Article

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A Cost Analysis of Kidney Replacement Therapy Options in Palestine

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Abstract

This study provides a cost analysis of kidney replacement therapy options in Palestine. It informs evidence-based resource allocation decisions for government-funded kidney disease services where transplant donors are limited, and some of the common modalities, i.e., peritoneal dialysis (PD) and home hemodialysis (HD), are not widely available due to shortages of qualified staff, specialists, and centers to follow the patient cases, provide training, make home visits, or provide educational programs for patients. The average cost of kidney transplant was US$16 277 for the first year; the estimated cost of HD per patient averaged US$16 085 per year—nearly as much as a transplant. Consistent with prior literature and experience, while live, related kidney donors are scarce, we found that kidney transplant was more adequate and less expensive than HD. These results have direct resource allocation implications for government-funded kidney disease services under Palestinian Ministry of Health. Our findings strongly suggest that investing in sufficient qualified staff, equipment, and clinical infrastructure to replace HD services with transplantation whenever medically indicated and suitable kidney donors are available, as well as deploying PD programs and Home HD programs, will result in major overall cost savings. Our results provide a better understanding of the costs of kidney disease and will help to inform Ministry of Health and related policy makers as they develop short- and long-term strategies for the population, in terms of both cost savings and enhanced quality of life.

Keywords

costs, average cost, hemodialysis, kidney transplant, resource allocation, Palestine Ministry of Health

The purpose of this study is to provide a cost analysis of kidney replacement therapy options in Palestine to inform evidence-based resource allocation decisions for government-funded kidney disease services. Kidney (renal) failure is a common condition in populations throughout the world. Kidney malfunction leads to increased fluid levels in the body, thus impacting the body's internal equilibrium. Numerous disorders can cause or result in kidney failure. Yet, some of the typical modalities for treating renal failure, i.e., peritoneal dialysis (PD) and home hemodialysis (HD), are not widely available in Palestine. This is due to a shortage of expert staff, specialists, and centers to follow the patient cases, provide training, make home visits, or provide educational programs for patients. Military checkpoints, closures, and conflict zones also make the connection between provider and patient challenging. Alternatively, kidney transplants in Palestine depend on related, live donors, rather than cadaveric donors. This results in few patients eligible for transplant. The average number of transplant patients is estimated at only 45–50 cases per year in Palestine.

Our study contributes to the literature by providing epidemic data and comparative cost analysis for end-stage renal disease (ESRD) treatments in a region of the world where governmentally funded service options are limited. The government bears almost all of the costs of HD and transplantation in Palestine. Consistent with prevailing international literature and practice, our findings strongly suggest replacing HD services with transplantation whenever medically indicated and suitable kidney donors are available. The results from our study provide a better understanding of the costs of ESRD in Palestine and will help to inform health policy makers as they develop strategies for kidney health services for the population, in terms of staffing needs, cost savings, and enhanced quality of life for patients.

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Background

Research indicates that the primary causes of kidney disease include: diabetes 43.8%; high blood pressure 26.8%; glomerulonephritis 7.6%; cystic diseases 2.3%; urologic diseases 2.0%; and others 17.5%. In severe cases kidney malfunction can lead to decreased urine production, blood in urine, anemia, and cardiovascular diseases. Renal failure can be categorized into acute and chronic. Chronic renal failure and ESRD are stages of concern in this study. This severe condition can be treated either by kidney transplant, or by dialysis.

The global average prevalence for dialysis was 215 patients per million. At least 8–10% of the population in Europe suffers from some form of chronic kidney disease (CKD). Interestingly, the current population undergoing dialysis in Europe is almost double the number that underwent treatment 15 years ago. The actual number of dialysis patients is growing steadily by about 4–6% per year in Europe. Kidney treatment is a burden for every healthcare system and if the same trend continues, almost 3% to 5% of European healthcare budgets would need to be spent on CKD treatments. In the United Kingdom, the annual incidence of end-stage renal failure is around 100 patients per million. The incidence has doubled over the past decade and is expected to continue to rise by 5–8% annually in the United Kingdom[1].

The highest incidence and prevalence rates of ESRD (both renal transplant and dialysis) are reported from the USA, Taiwan, and Japan. In the Arab Middle East, Saudi Arabia has recorded the highest prevalence of patients with renal failure of 600 cases per million of population, while Kuwait recorded a lower prevalence rate of 80 cases per million of population. Prevalence data from several countries are presented in Table 1.[2]

Table 1. Prevalence of ESRD.

Panel A: Prevalence of ESRD Worldwide.

Country	Prevalence of cases per million
Taiwan, 2004	1706
United States	1500
Japan, 2005	1149
Italy, 2004	1022
France, 2003	513

Panel B: Prevalence of ESRD in the Arab Middle East, 2005-2006.

Country	Prevalence of cases per million
Saudi Arabia	600
Jordan	340
Yemen	320
Qatar	262
Lebanon	243
Egypt	225
Kuwait	80

Note. ESRD = end-stage renal disease.

Renal Failure in the Palestinian West Bank

In the West Bank, the total number of renal failure patients has increased significantly over the last 5 years, but there is a lack of accurate data about the epidemiology and cost. In the first quarter of 2012, the total reported number of renal failure patients in the West Bank was 692 patients. This was an increase of 11.3% over the number of patients in the same period in 2011—which was numbered 622 patients, and an increase of 23.1% over the number of patients in 2010. This means that the combined annual rate of increase was 11%[3]. Table 2 summarizes the number of patients and HD sessions in governmental hospitals in the West Bank over the last 5 years.

Table 2. Number of Patients and Hemodialysis Sessions in Governmental Hospitals in the West Bank (2007-2011).

Year	2007	2008	2009	2010	2011
No. of patients	400	456	552	618	666
No. of hemodialysis sessions	50 583	54 648	65 750	74 611	82 787

Source. Palestinian Health Information Centre.[4,5]

According to Kahder's[2] distribution by probable cause, the vast majority of patients were either diabetic (22.5%), or hypertensive (11.1%), or both diabetic and hypertensive at the same time (10.6%). In addition, there were a considerable number of patients where the cause was unknown (27.6%), as presented in Figure 1.

Prevalence of HD

The overall prevalence in the West Bank was 240 patients per million of population. Table 3 classifies the prevalence by gender and age. Male prevalence was 57.6%, whereas female prevalence was 42.4%. The vast majority of patients (45%) were between ages 45 and 64, whereas about 4.3% were below 14 years of age.

Literature Review

Many prior studies have addressed the costs of kidney transplant and HD in various countries around the world. Table 4 summarizes some of the most salient studies for this paper. Additional details of these studies are then presented below.

Schweitzer et al[6] examined the current cost of life donor (LD) transplantation at the University of Maryland Institute

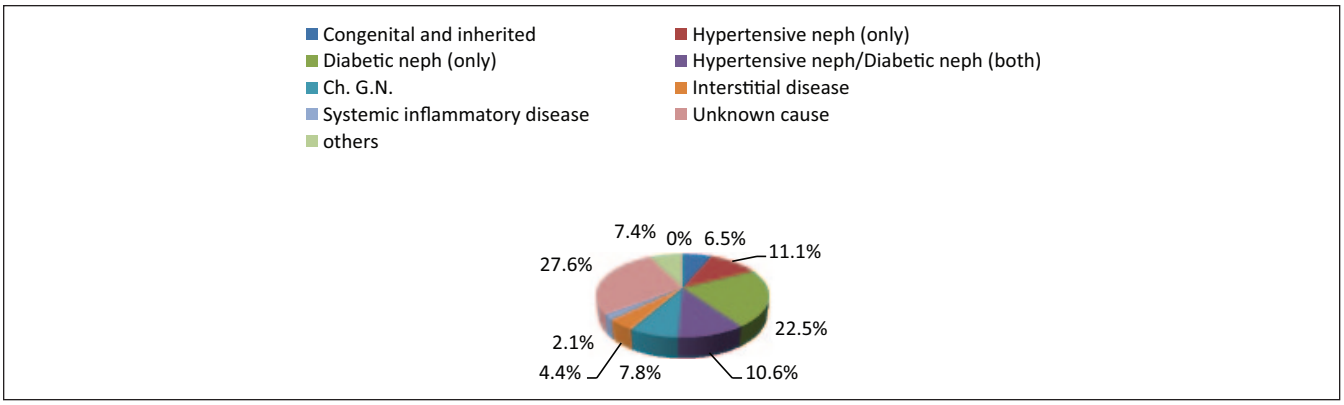

Figure 1. Number of patients by cause.
Source. Khader.[2]
Note. Ch.G.N. = chronic glomerulonephritis.

Table 3. Prevalence Rates and Presumed Causes of Hemodialysis by Gender and Age.

Variable	%	Presumed cause
Gender		
Male	57.6	
Female	42.4	
Age group (years)		
<14	4.3	Majority had congenital disease
15-24	8.9	Ch.G.N.
25-44	19.0	Ch.G.N.
45-64	45.0	Diabetic nephropathy
65-74	16.9	Diabetic nephropathy
>75	5.8	Diabetic nephropathy

Source. Adapted from Khader.[2]
Note. Ch.G.N. = chronic glomerulonephritis.

for Transplantation (United States), and compared it with dialysis. The study population consisted of 184 consecutive adult recipients of LD kidney transplants that were procured by the laparoscopic technique between March 1996 and March 1998. Cost-containment measures instituted during this series included elimination of routine postoperative antilymphocyte induction and an accelerated discharge clinical pathway with planned discharge of the recipient on the postoperative day. Costs of the transplants to the Medicare program were estimated from hospital charges, readmission rates, and immunosuppressant drug usage. These were compared with published costs to Medicare of dialysis in terms of a fiscal transplant vs. dialysis break-even point. The study found that the 1-year Kaplan-Meier patient and graft survival rates were 97% and 93%, respectively; and the break-even point with dialysis costs was calculated as 1.7 years after transplant. The study concluded that the cost of LD transplants can be safely reduced by elimination of routine postoperative antilymphocyte immune induction and by using a clinical pathway of early discharge.[6]

Hu et al[7] retrospectively reviewed the detailed medical records of 75 cadaveric renal transplantations performed at the National Taiwan University Hospital, between January 1992 and December 1996. All medical costs collected for each admission and outpatient clinic visit were analyzed. The study found that the average pre-transplant admission cost was not significant. The initial hospitalization cost for renal transplantation was US US$17 544 ± US$8745. The medical cost for maintenance HD was US$25 120 per year for one patient, and the average outpatient clinic visit charge after renal transplant was US$757 per month per patient. On average, for each renal transplant, there was a total savings of US$106 606 over 17 years, compared with regular HD of the same duration. They concluded that renal transplant is more economical than HD in the treatment of ESRD if the graft can function for more than 1.5 years 7.

The study by Kalo and Nagy[8] evaluated mortality hazard and cost of kidney transplantation compared to HD in Hungary. They examined 242 transplant patients and 840 HD patients with 3 years of follow-up. The standard mortality hazard was 3.5 times higher and the costs were significantly higher for the dialysis group, compared to the transplant group. Transplantation was deemed to have greater clinical efficacy and cost effectiveness.

Table 4. Summary of Prior Studies.

Year	Authors[ref.]	Region	Focus	Key findings
1998	Schweitzer et al[6]	USA	Cost of life donor transplantation compared with dialysis	Break-even point with dialysis costs was 1.7 years after transplant
1998	Hu et al[7]	Taiwan	Cadaveric renal transplant costs for each admission and outpatient clinic visit	Initial hospitalization cost for renal transplant was US$17 544 ± US$8745. Medical cost for maintenance hemodialysis was US$25 120 per year per patient. Outpatient clinic visit charge after renal transplant was US$757 per month per patient. Renal transplant yielded savings of US$106 606 over 17 years. Renal transplant is more economical if graft can function for >1.5 years
2001	Kalo and Nagy[8]	Hungary	Medical costs of kidney transplant vs hemodialysis	Transplant had significantly lower cost and risk after 1 year
2004	Jeantet et al[9]	Italy	Cost analysis of admission and clinical management of waiting list for renal and pancreas-kidney transplantation	Cost of managing waiting list for renal transplant is high and may substantially differ across different recipient groups by age and gender. Reduced waiting times allowed lower total costs
2005	Chaib-Eddour et al[10]	Belgium	Medical costs of kidney transplant	Mean direct medical costs from payer and patient were €37 792 and €2034, respectively
2007	Nourbala et al[11]	Iran	Kidney transplantation costs	Total cost of kidney transplantation was US$9235; 65.8% related to immunosuppression, 22.2% to transplant procedure, and 12% payments to donors
2007	Batieha et al[12]	Jordan	Epidemiology and burden of hemodialysis	Estimated annual cost of hemodialysis was US$29.7 million, 75% from hemodialysis sessions
2010	Elsharif et al[13]	Sudan	Estimated costs of kidney transplant compared with hemodialysis per year	Annual cost of hemodialysis was US$6847, total cost of first year after transplant was US$14 825, and US$10 651 after first year
2010	Su et al[14]	Taiwan	Risk factors and costs of dialysis patients	Risk factors such as age, hypertension, bile-duct disease, cancer, and high blood lipids were associated with higher costs
2010	Icks et al[15]	Germany	Long-term costs of dialysis covered by the statutory health insurance	Mean total dialysis-related cost was €54 777 per patient year, with 55% from dialysis procedures, 22% from medication, 14% from hospitalization, and 8% from transportation. No significant association between total cost and gender, dialysis strategy, ESRD duration, or diabetes

Note. Subjects of our interviews are briefly summarized in Table 5. ESRD = end-stage renal disease.

A study by Jeantet et al[9] assessed the costs of managing the waiting list of candidates for renal transplantation. They performed a cost analysis of admission and clinical management of a waiting list for renal and pancreas-kidney transplantation. Cost assessment followed a "bottom-up method" approach, defining global costs by adding the single factors of chemical-clinical and immunological tests, human leukocyte antigen mapping, imaging techniques, consultations with different specialists, and final control by the transplant team. The study found that the cost of managing the waiting list for renal transplantation is high and may substantially differ across different groups of recipients based on the requirements of age and gender. They did find that reduced waiting times allowed lower total costs.[9]

The study by Chaib-Eddour et al[10] evaluated medical costs of kidney transplantation in Belgium. The impact of acute rejection on the direct medical costs was investigated, as well as the costs of acute tubular necrosis (ATN) and complications, which were mostly cytomegalovirus (CMV) infection or disease. The analysis included the last 150 patients who received a kidney transplant, were treated with cyclosporine, and had 1 year of follow-up data. Cost information was obtained from anonymous hospital bills that provided amounts paid by the healthcare payer and patient. The mean direct medical costs from the healthcare payer's perspective, and patient's perspective, were €37 792 and €2034, respectively.[10]

Nourbala et al[11] conducted a study of kidney transplantation costs in Iran. The study reviewed the regulations for kidney transplantation using 2005 Dialysis and Transplant Patient Association information. Costs of transplantation procedures were categorized into personnel, drugs, auxiliary clinics, hospital beds, and other expenses. Included were the costs of immunosuppression and money paid to live donors.

The study found that the total cost of the kidney transplantation procedure was US$9235. 65.8% of the total cost was related to the immunosuppression, 22.2% to the transplant procedure, and 12% to payments to donors.[11]

Batieha et al[12] assessed the epidemiology and burden of HD in the Kingdom of Jordan. All patients on HD were surveyed between 1 September and 31 October, 2003. The study revealed that one third of the patients were 60 years of age or more and 55.9% were male. Prevalence of HD was 312 patients per million of population and the incidence in 2002 was 111 per million of population. Diabetes mellitus was the leading cause of HD—29.2% of all cases. The estimated total annual cost of HD was US$29.7 million, and 75% of the total cost was from HD sessions.[12]

Elsharif et al[13] conducted a cross-sectional study in the Sudan to estimate the costs of kidney transplantation and compare them to the costs of HD per year. The study recruited 78 patients with ESRD on regular HD and 33 kidney transplant recipients on regular follow-up at a center in Sudan. Patients on HD were receiving 2 sessions per week of in-center HD. Cost analysis was performed including the costs of medications administered by patients on dialysis, all of the consumed solutions for dialysis, drugs used during the dialysis session, the costs of transplantation surgery, all medications administered after transplantation, other medical procedures, costs of laboratory and radiological investigations, health staff salaries, non-medical supply costs, and depreciation of installations and equipment. The study found that the annual cost of HD was US$6847, the total cost of the first year after transplantation was US$14 825 and US$10 651 after the first year. It revealed that the cost of HD in Sudan was excessive, but less expensive than kidney transplantation.[13]

Su et al[14] examined the risk factors and costs of dialysis patients in Taiwan. On average, dialysis comprises 6–7% of the total annual health expenditure in Taiwan. In fact, reimbursements for dialysis are the highest when compared with other treatments. The study attempted to analyze and predict real resource consumption for dialysis patients with different risk factors, from a real cost perspective within healthcare organizations. Objectives of the study include identifying an association between risk factors of dialysis patients and consumption of medical resources, to suggest a model for setting the reimbursement rate for ESRD patients, and to explore and discuss the differences in types of resource consumption. Multiple regression analysis was used to identify 23 risk factors for routine dialysis patients. The study identified the relationship between the cost and risk factors based on average variable costs for each dialysis treatment. Their results show that certain risk factors such as age 75 and older, hypertension, bile-duct disease, cancer, and high blood lipids, were associated with higher costs.[14]

A study by Icks et al[15] estimated the long-term costs of dialysis covered by the statutory health insurance in Germany. All dialysis patients (n = 344) from the study region (54% male, mean age 69 ± 13 years, and diabetic), were assessed for the costs of dialysis procedures, dialysis-related hospital admission, outpatient contacts outside of the dialysis center, dialysis-related medications, patient transportation, and related costs. The study found that the mean total dialysis-related cost in 2006 was €54 777 per patient year. The largest part of the costs (55%) was caused by the dialysis procedures, followed by the costs of medication (22%), hospitalization (14%) and transportation (8%). No significant association was found between total cost and gender, dialysis strategy, ESRD duration, or diabetes.[15]

Methods

Because of the scarcity of data, we elicited expert estimates for some of the protocols and services. Our interviews with 8 experts included a hospital-based nephrologist, urosurgeon, Head of a kidney dialysis unit, Head Nurse of a kidney dialysis unit, pharmacist in the procurement unit of the Palestinian Ministry of Health, Director of Medical Supplies, Laboratory Department Director, and Head of the Intensive Care Unit. The subjects of our interviews are briefly summarized in Table 5.

Similar to prior research, the costing method we used was from the provider's perspective, and did not include the costs incurred by patients when obtaining care. We reviewed epidemic data on kidney diseases retrospectively, including the number of patients who were receiving in-center HD, the total number of deaths among patients on HD, the incidence rate, sessions per week, and number of dialysis machines in operation. Information on macroeconomic parameters was also collected, including the domestic inflation rate, domestic interest rate, and the lifetime of assets used to estimate capital costs.

We used expert opinions and prospective estimate methods to estimate the unit costs of HD and kidney transplantation. Costs were divided into direct and indirect components. Direct costs are those that are clearly associated with or physically traceable to a specific center, such as health care staff, medications, and consumed solutions. Indirect costs are those which benefit more than one cost center, including administrative service work for every service in the hospital. In the absence of data on actual overhead and administrative costs attributable to the target procedures, we added 20% of the direct costs as an estimate to obtain the total cost burden. To estimate the direct cost of kidney transplantation, our study divided the procedures into 3 phases, as presented in Table 6.

HD cost analysis was performed for each patient on dialysis, including the costs of medications, all the consumed solutions, drugs administered during the dialysis session, costs of laboratory/nonmedical supplies, specialists and nursing hours per session, and depreciation of equipment and dialysis machines. Our study used current replacement cost for capital items, rather than historical cost, which provided a more relevant measure of resource use. The following formula was used to estimate the annual costs of assets[16]:

Table 5. Summary of Expert Interviews.

Interviewees	Description
Nephrologist, Al-watani hospital	• Explain the kidney transplantation and hemodialysis process • Explain the effects of each procedure on productively and quality of life • Resources needed for each procedure, including human resources and other operating costs
Urosurgeon	• Explain the transplantation process, including the number of specialists, number of nurses, pre-process and post-process for transplantation, duration of medical procedures, hospitalization, drugs, and medical supplies.
Head of the Kidney Dialysis Unit, Palestine Medical Complex—Ramallah	• Provide overview of the hemodialysis process, and the optimal method for dialysis compared with the limited situation in Palestine
Head Nurse of the Kidney Dialysis Unit, Al-watani Hospital—Nablus	• Provide overview of the hemodialysis process, including all inputs of personnel time needed for each dialysis session, number of nurses per patient, drugs and medical supplies for each dialysis session
Pharmacist, Procurement Unit, Palestine Ministry of Health	• Estimate the unit cost of each prescription drug given to patients • In dialysis session • In kidney transplant • Monthly prescription drugs for non-communicable disease patients
Director of Medical Supplies	• Estimate the unit cost of each medical supply given to patients • In dialysis process • In kidney transplant
Director of Laboratory Department	• Estimate the lab tests needed and costs to the dialysis sessions, transplant, inpatient, and outpatient visits for ESRD patients
Head of the ICU Department, Palestine Medical Complex—Ramallah	• Explain the admission process for kidney transplantation patients, and the live donors • Average number of hospital days stay • Resources needed after surgery

Note. ESRD = end-stage renal disease.

Table 6. Phases, Procedures, and Inputs for Kidney Transplantation.

Phases	Procedure	Inputs
Phase 1: Pre-transplant	Medications, laboratory tests, diagnostic, outpatient visits	All medication costs (such as Simulect), all blood tests, and urine lab tests for each patient. Each diagnostic test used in transplants and the number of outpatient visits were also included The frequency of each test was multiplied by the unit costs of MOH tenders
Phase 2: Transplant surgery	All resources used	Resources used such as specialists' hours, nursing hours, laboratory, diagnostic, surgical, surgical supplies, medications, and support staff The number of units used by each patient was then multiplied by the cost per unit
Phase 3: Post-transplant	Medications, laboratory tests, diagnostic, outpatient visits, inpatients stay	All outpatient medications, immunosuppressive and anti-infective medications (with frequency). All blood and urine lab tests that were ordered for each patient, the cost of diagnostic and radiology services, the number/costs of outpatient encounters, and hospitalizations after surgery were also included Dosages were multiplied by the unit cost to determine cost per patient

Note. MOH = Ministry of Health.

Table 7. Annual Cost of Kidney Transplantation for the First Year (per Patient in US$).

Panel A: Cost of Kidney Transplantation by Phase.

Phases	Costs
Phase 1: Pre-transplant	1789
Phase 2: Transplant surgery	5499
Phase 3: Post-transplant	3809
Indirect costs	2220
Total	13 317

Panel B: Costs of Medications, Laboratory, and Outpatient Visits.

Category	Per month	Per year
Medications	231	2773
Laboratory	3	36
Outpatient visits	13	151
Total	247	2960

$$\text{Capital cost}_k = \frac{\text{Replacement cost}_k}{\text{Annualization factor}},$$

where k = year k, and the annualization factor is defined based on the real interest rate in the local market and the total life of the assets.

To estimate the capital cost per session, capital cost per year was divided by the number of annual sessions. The annual cost of HD was estimated using the following formula:

$$\text{Annual cost for hemodialysis per patient} = \alpha \times 3 \text{ per week} \times 52 \text{ week per year} + \beta,$$

where α is the unit cost of a dialysis session, and ß is the average shunt surgery per patient—as determined in a cost study by Jabr et al[17] For the years after the first year, we deduct ß from the formula.

The costs of medications for (1) diabetes, (2) blood pressure, (3) both conditions, were allocated to patients on dialysis and kidney transplantation, as 22.5%, 11.1% and 10.6%, respectively according to the risk factor rate estimated by Khader.[2]

Results

Our calculated average annual costs per patient for kidney transplantation, and the related medication, laboratory, and outpatient visits, are presented in Table 7, Panels A and B.

From Table 7, the total per-patient cost for kidney transplantation was US$13 317, plus US$2960 for the first year, or a total of US$16 277. After transplant, the per-patient cost continues at US$2960 per year.

Table 8. Average Costs of Hemodialysis Procedures per Session and per Year (per Patient in US$).

Category	Per session	Per year
Medications, medical, and non-medical supplies	45.50	7098
Labor costs	32.00	4992
Capital costs	3.50	546
Overhead (20%)	16.20	2527
Total cost	97.20	15 163

Note. Costs are based on an average of 3 sessions per patient per week, or 156 sessions per year.

In contrast, for a HD patient, the initial cost of shunt surgery (US$335, if needed) is significantly lower, but, consistent with prevailing international experience, the annual costs of dialysis are many times higher than transplantation, making HD significantly costlier than transplantation over time. Our per-patient costs of HD are presented in Table 8.

In addition to the costs presented in Table 8, the average cost of per patient for outpatient visits, medications and laboratory tests was US$922 per year. Thus, the total cost per patient was an average of US$16 085 per year (US$15 163 + US$922). This is in contrast with the US$2960 annual cost after transplantation.

Therefore, the higher first-year cost (US$16 277) of transplantation is fully offset in just 1.24 years by the yearly cost-savings of US$13 125 (US$16 085 for dialysis – US$2960 for transplantation). The annual cost savings then continue in subsequent years.

Conclusions

Kidney transplantation is generally acknowledged as the more clinically effective and more cost–effective option in managing patients with ESRD, providing substantial benefits in quality of life at reduced long-term costs, as compared with dialysis. Our study sought to compare the costs of dialysis with those of kidney transplants from the provider perspective in Palestine, with the aim to contribute in Ministry of Health policy development for renal health services. Since some of the typical modalities for treating renal failure, i.e., PD and home HD, are not widely available in Palestine due to a shortage of expert staff, specialists, and centers to follow the patient cases, provide training, make home visits, or provide educational programs for patients, this contributes to the clear advantages of transplantation. However, kidney transplants in Palestine depend on related, live donors, rather than cadaveric donors, which means fewer cases are eligible for transplant.

The government bears almost all of the costs of HD and transplantation in Palestine and will continue to do so into the foreseeable future. Our findings strongly suggest that investing in sufficient qualified staff, equipment, and clinical

infrastructure to replace HD services with transplantation whenever medically indicated and suitable kidney donors are available, as well as deploying PD programs and Home HD programs, will result in major overall cost savings. Our study contributes to the literature by providing epidemic data and comparative cost analysis for ESRD treatments in a region of the world where governmentally funded service options are quite limited. Our results provide a better understanding of the costs of ESRD and will help to inform Ministry of Health and related policy makers as they develop short- and long-term strategies for kidney health services for the population, in terms of both cost savings and enhanced quality of life.

Declaration of Conflicting Interests

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