Personal Support Worker (PSW)-supported home hemodialysis: A paradigm shift

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Abstract

Introduction: Despite improving clinical outcomes associated with the use of home hemodialysis (HD), its utilization is low in most countries. The inability or unwillingness of patients and their families to participate in their own treatment is one of the most important barriers to the adoption of home HD.

Methods: We hypothesized that paid helper-delivered home HD supported by public funds would be successful and welcomed by patients and be delivered at an affordable cost. We conducted a pilot project to dialyze six patients at home using Personal Support Workers (PSW) and resolve regulatory, organizational and financial constraints.

Findings: We provided publically-funded PSW-supported home HD to six patients. We describe the administrative structure of the pilot project allowing scalability and turnkey operation in the province of Ontario. Regulatory and insurance concerns were resolved and patients and staff were enthusiastic. The projected total dialysis cost, when economies of scale are met, are expected to be lower than the cost of in-center HD.

Discussion: A second phase of the project is currently under way including 8 hospitals and 67 patients. If equally successful, it may have significant implications for the delivery of care for End Stage Renal Disease in Ontario and similar jurisdictions. It promises to increase the utilization of home dialysis possibly at a lower cost than in-center HD. This would be particularly important in providing dialysis in underserviced and geographically hard to access areas.

Key words: Home hemodialysis, helpers, personal support workers

INTRODUCTION

Despite the high prevalence of home hemodialysis (HD) in the 1960's (>40%), the rate decreased after the commencement of public reimbursement of dialysis costs and the advent of CAPD. Since the mid 1990's there has been a resurgence in the interest for home HD associated with, among other factors, the improved outcomes of longer and more frequent HD. The most important barrier to the adoption of home HD is the unwillingness or inability of the patients and their families to perform hemodialysis at home. The Ontario Renal Network (ORN), a governmental organization, provides adequate funding for dialysis in Ontario including frequent dialysis.

Humber River Hospital in Toronto has 15 years' experience with patient-funded, paid helper-supported, home
HD. The helpers were employed by the patient or the patient’s family. The positive experience with patient-funded helpers served as incentive to embark on a pilot project employing Personal Support Workers (PSWs) to provide home HD using public funds.

PSWs are unregulated health care providers in Ontario who work under the supervision of a regulated health care professional or in the supported independent living environment under the direction of the client. Other names for similar personnel in other jurisdictions are unlicensed assistive personnel (UAP) and home health aides (HHA).

Hypothesis. We hypothesized that a. PSW-supported home HD can be provided successfully, safely and be welcomed by patients. b. the projected running cost (excluding capital cost and training or overhead cost) of delivery of PSW-supported HD is equal or lower than in-center hemodialysis. c. PSW-supported HD is structured to be generalizable to become a choice for patients in ESRD in the province of Ontario or similar jurisdictions. We describe the first phase of this pilot.

METHODS

A pilot project of paid helper-supported home HD was conducted from November 2012 censored at the end of October 2015. The scope of the project was to provide home hemodialysis to three patients, provided by three PSWs without any financial burden to the patients. It was subsequently extended to six patients.

Patient selection criteria

Patient selection criteria included patient medical stability for safe delivery of dialysis at home. There was no upper age limitation. The patients or family members were unable or unwilling to be trained to perform home HD. The patients had appropriate housing, water, and electricity supply in the Greater Toronto Area (GTA). Only prevalent patients were included. Incident patients were encouraged to adopt self-care home HD.

PSW training

The Humber River Hospital home dialysis team provided training to the PSWs as well as clinical supervision of the patient’s care, with assumption of the relevant responsibilities. The training was similar to the training provided to family members of the patients including fistula cannulation (ladder or buttonhole technique). The PSWs provided hemodialysis at home during the day, from 3 to 4 hours, 3 to 6 days per week based on clinical indications. Nocturnal HD was not offered. Each PSW was trained to provide hemodialysis to a specific patient(s). Dialysis training of the PSWs did not confer long term qualifications to the PSW to dialyze other patients. Training was provided for each new patient and the competency of the PSW to provide dialysis to that particular patient was reaffirmed.

Patient follow up

The patients were dialyzed at home according to the standard protocols and were followed in the home hemodialysis clinics accompanied by their PSW.

Review/approval

The project was approved by the Ethics Review Board of the hospital and the patients’ written consent was obtained.

Funding

The project was funded for the first 6 months through a grant from Janssen Inc. (Toronto, Canada). After the first 6 months, the funding of the project was assumed by the ORN, a governmental organization, while a more extended pilot project was being considered. The monies flowed through the hospital to the vendor employing the PSWs.

Administrative structure

The following administrative structure was created to allow for future scalability and low administrative cost.

Human resources (HR) administration

A partnership was established between the Humber River Hospital (HRH) and a private vendor (First Step Medical, Inc., Toronto, Canada). The vendor employed and supervised the administrative aspects of the PSW employment. It is expected that this structure would allow other dialysis programs to have access to PSWs in the future through the same vendor, connecting to a turnkey operation, while contributing to economies of scale (20–30 patients).

Liability insurance

The hospital agreed to provide legal protection for the home dialysis nurses, as when they train home hemodialysis patients. The vendor provided liability insurance for the PSWs.

Role of the funding agency

Janssen Inc. and later on the ORN provided reimbursement for the cost of the PSW involvement. The home
dialysis cost was reimbursed by the ORN as usual based on the home HD bundle payment.

Role of the PSW
The PSWs provided the full dialysis procedure to an individual patient including dialysis machine preparation and routine disinfection, blood sampling for testing and intravenous treatment (iron or antibiotics) as is routinely done by the patients or their families. The PSWs communicated with the home HD nurses about all the clinical or technical issues encountered and came to the clinic visits with the patient. They communicated with the vendor about HR issues. They did not train patients. They did not provide any services outside the scope of dialysis.

Role of the hospital
The home dialysis clinical group vetted the selection of the PSWs prior to their hiring by the vendor. The group was responsible for the training, certification, and maintenance of skills of the PSWs. It provided clinical care for the patients as well as back-up support by dialyzing patients in the hospital if the dialysis at home needed to be interrupted during hospital admissions or periods of unavailability of individual PSWs. It assumed liability insurance for the PSW training and the clinical care as well as fiscal responsibilities related to possible disruption of the process (e.g., late cancellation of a dialysis session without warning).

Role of the vendor
The vendor was responsible for the employment of the PSWs pursuing a contractual agreement with the hospital. A standardized contract was created by the ORN and is used in the extended project under way. The vendor supervised the adherence of the PSWs to the employment rules and behavior, and provided insurance liability costs for the PSWs. It had no involvement with the clinical aspects of the treatment.

Regulatory aspects
The Health Professions in Ontario are regulated by the Regulated Health Professions Act, enacted in 1991.4 Dialysis is a “controlled act” in Ontario. It can only be performed by a member of one of the regulated professions. These members, physicians and nurses, are regulated by the Colleges of Physicians and Surgeons of Ontario and the College of Nurses of Ontario respectively. The basis of the restriction of the act of dialysis is that it involves a. “a procedure on tissue below the dermis” and b. “administering a substance by injection.” A “controlled act” can be delegated. The delegation of a controlled act by a member of a health profession must be in accordance with any applicable regulations under the Health Profession Act governing the member’s profession (College of Physicians and Surgeons of Ontario and College of Nurses of Ontario). Dialysis was delegated by the nurses to the PSWs as part of this pilot.

RESULTS
Three PSWs were initially employed to dialyze three patients. All patients were dialyzed daily for 3 hours, 5 to 6 days weekly. The daily HD schedule of these patients was dictated by clinical indications. During the course of the project the same PSWs serviced another three patients for a total of six patients. The total of six patients included three males and three females with an average age of 64 (range 52–88). They were dialyzed for 5 to 31 months. Out of the original three patients: One was transplanted, one continues to be fully supported by a PSW, and one felt comfortable enough to perform her own home hemodialysis (nocturnal HD). The three extra patients were already on home HD, and would have been transferred back to in-center HD. They were still supported by PSWs at the end of the project.

The training of the PSWs took place within the allotted training time of 21 dialysis days. No dialysis related complications necessitating discontinuation of dialysis session and emergency transfer to the hospital occurred. On three occasions the patients were dialyzed in the home dialysis unit when the PSW was unavailable for 1 week at a time. There were two hospital admissions for reasons unrelated to the dialysis procedure. There were no episodes of access infection.

The pilot project was evaluated by an independent consulting company commissioned by the ORN (Cathexis Consulting, Toronto, Ontario, Canada). The patients, families, administrators, physician (AP), dialysis nurses, vendor, and PSWs were interviewed. The achievements of the project were outlined as follows: a. PSW assistance helps overcome barriers to HHD. b. PSW assistance improved care and self-reported quality of life. Although the number of patients was small and the scope of the pilot limited, all the patients were enthusiastically supportive of the project and happy with their experience.

Cost projections (all amounts are in CDN dollars: ORN perspective)

Cost description
The cost of the PSW-supported dialysis has of two components (Figure 1, Table 1):
a. **Cost of home dialysis (from ORN perspective).** This is reimbursed by the ORN to the hospital depending on the dialysis frequency, at $22,000 per patient year for conventional home hemodialysis thrice weekly and $34,000 per patient year for daily home hemodialysis (≥5X per week). It covers the cost of consumables, labor, administrative costs, and overhead of the dialysis program. The cost of the dialysis machine, home renovations for the machine installation, and the training of the patient are funded separately. In comparison, the reimbursement for providing in-center hemodialysis by the ORN is $50,400 per patient year for thrice weekly hemodialysis and $84,100 per patient year for in-center daily hemodialysis. The ORN reimbursement for CAPD is $34,000 per patient year and $38,000 for CCPD.

b. **PSW-related cost.** The extra cost required to provide PSW support includes the salary of the PSWs, as well as the vendor born administrative cost. The administrative cost per patient decreases with the number of patients in the program and is projected to plateau at 20 to 30 patients. The cost of training of the PSWs is covered in the reimbursement from the ORN, funding that would otherwise have covered the costs of home training for self-care.

The total cost of providing PSW-supported HD at home for 30 patients (economies of scale) represents the reimbursement cost paid by the ORN for home HD (see above) with the addition of the amount requested by the vendor to provide the PSW services (PSW salary and administration cost). The cost projected below is based on this vendor’s invoice and response to the Request For Proposal (RFP). We hope that early PSW attrition will be balanced by availability of previously trained PSW needing less training.

**Cost projection**

*Conventional.* PSW-supported home dialysis (4-hour dialysis thrice weekly, machine preparation and disinfection) is projected to cost: $22,000 for the dialysis cost

| Dialysis 3X per week at 6 h per visit | Dialysis 6X per week 5 h per visit |
|--------------------------------------|-----------------------------------|
| Total PSW-supported dialysis cost from payer perspective | $46,000 | $70,500 |
| Reimbursement for in-center HD from payer perspective | $50,400 | $84,100 |
| Savings per patient year | $4400 | $13,600 |
| PSW cost per patient per year | $24,000 | $36,500 |
| Home dialysis reimbursement by ORN | $22,000 | $34,000 |

**Table 1** Projected cost of PSW supported home HD compared to the cost of in center and home dialysis.
(current ORN bundle) and $24,500 for PSW salary and administration ($147 per session) for a total of $46,500. This is lower than the reimbursement rate of $50,400 per year provided by the ORN to the hospital for similar length in-center HD.

Daily. PSW-supported home dialysis (3-hour dialysis 5 days a week, machine preparation and disinfection) is projected to cost $34,000 for dialysis (current ORN bundle) and $36,000 for the PSW cost ($138 per session—shorter dialysis), total $70,000. This is lower than the current amount of $84,100 paid as part of the in-center daily HD rate currently provided by the ORN to the hospital.

Therefore, the savings by transferring patients from in-center HD to PSW-supported home HD are higher for patients on daily rather than conventional HD regimen. Depending on the dialysis frequency mix of the patients, it is projected that the cost of providing PSW supported home HD would be lower than in-center HD from the ORN (payor) perspective.

DISCUSSION

Renal replacement therapy for chronic ESRD using hemodialysis started in the early 1960's with more than 40% of the early patients on home hemodialysis, the only affordable dialysis modality at the time due to its low labor cost.1 Initiation of public reimbursement for dialysis in the 1970's led to the proliferation of hemodialysis units and a decline in home hemodialysis use.

Evidence over the last few years from both cohort and randomized controlled trials provided evidence of improved patient outcomes of home HD both from conventional as well as from frequent and long hemodialysis.5,6 Sufficient evidence supports improved blood pressure control with fewer medications, regression of cardiac hypertrophy, improved autonomic nervous system balance, improved sleep, improved phosphate control, reproductive health and pregnancy, quality of life, patient survival, and decreased hospitalization rates. In cohort studies, including a large number of patients, the outcomes of home HD may be better than on peritoneal dialysis.7 Despite some local variability, the attrition rate of home HD is lower than reported on peritoneal dialysis. Despite the positive implications from the use of home HD and the increased interest, the utilization of home HD is low in most jurisdictions.8

Paid home hemodialysis helpers had been used during the early years of hemodialysis in Seattle (Blagg C, personal communication, 2016). Nurses or unregulated helpers were also used in the 1970's in Alberta, Canada to provide home HD. Although the authors reported that the cost of assisted dialysis at home was lower than that of in center HD, the programs did not continue.9 The cost of nurse-supported home HD is prohibitive.

Renal care in Ontario

Health care in Canada is under provincial jurisdiction, partially supported by transfer payments from the Federal Government to the provinces. The province of Ontario has about 11,000 patients on dialysis, 8500 of whom are dialyzing in a hospital setting. The ORN, a public organization under the auspices of Cancer Care Ontario, funds, sets standards, and oversees the provision of dialysis in the province.10 The overwhelming majority of the dialysis providers in Ontario are the public hospitals. A dialysis reimbursement fee is paid by the ORN to the dialysis provider for each patient on a yearly basis (or part thereof), based on the type of dialysis modality utilized. The reimbursement rates for home dialysis are lower than those for in-center hemodialysis, reflecting the lower labor cost. Appropriate funding for frequent hemodialysis (daily or nocturnal) is provided by the ORN for both in-center and daily home HD.

Support for the adoption of Independent Dialysis (dialysis outside a dialysis unit, mainly home dialysis) has been a strategic priority of the ORN 11 and fiscal and administrative barriers are not significant. It is therefore likely that the most significant barriers to home hemodialysis in Ontario are related to the inability or the unwillingness of the patients or their families to be trained. Provision of home support by publically funded paid helpers, if offered, may then be potentially a catalytic option in expanding the utilization of home hemodialysis. A consensus conference in Australia reported that 13% of patients were prepared to do self-care dialysis at home but this number rose to 34% if assisted care was provided.12 This supports the concept that wider implementation of the current project will enhance the utilization of home HD.

Home HD at Humber River Hospital

Humber River Hospital is a community-based hospital in Toronto Canada, affiliated with the University of Toronto. Currently, out of 450 patients on dialysis, 20% are on home HD, 15% on peritoneal dialysis, 8% on limited self-care hemodialysis and the rest are on in-center hemodialysis. During the last 15 years, selected patients with adequate finances employed home helpers who were trained to provide home HD. Dialysis was performed during the
day and even at night. Most of the patients were on frequent HD. It was noted that in all the cases the quality of dialysis and communication of the health care team with the helper and the family were excellent. This success as well as the inability of most patients to bear the financial burden of a helper led to the current project.

PSW-supported home hemodialysis appeared to be safe as there were no complications related to the use of PSWs for 15 years. The perception among the renal team has been that PSW supported home HD is potentially safer than self-care dialysis at home, since the PSWs were more reliable compared to patients who can become unstable during HD impairing their ability to react to dialysis related catastrophic events. No significant system issues were encountered during the long experience with PSW supported home dialysis (total 14 patients over 15 years).

The potential of the project to lead to full home independence is exemplified by a patient who was trained to be fully independent. The potential of preventing attrition of home HD is exemplified by three patients currently supported who would have had to move to in-center HD.

The potential obstacles for the use of PSWs for the delivery of home HD are financial, administrative, regulatory, and related to the perception of risk. The current pilot has resolved most of these obstacles and was completed successfully. The hospital assumed the relevant risk, regulatory issues were considered and guidelines were created and followed. The administrative structure chosen includes the involvement of a vendor outside the hospital to assume the human resource administration of the PSWs. This will allow the addition of PSW supported patients from other hospitals without any new administrative burden involved. Provision of a PSW to patients from several hospitals is expected to decrease the administrative cost of the vendor per patient and allow the total cost of dialysis with PSW assistance to be potentially less expensive than in-center HD. Alternatively, PSWs can be employed by the hospital directly leading possibly to lower cost. The current structure is preferable allowing wider adoption of the concept.

The projection of potential financial benefits from PSW supported dialysis was done from the payor perspective (ORN). Other potential savings from such an approach can be accretive to these savings. Savings could stem from the decreased need to expand existing or to create new HD units; it will decrease transportation costs for patients and possibly to the public transportation system. The positive financial impact on the patients and their families can be significant either through improved vocational rehabilitation given the extra time available to them or the flexibility of the timing of dialysis. Inefficient satellites with a small number of patients in sparsely populated rural communities may be replaced by PSW supported dialysis at home. Furthermore, patients who need to travel for hours to the nearest dialysis unit will be able to be dialyzed at home.

Other benefits of the engagement of publically supported PSWs will be in servicing remote northern communities. The northern part of Ontario encompasses a large part of the province isolated during the harsh Canadian winters. Frequently during the winter time transportation is impossible. The patients, often residents of First Nation Reserves, have to permanently relocate to larger cities to receive HD if they are not good candidates for PD. A PSW program utilizing local residents would provide treatment at the home of the patient while providing local employment. Therefore, PSW supported home HD may be at least a partial solution to the accessibility to dialysis.

Previous attempts to use home assistants, although somewhat successful, did not become permanent due to financial or organizational reasons. They probably lacked the required organization, appropriate funding, the desirable scalability, or a centralized supervisory structure. The PSW project is supervised by the ORN that oversees, coordinates and funds dialysis in the province of Ontario. Therefore, it has a high probability to be successful and to become available throughout the whole province of Ontario.

**Expanded multi-center ORN pilot of PSW-supported home HD**

The successful implementation of the PSW pilot project at the Humber River Hospital and the attractive financial projections led to the planning of an expanded pilot project employing PSWs in the province of Ontario under the auspices of the ORN. The main goal is to examine the feasibility of such a project on a larger scale and to confirm that the projected costs from the first phase of the pilot project are accurate when economies of scale (more than 30 patients) are reached. This expanded project is already under way. It includes 8 hospitals in several cities in Ontario. It will provide PSW support to 67 prevalent HD patients who would otherwise not be able to dialyze at home. The project will be completed in 2 years. The ORN will continue reimbursing the hospitals at the rate of in-center HD bundle (conventional or daily) even when they are dialyzed by PSWs at home, expecting that the cost of PSW-supported home HD will be similar or lower than in-center HD.
This expanded project is consistent with the plans of the Provincial Ministry of Health and Long Term Care of Ontario to promote home care including the expanded use of PSWs.\textsuperscript{13}

In summary, we have shown that home dialysis provided by PSWs is feasible and is welcome by the patients. It is projected that the running cost from the payor’s perspective is likely to be lower than the cost of in-center dialysis of similar frequency. The organization of the project allows scalability to other dialysis centers. If indeed affordable, it may represent a breakthrough in the delivery of dialysis in Ontario and similar jurisdictions. It could remove the most significant obstacle, the inability or reluctance of the patients or their families to be trained, and may resolve the obstacles to providing dialysis in remote communities at a cost close to the in-center HD. An expanded feasibility project sponsored by the ORN which oversees the funding of dialysis in the province is under way with a larger number of patients and hospitals. PSW-supported home HD may have a significant effect on the model of provision of dialysis care in the province of Ontario and other similar jurisdictions.

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