

Patient Education and Peritoneal Dialysis Modality Selection: A Systematic Review and Meta-analysis

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Background: Educational interventions are increasingly used to promote peritoneal dialysis (PD), the most common form of home therapy for end-stage renal disease. A systematic review of the evidence in support of dialysis modality education is needed to inform the design of patient-targeted interventions to increase selection of PD. We performed a systematic review and meta-analysis to characterize the relationship between patient-targeted educational interventions and choosing and receiving PD.

Study Design: Systematic review and meta-analysis.

Setting & Population: Published original studies and abstracts.

Selection Criteria for Studies: We searched MEDLINE, EMBASE, CINAHL and EBM. We included controlled observational studies and randomized trials of educational interventions designed to increase PD selection.

Intervention: Predialysis educational interventions.

Outcomes: The primary outcome was choosing PD, defined as intention to use PD regardless of whether PD was ever used. The secondary outcome, receiving PD, was defined as an individual receiving PD as his or her treatment.

Results: Of 3,540 citations, 15 studies met our inclusion criteria, including 1 randomized trial. In the single randomized trial (N = 70), receipt of an educational intervention was associated with a more than 4-fold increase in the odds of choosing PD (OR, 4.60; 95% CI, 1.19-17.74). Based on results from 4 observational studies (N = 7,653), patient-targeted educational interventions were associated with a 2-fold increase in the odds of choosing PD (pooled OR, 2.15; 95% CI, 1.07-4.32; $I^2 = 76.7%$). Based on results from 9 observational studies (N = 8,229), patient-targeted educational intervention was associated with a 3-fold increase in the odds of receiving PD as the initial treatment modality (OR, 3.50; 95% CI, 2.82-4.35; $I^2 = 24.9%$).

Limitations: Most studies were observational studies, which can establish an association between education and choosing PD or receiving PD, but does not establish causality.

Conclusions: This systematic review demonstrates a strong association between patient-targeted education interventions and the subsequent choice and receipt of PD.

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INDEX WORDS: Peritoneal dialysis (PD); patient-targeted educational intervention; patient choice; dialysis modality; modality selection; choosing PD; patient-centered care; medical decision-making; renal replacement therapy (RRT); end-stage renal disease (ESRD); systematic review.

The prevalence of end-stage renal disease (ESRD) continues to increase.¹ Although patients with kidney failure constitute <0.1% of the adult population, they account for 5% to 7% of health care expenditures in high-income countries.² This is largely driven by the cost of providing long-term dialysis therapy, which, although life-saving, is resource intensive.² Conventional in-center hemodialysis (HD) and home peritoneal dialysis (PD) are the 2 main treatment options for patients requiring dialysis. Although PD and HD are

associated with comparable clinical outcomes^{3,4} and PD is much less expensive to provide in the developed world,⁵ PD use relative to other modalities is declining.¹ This has led to renewed interest in understanding the determinants of PD use and designing interventions to maximize the safe and effective use of PD.

Patients with kidney failure should be educated about the treatment options available to them and encouraged to make an informed decision regarding their preferred form of renal replacement therapy,

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unless they opt for conservative care. Current international guidelines support informed decision making by recommending that patients receive education about different modality options.⁶ Although a number of factors have likely had a role in PD use,⁷⁻⁹ the availability of modality education and the way in which modality education is provided may affect the proportion of patients who ultimately choose PD as their preferred treatment.

We conducted a systematic review of controlled observational and experimental studies to evaluate the association between structured patient-targeted dialysis modality education interventions and the choosing or receiving of PD in adults with chronic kidney disease (CKD). The primary outcome of interest was choosing PD; in other words, whether an individual intended to use PD, regardless of whether the individual ever received it. The secondary outcome of interest was receiving PD, defined as whether an individual went on to receive PD as his or her dialysis treatment.

METHODS

We did a systematic review according to a prespecified protocol (PROSPERO [International Prospective Register of Systematic Reviews] number: CRD42014010017) and reported in accordance with published guidelines.^{10,11}

Search Strategy

We searched MEDLINE, EMBASE, Cumulative Index to Nursing and Allied Health Literature (CINAHL), and Evidence-Based Medicine Reviews (EBMR) in September 2015 (Item S1, provided as online supplementary material). In addition, we reviewed abstracts from the annual meeting of the American Society of Nephrology for 2009 to 2014 and hand-searched reference lists of included articles for relevant citations. Each reviewer (B.W. and D.J.D.) independently performed title and abstract screening, and the full text of any study considered relevant according to the selection criteria outlined in the next section was retrieved for detailed review.

Selection Criteria

Two reviewers (B.W. and D.J.D.) independently assessed the full text of each potentially relevant study for inclusion using predetermined eligibility criteria. Studies of adults (aged ≥ 18 years) with CKD that reported patient-targeted education strategies about available dialysis modalities were included if they reported relevant outcomes (choosing PD or receiving PD only or choosing/receiving of PD with home HD) and incorporated a standard-care control group. We included both experimental and controlled observational studies and studies of all languages. Cross-sectional studies, case reports, review articles, and editorials without original data were excluded. Disagreements were resolved by a third coinvestigator (M.T.J.).

Data Extraction

All data were extracted in duplicate and included study characteristics (country, year, study design, sample size, and study duration), patient characteristics (age, sex, and mean estimated glomerular filtration rate at the time of education; Table 1), descriptions of the educational intervention (Table 2), and specific features of the education intervention (educators, diet, duration,

discussion format, inclusion of family members, medium of material; Table 3).

Outcomes

The primary outcome of interest was choosing PD; in other words, whether an individual intended to use PD regardless of whether the individual ever received it. This was expressed as an odds ratio (OR) that represented the odds that a patient receiving targeted modality education chose PD divided by the odds that a patient receiving standard care chose PD. A secondary outcome of interest was receiving PD. This captured whether an individual went on to receive PD and was calculated by dividing the odds of receiving PD in those receiving targeted modality education by the odds of receiving PD in patients receiving standard care.

Risk-of-Bias Assessment

For randomized studies, we evaluated risk of bias using criteria adapted from Higgins et al.¹² A risk-of-bias assessment tool based on Newcastle-Ottawa Scale criteria was applied to observational studies.¹³ Quality assessment did not influence the decision to include studies.

Data Synthesis and Analysis

Characteristics of included studies were compiled in tabular form according to the outcome of interest. The principal summary measures used were ORs. We compared the likelihood of choosing PD or receiving PD for participants who received educational intervention relative to the odds for those who did not receive educational interventions. Data were analyzed using Stata, version 13.1 (StataCorp LP). Due to expected differences between studies due to study design, patient population, and the different education strategies, we combined results using a random-effects model by DerSimonian and Laird.¹⁴ Studies' unadjusted estimates were pooled in the meta-analysis. The weight of each study in the meta-analysis was represented by size of the treatment effect estimated from that study. A random-effects model was used to determine the relative weight of each study. Statistical heterogeneity was quantified using the I^2 statistic. Stratified analyses and metaregression were used to examine whether the association between educational intervention and outcomes was modified by the following variables defined a priori: geographical region in which the study was conducted (European, Asian, and North American studies), severity of kidney disease at the time of receipt of education (only CKD stage 5 and patients with ESRD vs all patients with CKD), and whether the study reported choosing PD or receiving PD, or choosing or receiving PD and other self-care dialysis modalities combined.

RESULTS

Search Yield

The search strategy generated 3,540 unique citations; 3,373 citations were excluded after reviewing title and abstract. The initial study eligibility agreement between reviewers for abstract and title screening was high ($\kappa = 0.91$). A total of 167 articles were retrieved for full-text review (Fig 1). Of these, 15 primary articles and abstracts were eligible for inclusion in our systematic review. Reasons for exclusion included primary or secondary outcomes of interest not reported in the article ($n = 59$), not a report of original research ($n = 42$), lack of a control group ($n = 19$), intervention not clearly defined ($n = 19$), and cross-sectional design ($n = 13$; Fig 1). Among the 15 included studies, 7 were before-and-after studies, 5 were cohort studies, 2 were

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