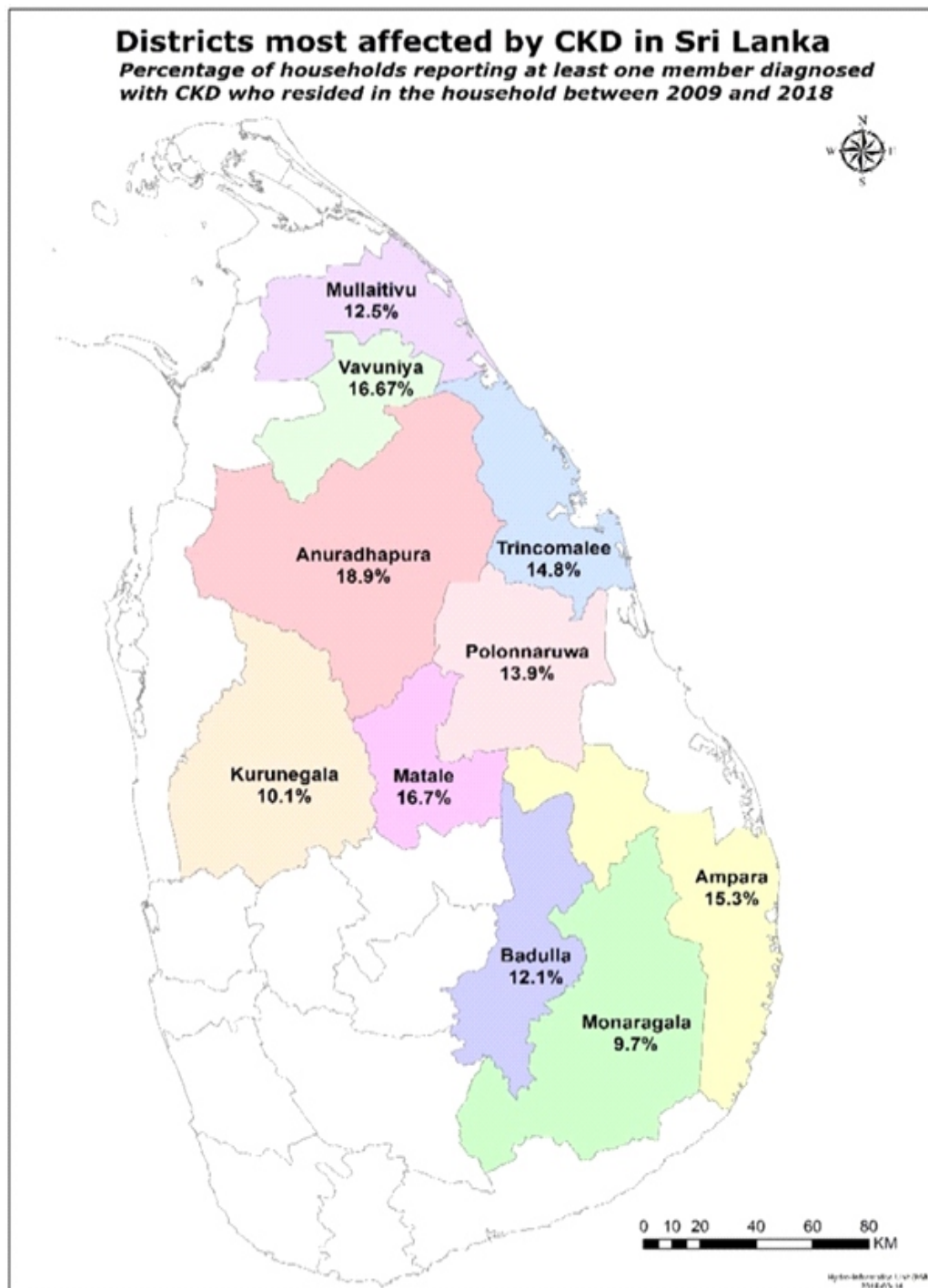


Figure 1: CKD prevalence rates across the most affected districts in Sri Lanka.

recorded as the 7th leading cause of death nationally. Research shows, that CKDu is more common with the people who are involved with farming and in some districts, the rate of prevalence takes 15.1%-22.9% value⁴. According to Kafle, Horbulyk, and

Balasubramanya, a survey conducted in 10 districts across 8046 families reported that at least one member diagnosed with CKD resides in the households⁵.

Patients who are suffering from CKD/CKDu must go for suitable renal replacement

Table 1: Distribution of CKDu patients by the provinces in Sri Lanka 2015 -2021 Feb

No	Province	Accumulated	New Patients				
		2015	2016	2017	2018	2019 (CKD/CKDu)	Total
1	North Central (Anuradhapura, Polonnaruwa)	21159	5248	4159	2615	2464	37787
2	Central (Matale → Wilgamuwa, Galewela, Naula, Laggala Pallegama, Dambulla, Ukkwela, Yatawatta, Pallepola)	952	266	461	276	285	2240
3	Eastern (Ampara → Dehiathakandiya, Mahaoya, Ridimaliyadda/ Trincomalee → Padavisripura, Gomarankadawala, Kanthale, Morawewa, Trincomalee, Kinniya, Seruvila, Muthur, Thambalagamuwa)	1138	641	482	303	175	2739
4	North Western (Kurungala + Puttalam -from year 2018)	1425	479	424	2448	2046	6822
5	Northern (Vavuniya, Mulathive, Mannar)	1986	190	105	582	289	3152
6	Southern (Hambanthota)	312	100	178	115	250	955
7	Uva (Badulla → Girandurukotte, Mahiyangane, Ridimaliyadda/ Monaragala)	3685	236	209	136	190	4456
8	Western (Gampaha, Negambo, Colombo)	-	-	-	-	3048	3048
Total		30657	7160	6018	6475	8747	61199

Source - National Renal Disease Prevention & Research Unit

therapy to sustain their lives. They are always encouraged to continue their regular clinic visits to have medical guidance, medicine, and supervision to increase their quality of life along with the disease. At a certain stage, according to the advice of the consultant nephrologist, the patient must go for either dialysis or kidney transplantation.

NHSL conducts four renal clinics per week due to the rapid increase in the patient

number. Pre-transplant, post-transplant, and a wide variety of renal patients attend these clinics for treatments. In addition, an average of 1000 hemodialysis (HD) sessions are conducted for acute kidney injuries, CKD, and patients who are waiting for kidney transplantation. In 2003 they carried out 3000 HD sessions but when it comes to 2013 the number increased to 11900 due to the high demand⁶.

Table 2: Services provided for CKD patients from 2003 to 2014 at NHSL

Year	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
Number of HD done	4603	4978	5785	6576	6378	8504	9314	8097	8593	10161	11669	6919
Number of KT done	-	-	3	6	19	24	25	35	38	50	57	46
New clinic attendance	*	*	*	442	615	533	593	624	666	611	681	471

Treatment Modalities

Hemodialysis, peritoneal dialysis, and kidney transplantation are the major renal replacement modalities available in Sri Lanka. The main concerns in CKD management are screening, early detection, and prevention of the disease. Unfortunately, most of the cases are reported and detected in the late stages of the disease. When the disease is progressing, patients are encouraged to plan for renal replacement therapy⁷.

Transplantation

Most young and middle-aged patients are offered transplantation. Kidney transplantation was introduced to Sri Lanka in 1985. It has completed nearly 5000 transplantations up to 2014^{7,8}. KT is the best option for all advanced CKD patients unless there are medical contraindications⁷. However, it has become a challenge due to the rising number of patients.

Kidney transplants can be divided into two main types:

- Live donor transplants
- Deceased donor transplants

In live donor transplant surgery, a patient receives a kidney from a person who is still alive. This donor can be a parent, friend, relative, or any other person who is willing to donate a kidney to the patient. In the deceased donor transplant process, the patient receives a kidney from a person who has just deceased. If a patient could not find a suitable donor for the transplantation, he is added to the waiting list for the deceased donor

transplant option. When live donor transplantation is considered if the donor is from an area where CKDu is prevalent, he might have a high chance of catching CKDu in his life course. In such cases, close monitoring and nephrology follow-up are essential for the donor⁷. KT belongs to the long-term strategy of the management of the disease. So, it is needed to establish more PD and HD centers to expand options to the affected people⁸.

Dialysis

Hemodialysis

Hemodialysis is a process which uses to clean the blood in the body by using a dialysis machine along with dialysis solutions and a special filter that acts as an artificial kidney. In this mechanism, the dialysis machine pumps the blood through the filter. When blood passes through the fibers in the filter, dialysis solution passes in the opposite direction of the blood flow. Then the waste products move into the dialysate solution and filtered blood returns to the body⁹.

Most countries considered HD as the default renal replacement therapy method. In the Sri Lankan aspect, much of the CKD population is reported from outside the cities. Some patients must travel more than 20km to reach an HD center. It is unable to establish HD centers in all the prevalent areas. A developing country like Sri Lanka allocated a significantly low budget to hemodialysis compared to other developed countries¹⁰. Based on the medical condition of the patient, they require to engage with 2 to 3 HD cycles per week. Patients and their family members

or helpers must face many difficulties to manage their work-life balance with this treatment. Especially more time must be consumed for traveling and treatment. Food and travel expenses also are borne by the patient, and it makes many deviances from their usual lifestyle. However, the other alternative dialysis method the PD gives better opportunities and several advantages to the patients, compared to HD¹⁰.

Peritoneal Dialysis

Peritoneal dialysis brings more independence compared to hemodialysis. It's a needle-free treatment that brings no pain during the treatment. It grants the freedom to schedule their own treatment in a flexible manner as per their living style. Dietary restrictions are also less compared to other dialysis methods. The greatest advantage of this method is that patients are not required to visit the dialysis unit on regular basis. PD can be carried out at home¹¹. On the other hand, it greatly reduces the hospital burden as well.

In peritoneal dialysis, a cleansing fluid contained in a bag including dextrose, water with salt, and other additives fills into the peritoneal cavity through a soft catheter implanted in the abdomen. When the solution entered the body cavity it absorbs the waste products and extra fluid from the body. After a certain number of hours, the solution which filled in the body drains out into an empty bag. When the drain is complete, the same procedure is repeated continuously with a fresh solution. Peritoneal dialysis can be categorized into two types¹².

- Continuous Ambulatory Peritoneal Dialysis (CAPD)

- Continuous Cyclic Peritoneal Dialysis/Automated PD (CCPD/APD)

CAPD

This process usually does 3-4 cycles in a period of 24 hours. The patient can sleep while the fluid is in the abdomen. Patients can schedule their treatment without getting day-to-day activities disturbed¹².

CCPD/APD

APD gives more freedom to patients compared to CAPD. In this procedure, a machine called the 'Cycler' does the fluid fill and drain without manual involvement. The number of cycles and other required data feeds to the machine when it is installed in the patient's home premises. Usually, this procedure is done at night times. So, the patient can spend the entire day time without having fluid in the abdomen. APD requires a minimum human touch to do the process¹².

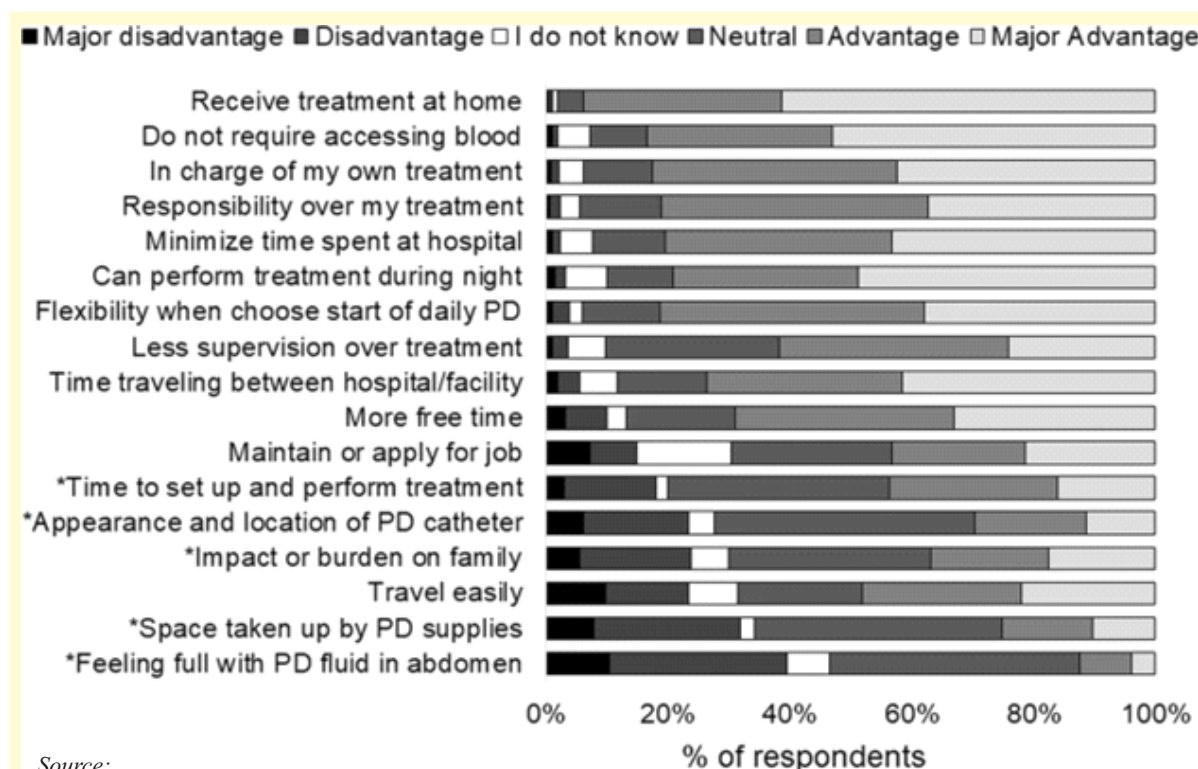
Significant growth in PD has occurred in the US after changing the dialysis reimbursement policies by the government in 2011. According to Sukul et al. "Compared with facility hemodialysis, peritoneal dialysis is more cost-effective, less technically demanding, minimizes the exposure of patients to hospital-acquired infections, more feasible in rural and remote settings, and associated with better preservation of residual kidney function which is a factor associated with survival advantage among patients receiving dialysis¹³. Commonly perceived patient advantages of PD include enhanced

opportunities for rehabilitation and return to employment and improved satisfaction and quality of life”.

Research conducted from 2014-2017 with the participation of 2760 PD patients responded to over 17 questions regarding the advantages and the disadvantages of peritoneal dialysis treatment. Patients above age 18, from Australia, New Zealand, Canada, Japan, Thailand, the United Kingdom, and the US were involved in this study, and Figure 2 summarizes how patients rated each of the 17 items related to their perceived advantages and disadvantages of PD. The factor most perceived as an advantage (i.e., advantage or major advantage) was “receive treatment at home” (94%), followed by “do not require accessing

of blood” (84%). The most rated disadvantage (i.e., disadvantage or major disadvantage) of PD treatment was “feeling a full or bloated sensation with fluid in the abdomen” (39%), followed by “space taken up by PD supplies” (32%)¹³.

Furthermore, Fig. 3 shows the distribution of the ADS by country. Japan and Thailand had the highest proportion of patients with a negative rating (ADS < 0, 11% within both countries), compared with 3–6% elsewhere. Most patients had a positive rating; 22–43% with ADS ≥ 1; and 32–42% with 0.5 ≤ ADS < 1. The data analysis of this large-scale study indicates the dialysis outcomes and the practice patterns of those patients in respective countries reported many advantages of PD than disadvantages.



Source:

Sukul, N., Zhao, J., Douglas Fuller, D. S., Karaboyas, A., Bieber, B., & Sloand, J. A. (2019, April 2). *BMC Nephrology*. Retrieved September 19, 2021, from <https://bmcnephrol.biomedcentral.com/articles/10.1186/s12882-019-1304-3>

Figure 2: Perception of patients on the advantages and disadvantages of PD

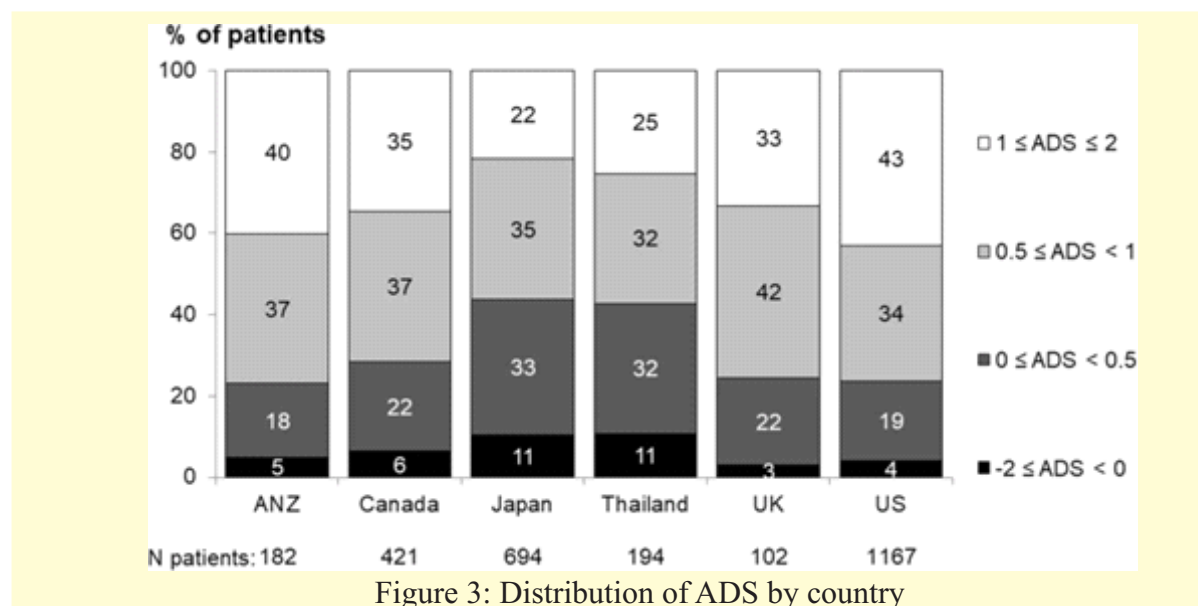


Figure 3: Distribution of ADS by country

The PD First Policy in South Asia has been gradually getting established in Sri Lanka. Through this approach, it has become much more convenient to provide Renal Replacement Therapy (RRT) to patients who are in affected areas. When establishing an HD unit in a hospital, the government needs to afford the high expenses of dialysis machines, equipment, and infrastructure. Reserving a space for that kind of purpose and staff allocation is also a challenge in the situation. However, with the PD modality, these factors are no longer a challenge to provide RRT⁷.

The doctors and the nurses who are trained for PD, and the PD trainers from certain institutions, can provide adequate training and knowledge to the patients when they are selected and continue PD. Conducting home visits for the assessment of peritoneal dialysis patients is much important for the sustainability of the treatment and for improving the quality of life of those patients. The National Hospital Kandy is the main PD

center which is having a successful peritoneal dialysis program in Sri Lanka. In the initial stage, staff faced many troubles to convince patients to the treatment. It was only 10% consented to PD. However, after introducing the PD clinics they were more receptive to initiating PD. Importantly, the International Fraternity of Nephrologists, the International Society of Nephrology, Sister Center partnership with the National Hospital Kandy, and Stanford University Division of Nephrology support making the PD successful in Sri Lanka⁷. In this sense, policy-level attention is all that needs to ignite the phase toward popularizing PD in Sri Lanka.

REFERENCES

1. American Kidney Fund. (2021). *American Kidney Fund*. Retrieved September 16, 2021, from <https://www.kidneyfund.org/kidney-disease/kidney-failure/>
2. Arora, P. (2021). *Medscape*. Retrieved September 16, 2021, from <https://emedicine.medscape.com/article/238798-overview>
3. Balasubramanya, S., & Stifel, D. (2019). *IWMI*. Retrieved September 16, 2021, from <https://www.iwmi.cgiar.org/2019/12/chronic-kidney-disease-in-sri-lanka/>
4. Senaka, R., Shivanthan, M. C., & Selvarajah, M. (2016). Chronic kidney disease of unknown etiology in Sri Lanka. *Internatinal Journal for Occupational & Environmental Health*, 22(3), 259-264.
5. Kafle, K., Horbulyk, T., & Balasubramanya, S. (2019). *Science Direct*. Retrieved September 16, 2021, from <https://www.sciencedirect.com/science/article/pii/S0048969719337088#bbb0015>
6. The National Hospital of Sri Lanka. (2015). *The National Hospital of Sri Lanka*. Retrieved September 17, 2021, from http://www.nhsl.health.gov.lk/web/index.php?option=com_content&view=article&id=60&lang=si
7. Varughese, S., Agarwal, S. K., Raju, R., & Khanna, T. (2020). Options of Renal Replacement Therapy in CKDu. *indian Journal of Nephrology*, 30(4), 261-263.
8. Jayasinghe, S. (2014). Chronic kidney disease in rural areas of Sri Lanka: an evolving. *Ceylon Medical Journal*, 59(3), 94-96.
9. National Kidney Foundation. (2021). *National Kidney Foundation*. Retrieved September 17, 2021, from <https://www.kidney.org/atoz/content/hemodialysis>
10. Ranasinghe, P., Perera, Y. S., Makarim, M. F., Wijesinghe, A., & Wanigasuriya, K. (2011). The costs in provision of haemodialysis in a developing country: A multi-centered study. *BMC Nephrology*, 12(42).
11. NHS. (2018). *NHS*. Retrieved September 18, 2021, from <https://www.nhs.uk/conditions/dialysis/pros-cons/>
12. National institute of diabetes and digestive and kidney diseases . (2018). *NIH*. Retrieved September 18, 2021, from <https://www.niddk.nih.gov/health-information/kidney-disease/kidney-failure/peritoneal-dialysis>
13. Sukul, N., Zhao, J., Douglas Fuller, D. S., Karaboyas, A., Bieber, B., & Sloand, J. A. (2019, April 2). *BMC Nephrology*. Retrieved September 19, 2021, from

<https://bmcnephrol.biomedcentral.com/articles/10.1186/s12882-019-1304-3>

14. UPMC. (n.d.). *UPMC*. Retrieved September 16, 2021, from <https://www.chp.edu/our-services/transplant/kidney/surgery/types>
15. National Kidney Foundation. (2021). *National Kidney Foundation*. Retrieved September 18, 2021, from <https://www.kidney.org/atoz/content/peritoneal>
16. Nidhi Sukul Junhui Zhao, D. S. (2019, April 2). *BMC Nephrology*. Retrieved September 18, 2021, from <https://bmcnephrol.biomedcentral.com/articles/10.1186/s12882-019-1304-3#citeas>