SHORT REPORTS

Knowledge, Attitudes, and Practices with Regard to PD Access: A Report from the Peritoneal Dialysis Access Subcommittee of The Ontario Renal Network Committee on Independent Dialysis

The Ontario Renal Network (ORN) is a provincial organization that coordinates chronic kidney disease (CKD) care in Ontario, Canada. Ontario is Canada's largest province, with a population of approximately 13 million people. Approximately 16,561 patients were receiving chronic renal replacement therapy in 2011. Of these, 1,679 (10%) were undergoing peritoneal dialysis (PD) (1). In an effort to better understand the variability in PD utilization and practices within the province, and to understand opportunities to maximize the utilization of home dialysis therapies among eligible patients, the ORN established the Independent Dialysis Committee. A PD Access Subcommittee was subsequently formed to better understand and explore the barriers to successful and timely establishment of PD access and PD utilization across different programs.

In an initial effort to understand the role of successful and timely PD access, a survey was administered to all regional CKD programs in Ontario. The primary objective of this survey was to characterize the variability in the current state of PD catheter-related practices across programs in Ontario. Secondary objectives were to: 1) evaluate adherence to current evidence-based PD access practices, and 2) identify perceived PD access-related bottlenecks in regional programs that may be limiting growth in PD.

METHODS

The PD Access Subcommittee developed a survey based largely on the international guidelines for PD access (2) as well as input from the various regional medical and operational directors. The survey was designed to obtain information regarding: the number of PD catheters inserted, the characteristics of the operator(s) inserting PD catheters across programs, the insertion techniques used, the PD catheter type, pre- and post-operative

practices, perceived waiting times, and perceived complication rates, as well as respondent opinions regarding optimizing PD-access related practices and perceived barriers. The survey was subdivided into 2 sections: Section 1 was administered to PD nurses and/or regional directors, and Section 2 targeted medical PD program directors. After the survey was piloted in 2 programs, it was distributed in March 2012 by email to nephrology division heads and regional directors/PD nurse managers across the 26 regional CKD programs throughout Ontario. Where responses were not initially obtained, subsequent email follow-up on 2 occasions was sent directly to the non-responders to increase the survey's response rate.

RESULTS

Of the 26 regional CKD units to which this survey was sent, responses were received from 24 PD nurses or regional directors (92% response rate) and 19 division heads (73% response rate). The mean number of catheter insertions reported per program was 29.7 per year (median 31, range 2 – 64). The mean number of reported incident PD patients between January 1 and December 31, 2011, was 22. Of the survey responses analyzed, 34 had complete information, 7 had missing information for 1 – 2 survey questions, and 2 had missing information for 3 or more questions. Two medical director survey responses were received from the same center and lacked internal validity and so results were excluded from the analyses.

When asked, "Of the implanted catheters in 2011, what are the volumes of implants by specialty," programs reported that surgeons inserted 64.2% of all catheters, interventional radiologists inserted 20.5%, and nephrologists inserted 15.4%. With regard to the PD catheter characteristics, double-cuff catheters are used in 91.3% of centers, 4.3% use single-cuff catheters, and 4.3% use both. Regarding the intra-abdominal catheter segments, 73.9% of centers use coiled tip ("pig tail") catheters, 17.4% use straight tip, and 8.7% use both. In terms of PD access practices, when asked, "Does your center use prophylactic antibiotics at the time of PD catheter implantation," 84.2% of centers

Figure 1 — Number of inserted PD catheters that suffer from primary malfunction* within 3 months among 24 CKD programs in Ontario. * Primary malfunction was defined as the inability of the PD catheter to support adequate inflow and/or outflow of peritoneal dialysate despite aggressive medical management, requiring either procedural revision/manipulation, removal, or transfer to hemodialysis. PD = peritoneal dialysis; CKD = chronic kidney disease.

reported that they do. Figure 1 shows the rates of PD catheter primary malfunction (defined as the inability of the PD catheter to support adequate inflow and/or outflow of peritoneal dialysate despite aggressive medical management requiring either procedural revision/manipulation, removal, or transfer to hemodialysis). With regard to PD access dysfunction, 62.5% of centers reported that less than 10% of newly inserted catheters (inserted within 3 months) suffer from primary malfunction.

In response to the question, “How strongly do you agree that each of the following represent barriers to acquiring new patients in your peritoneal dialysis program: wait times for peritoneal dialysis catheter implantation,” 62.5% of centers reported that they do not view overall wait times for all methods of PD catheter insertion available at the center as a barrier to PD catheter insertion. When we characterized centers as interventional radiology (IR)-, surgery-, or nephrology-dominant (> 50% of catheters inserted by one method), we found that a higher percentage of IR- and nephrology-dominant centers felt that wait times for elective surgical catheter insertion were inappropriate compared to surgery-dominant centers (Figure 2A). As well, a higher percentage of IR- (75.0%) and nephrology-dominant centers (33.3%) felt that the surgeons at their center were not motivated to insert PD catheters compared to surgery-dominant centers (4.5%) (Figure 2B). The vast majority of centers (90.9%) believe that patients with previous major abdominal surgery are best served with laparoscopic PD catheter insertion vs nephrology- or radiology-inserted catheters, while the rest had neutral opinions in this regard.

Figure 2A — Attitudes toward wait times for elective surgical PD catheter implantation. PD = peritoneal dialysis; IR = interventional radiology.

Figure 2B — Attitudes toward surgeon motivation to insert PD catheters. * Dominance was defined as >50% of PD catheters at a facility inserted by a single insertion technique. PD = peritoneal dialysis; IR = interventional radiology.

DISCUSSION

The survey results demonstrate that there is significant variability in PD access-related practices within the province of Ontario. This is consistent with similar findings among a recent UK PD access audit (3). The findings are not surprising as there is a paucity of published data on optimal insertion methods or PD catheter designs. Where data does exist, it is often conflicting. For example, North-American observational data suggest that double-cuff catheters reduce the risk of PD-related infections and other PD-related complications (4), though Eklund *et al.* found that no such association exists in a prospective randomized controlled study, nor the results of a recent meta-analysis (5,6). Yet the practice of using double-cuff catheters was almost unanimous among surveyed centers, with 91.3% of centers reporting the exclusive use of double-cuff catheters. Similarly, we found that the majority of centers (73.9%) report the exclusive use of coiled-tip catheters, which are thought to reduce dialysate infusion pain, though meta-analysis has also linked them to increased rates of catheter tip migration (7). Our results for double-cuff catheter use as well as coiled-tip catheter use are remarkably similar to Wilkie's report on

a UK PD access survey, which reported values of 85.7% and 76.0%, respectively (8). It is clear that evidence-based knowledge regarding PD catheter type is lacking, and International Society for Peritoneal Dialysis (ISPD) guidelines do not suggest any one particular catheter type over another (2).

The variability in reported practices appears to extend even to those practices that are evidence-based. We chose to particularly focus on one evidence-based PD access practice: prophylactic antibiotic administration at the time of PD catheter insertion. Consistent with previous reports (9), we saw that the majority of centers adhere to this practice. In terms of center characteristics among those that did endorse the practice, of the 15.8% of centers that did not report administration of prophylactic antibiotics at the time of PD catheter insertion, none were university-affiliated centers, while all university-affiliated PD centers in the province reported the administration of perioperative prophylactic antibiotics. With regard to other reported associations with adherence to evidence-based guidelines (9) such as larger PD facility size, the median number of incident patients among facilities that did not administer perioperative prophylactic antibiotics was smaller, at 14 (interquartile range [IQR] 4 – 25), compared to 31 (IQR 17.5 – 45) in those centers that did. Of course, it is possible that some centers were unaware of the practice during routine surgical perioperative care. Nonetheless, this is particularly alarming given the strong high-grade recommendations for prophylactic antibiotic administration in the ISPD guidelines (2), and the findings of Gadallah *et al.* that failure to administer prophylactic antibiotics is associated with a high risk for the development of post-operative peritonitis (10). The variability in this practice in Ontario suggests the need for ongoing development of educational strategies and improvements in knowledge translation.

The survey results indicate variability in PD catheter outcomes as well, as seen in Figure 1, which shows reported primary PD catheter malfunction rates within 3 months. These low reported rates of PD access malfunction are consistent with recently reported Canadian data that reported a primary PD access failure rate of 4.6% among 4 PD programs within Canada (3 Ontario, 1 Manitoba) (11). International Society for Peritoneal Dialysis guidelines aim for a 1-year catheter patency rate of 80%, and we recommend further study to better define PD access quality indicators and determine the cause and nature of primary PD access malfunction, particularly at centers that reported high rates of primary malfunction (2).

Variability in PD access practices exists among different countries as well. Figure 3 shows the types of operators that perform PD catheter implantations in Ontario. In particular, the use of surgical PD access insertion varied significantly between facilities, which is consistent with a recent PD access audit by the UK Renal Registry (3). As well, similarly to the results of Wilkie's UK survey, we found that surgical insertion is most common, accounting for a reported 64.2% of all insertions. However, Wilkie reports that 1.2% of UK catheter insertions are performed by nurse specialists, a practice that is non-existent Ontario (8). Conversely, radiological insertion, which accounts for a reported 20.5% of all insertions in Ontario, does not appear to be reported as a practice performed in the UK (8).

To better understand the reasons behind the variability in surgical PD access insertion within the province, we questioned attitudes towards various aspects of the PD access process at the respective centers. At 62.5%, the majority of centers did not view PD access wait times as a barrier to the growth of their PD program. Yet we further examined the results between IR-, nephrology-, and surgery-dominant centers and focused on access to surgical PD catheter insertion. In doing so, we found that IR- and nephrology-dominant centers were more likely to report inappropriate wait times for elective surgical catheter insertion (Figure 2A) and less surgical motivation for PD access insertion (Figure 2B). These results are particularly interesting given that at 90.9%, the majority of respondents felt that laparoscopic PD catheter insertion was most appropriate for certain patients (i.e. those with previous major abdominal surgery). When taken together, these findings suggest the possibility that centers may be driven towards IR- and nephrology-guided catheter insertion as a result of dissatisfaction with their surgical insertion programs. To improve access to PD among patients, a better understanding of the need for strategies to improve access to surgical PD catheter insertion may be needed.

At this point it is unclear how the variability in PD access-related practices among different programs impacts PD access outcomes at these programs. The results of this study simply show that significant variability does exist, not only among different Ontario CKD programs but between Ontario and the UK as well. Further study is needed to develop and implement validated and standardized PD access quality performance metrics to better understand the impact that these differences have on the quality of care delivered and patient outcomes, particularly as it relates to the optimal insertion of PD access.

Figure 3 — Distribution of methods of PD catheter implantation across 23 chronic kidney disease programs in Ontario. PD = peritoneal dialysis.

ACKNOWLEDGMENTS

The authors would like to thank participating centers for the completion of these surveys and the support of the Ontario Renal Network Committee on Independent Dialysis.

DISCLOSURES

The authors have no financial conflicts of interest to declare.

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doi: 10.3747/pdi.2013.00240