**National Quality Forum—Evidence (subcriterion 1a)**

**Measure Number** (*if previously endorsed*)**:** 2706

**Measure Title**: Pediatric Peritoneal Dialysis Adequacy: Achievement of Target Kt/V

**IF the measure is a component in a composite performance measure, provide the title of the Composite Measure here:** Click here to enter composite measure #/ title

**Date of Submission**: 4/2/2019

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| **Instructions**  *Complete 1a.1 and 1a.2 for all measures. If instrument-based measure, complete 1a.3.*  *Complete* ***EITHER 1a.2, 1a.3 or 1a.4*** *as applicable for the type of measure and evidence.*  *For composite performance measures:*  *A separate evidence form is required for each component measure unless several components were studied together.*  *If a component measure is submitted as an individual performance measure, attach the evidence form to the individual measure submission.*   * All information needed to demonstrate meeting the evidence subcriterion (1a) must be in this form. An appendix of *supplemental* materials may be submitted, but there is no guarantee it will be reviewed. * If you are unable to check a box, please highlight or shade the box for your response. * Contact NQF staff regarding questions. Check for resources at [Submitting Standards webpage](http://www.qualityforum.org/Measuring_Performance/Submitting_Standards.aspx). |

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| **Note: The information provided in this form is intended to aid the Standing Committee and other stakeholders in understanding to what degree the evidence for this measure meets NQF’s evaluation criteria.**   1a. Evidence to Support the Measure Focus The measure focus is evidence-based, demonstrated as follows:   * Outcome: [**3**](#Note3) Empirical data demonstrate a relationship between the outcome and at least one healthcare structure, process, intervention, or service. If not available, wide variation in performance can be used as evidence, assuming the data are from a robust number of providers and results are not subject to systematic bias. * Intermediate clinical outcome: a systematic assessment and grading of the quantity, quality, and consistency of the body of evidence [**4**](#Note4)that the measured intermediate clinical outcome leads to a desired health outcome. * Process: [**5**](#Note5) a systematic assessment and grading of the quantity, quality, and consistency of the body of evidence [**4**](#Note4) that the measured process leads to a desired health outcome. * Structure: a systematic assessment and grading of the quantity, quality, and consistency of the body of evidence [**4**](#Note4) that the measured structure leads to a desired health outcome. * Efficiency: [**6**](#Note6) evidence not required for the resource use component. * For measures derived from patient reports, evidence should demonstrate that the target population values the measured outcome, process, or structure and finds it meaningful. * Process measures incorporating Appropriate Use Criteria: See NQF’s guidance for evidence for measures, in general; guidance for measures specifically based on clinical practice guidelines apply as well.   **Notes**  **3.** Generally, rare event outcomes do not provide adequate information for improvement or discrimination; however, serious reportable events that are compared to zero are appropriate outcomes for public reporting and quality improvement.  **4.** The preferred systems for grading the evidence are the Grading of Recommendations, Assessment, Development and Evaluation [(GRADE) guidelines](http://www.gradeworkinggroup.org) and/or modified GRADE.  **5.** Clinical care processes typically include multiple steps: assess → identify problem/potential problem → choose/plan intervention (with patient input) → provide intervention → evaluate impact on health status. If the measure focus is one step in such a multistep process, the step with the strongest evidence for the link to the desired outcome should be selected as the focus of measurement. Note: A measure focused only on collecting PROM data is not a PRO-PM.  **6.** Measures of efficiency combine the concepts of resource use and quality (see NQF’s [Measurement Framework: Evaluating Efficiency Across Episodes of Care](http://www.qualityforum.org/Publications/2010/01/Measurement_Framework__Evaluating_Efficiency_Across_Patient-Focused_Episodes_of_Care.aspx); [AQA Principles of Efficiency Measures](http://www.aqaalliance.org/files/PrinciplesofEfficiencyMeasurementApril2006.doc)). |

**1a.1.This is a measure of**: (*should be consistent with type of measure entered in De.1*)

Outcome

Outcome: Click here to name the health outcome

Patient-reported outcome (PRO): Click here to name the PRO

*PROs include HRQoL/functional status, symptom/symptom burden, experience with care, health-related behaviors.* (*A PRO-based performance measure is not a survey instrument. Data may be collected using a survey instrument to construct a PRO measure.)*

Intermediate clinical outcome (*e.g., lab value*): Kt/V

Process: Click here to name what is being measured

Appropriate use measure: Click here to name what is being measured

Structure: Click here to name the structure

Composite: Click here to name what is being measured

**1a.2** **LOGIC MODEL** Diagram or briefly describe the steps between the healthcare structures and processes (e.g., interventions, or services) and the patient’s health outcome(s). The relationships in the diagram should be easily understood by general, non-technical audiences. Indicate the structure, process or outcome being measured.

Dialysis dose is an intermediate clinical outcome. The link is intermediate health outcome-health outcome. The dose of dialysis is used to estimate the ability of peritoneal dialysis to clear the blood of accumulated toxins. In the adult population, outcome studies have shown an association between dose of hemodialysis in terms of small solute removal and clinical outcomes. Studies have shown a Kt/V of 1.8/week or greater in adult PD patients was associated with better serum albumin levels and improved survival.

Pediatric PD adequacy targets should be no lower than existing adult PD adequacy targets since generally, pediatric patients’ greater metabolic demands require higher adequacy targets in terms of small solute clearance. No equivalent large scale clinical trials have been conducted in the pediatric peritoneal dialysis population but smaller scale observational studies support the association between delivered peritoneal dialysis dose and patient outcomes including the potential for improved growth.

**1a.3** **Value and Meaningfulness:**  **IF** this measure is derived from patient report, provide evidence that the target population values the measured ***outcome, process, or structure*** and finds it meaningful. (Describe how and from whom their input was obtained.)

N/A

**\*\*RESPOND TO ONLY ONE SECTION BELOW -EITHER 1a.2, 1a.3 or 1a.4) \*\***

**1a.2** **FOR OUTCOME MEASURES including PATIENT REPORTED OUTCOMES - Provide empirical data demonstrating the relationship between the outcome (or PRO) to at least one healthcare structure, process, intervention, or service.**

N/A

**1a.3.****SYSTEMATIC REVIEW(SR) OF THE EVIDENCE (for intermediate outcome, PROCESS, or STRUCTURE PERFORMANCE measures, including those that are instrument-based) If the evidence is not based on a systematic review go to section 1a.4) If you wish to include more than one systematic review, add additional tables.**

**What is the source of the systematic review of the body of evidence that supports the performance measure? A systematic review is a scientific investigation that focuses on a specific question and uses explicit, prespecified scientific methods to identify, select, assess, and summarize the findings of similar but separate studies. It may include a quantitative synthesis (meta-analysis), depending on the available data. (IOM)**

X Clinical Practice Guideline recommendation (with evidence review)

☐ US Preventive Services Task Force Recommendation

☐ Other systematic review and grading of the body of evidence (*e.g., Cochrane Collaboration, AHRQ Evidence Practice Center*)

☐ Other

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| **Source of Systematic Review:**   * **Title** * **Author** * **Date** * **Citation, including page number** * **URL** | National Kidney Foundation. KDOQI Clinical Practice Guidelines and Clinical Practice Recommendations for 2006 Updates: Hemodialysis Adequacy, Peritoneal Dialysis Adequacy and Vascular Access. Am J Kidney Dis 48:S1-S322, 2006 (suppl 1).  http://www2.kidney.org/professionals/KDOQI/guideline\_upHD\_PD\_VA/pd\_rec6.htm |
| Quote the guideline or recommendation verbatim about the process, structure or intermediate outcome being measured. If not a guideline, summarize the conclusions from the SR. | “6.3.2.1 The minimal “delivered” dose of total (peritoneal and kidney) small-solute clearance should be a Kt/Vurea of at least 1.8/wk”  “For areas in which no pediatric-specific data exist, the CPGs and CPRs for adult patients should serve as a minimum standard for pediatric patients, but the overall clinical “wellness” of the individual pediatric patient should be the primary factor that influences the quantity and quality of the care provided.” |
| Grade assigned to the **evidence** associated with the recommendation with the definition of the grade | N/A |
| Provide all other grades and definitions from the evidence grading system | N/A |
| Grade assigned to the **recommendation** with definition of the grade | N/A |
| Provide all other grades and definitions from the recommendation grading system | N/A |
| Body of evidence:   * Quantity – how many studies? * Quality – what type of studies? | N/A |
| Estimates of benefit and consistency across studies | N/A |
| What harms were identified? | N/A |
| Identify any new studies conducted since the SR. Do the new studies change the conclusions from the SR? | The number of published clinical studies in the pediatric population is very small and includes small numbers of patients. PD adequacy studies among the pediatric population are largely observational studies; large scale clinical trials do not exist in the pediatric PD population because of the low prevalence of stage 5 CKD among pediatric patients, high transplantation rate, and difficulty of determining measurable study end points. Therefore, outcomes from the adult PD adequacy studies are evaluated, as experts agree that pediatric PD adequacy targets should be no lower than existing adult PD adequacy targets since generally, pediatric patients’ greater metabolic demands require higher adequacy targets in terms of small solute clearance.  Studies in the adult population and the small number of studies in the pediatric population generally support the relationship between improved solute clearance and clinical outcomes. The evidence supports a target Kt/V for peritoneal dialysis adequacy of between 1.7 and 1.8/week. There is evidence to support that the higher metabolic demands for growth in the pediatric population may require dialysis targets that are at least equal if not higher than in the adult population. There are no specific clinical studies evaluating frequency of adequacy measurements. However, dialysis adequacy would need to be measured in order to ensure that target adequacy doses are achieved.  The 2013 clinical TEP reviewed 30-40 studies on peritoneal dialysis adequacy for both the adult and pediatric populations. PD adequacy studies among the pediatric population are largely observational studies; large scale clinical trials do not exist in the pediatric PD population because of the low prevalence of stage 5 CKD among pediatric patients, high transplantation rate, and difficulty of determining measurable study end points. These include studies on solute clearance and clinical outcomes (such as the ADEMEX), the method of measurement of volume in the pediatric population (Morgenstern, et al. JASN 17:285-293, 2006), the importance of measurement of residual renal function (CANUSA study, Bargman JM, et al. JASN 2158-2162, 2001) and the importance of growth as an outcome measure in the pediatric population (Chadha V, et al. PDI 2001), among others.  In May 2014, an additional literature search was performed and additional pieces of evidence [11-14] are included in the citations below as a result of that search.   1. Paniagua R, Amato D, Vonesh E, et al. “Effects of increased peritoneal clearances on mortality rates in peritoneal dialysis: ADEMEX, a prospective, randomized, controlled trial.” Journal of the American Society of Nephrology: JASN (2002) 13:1307-20. PMID: 11961019.   Abstract: Small-solute clearance targets for peritoneal dialysis (PD) have been based on the tacit assumption that peritoneal and renal clearances are equivalent and therefore additive. Although several studies have established that patient survival is directly correlated with renal clearances, there have been no randomized, controlled, interventional trials examining the effects of increases in peritoneal small-solute clearances on patient survival. A prospective, randomized, controlled, clinical trial was performed to study the effects of increased peritoneal small-solute clearances on clinical outcomes among patients with end-stage renal disease who were being treated with PD. A total of 965 subjects were randomly assigned to the intervention or control group (in a 1:1 ratio). Subjects in the control group continued to receive their preexisting PD prescriptions, which consisted of four daily exchanges with 2 L of standard PD solution. The subjects in the intervention group were treated with a modified prescription, to achieve a peritoneal creatinine clearance (pCrCl) of 60 L/wk per 1.73 m(2). The primary endpoint was death. The minimal follow-up period was 2 yr. The study groups were similar with respect to demographic characteristics, causes of renal disease, prevalence of coexisting conditions, residual renal function, peritoneal clearances before intervention, hematocrit values, and multiple indicators of nutritional status. In the control group, peritoneal creatinine clearance (pCrCl) and peritoneal urea clearance (Kt/V) values remained constant for the duration of the study. In the intervention group, pCrCl and peritoneal Kt/V values predictably increased and remained separated from the values for the control group for the entire duration of the study (P < 0.01). Patient survival was similar for the control and intervention groups in an intent-to-treat analysis, with a relative risk of death (intervention/control) of 1.00 [95% confidence interval (CI), 0.80 to 1.24]. Overall, the control group exhibited a 1-yr survival of 85.5% (CI, 82.2 to 88.7%) and a 2-yr survival of 68.3% (CI, 64.2 to 72.9%). Similarly, the intervention group exhibited a 1-yr survival of 83.9% (CI, 80.6 to 87.2%) and a 2-yr survival of 69.3% (CI, 65.1 to 73.6%). An as-treated analysis revealed similar results (overall relative risk = 0.93; CI, 0.71 to 1.22; P = 0.6121). Mortality rates for the two groups remained similar even after adjustment for factors known to be associated with survival for patients undergoing PD (e.g., age, diabetes mellitus, serum albumin levels, normalized protein equivalent of total nitrogen appearance, and anuria). This study provides evidence that increases in peritoneal small-solute clearances within the range studied have a neutral effect on patient survival, even when the groups are stratified according to a variety of factors (age, diabetes mellitus, serum albumin levels, normalized protein equivalent of total nitrogen appearance, and anuria) known to affect survival. No clear survival advantage was obtained with increases in peritoneal small-solute clearances within the range achieved in this study.   1. Lo WK, Lui SL, Chan TM, et al. “Minimal and optimal peritoneal Kt/V targets: Results of an anuric peritoneal dialysis patient's survival analysis.” Kidney international (2005) 67:2032-8. PMID: 15840054   BACKGROUND:   Residual renal clearance has been shown to be much more predictive of survival than peritoneal clearance. There has been little data to support a target level of peritoneal clearance. A retrospective study was therefore conducted to see how the peritoneal Kt/V had affected the survival of anuric patients in our center.  METHODS:  Over a period of 10 years, there were 150 peritoneal dialysis patients with documented anuria. Their survival was analyzed according to their baseline peritoneal Kt/V at the time of documentation of anuria and at the time of their latest altered peritoneal dialysis (PD) prescription (subsequent Kt/V).  RESULTS:  There were 90 females and 42 diabetics. The mean age and duration of dialysis were 57.7 +/- 14.7 and 44.1 +/- 31.3 months, respectively. The 2-year and 5-year survival rates were 88.7% and 66.7%, respectively. We found that patients with baseline peritoneal Kt/V below 1.67 had poorer survival after the documentation of anuria than those above [relative risk (RR) 1.985, P= 0.01], although the baseline Kt/V was not an independent risk factors in the whole group of patients. However, such effect was mainly observed in female patients. The survival was identical between those with Kt/V above or below 1.80 (P= 0.98). Among female patients, the group with baseline Kt/V 1.67 to 1.86 had the best survival, followed by those greater than 1.86 and lowest in those below 1.67 (P= 0.0016). For patients with baseline Kt/V below 1.80, those with subsequent Kt/V above 1.76 had better survival than those below (P= 0.033).  CONCLUSION:  Our data suggested that a negative effect of peritoneal Kt/V on survival is apparent at a level below 1.67 and there exists a limit of its effect at around 1.80. We suggested a minimal Kt/V target of 1.70 and an optimal target at 1.80 in anuric patients based on survival data. Prospective randomized study is required to confirm this finding.   1. Holtta T, Ronnholm K, Jalanko H, Holmberg C. “Clinical outcome of pediatric patients on peritoneal dialysis under adequacy control.” Pediatric Nephrology (2000) 14: 889-97. PMID: 10975294   Abstract: Clinical outcome under adequacy control was studied in 10 pediatric patients under 5 years and 11 patients over 5 years of age on continuous peritoneal dialysis (PD). Outcome was compared between the age groups and with our previous results in patients under 5 years of age. Peritoneal equilibration test and 24-h dialysate collection were performed. Laboratory data, clinical status, and diet were recorded. PD prescription was adjusted for these parameters. The mean weekly urea Kt/V was similar and stable in the two age groups (3.1+/-0.6 vs. 3.2+/-0.4 at baseline). The mean weekly creatinine clearance (C(Cr)) was at baseline significantly lower in the younger age group (58.7+/-11.9 vs. 78.0+/-14.9 l/week per 1.73 m2, P=0.004), but later similar. Urea Kt/V and C(Cr) correlated significantly. Hematological and biochemical parameters were stable, and catch-up growth was observed in 62% of the patients during 9 months of follow-up. The outcome for children under and over 5 years of age did not differ significantly. The clinical outcome in patients under 5 years of age improved under adequacy control, when compared with our previous results in patients of the same age. This suggests a positive effect of adequacy control on clinical outcome.   1. National Kidney Foundation. KDOQI Clinical Practice Guidelines and Clinical Practice Recommendations for 2006 Updates: Hemodialysis Adequacy, Peritoneal Dialysis Adequacy and Vascular Access. Am J Kidney Dis 48:S1-S322, 2006 (suppl 1). 2. Rees L, Feather S, Shroff R. “Peritoneal Dialysis Clinical Practice Guidelines for Children and Adolescents.” British Association of Pediatric Nephrology (2008). 3. White CT, Gowrishankar M, Feber J et al. “Clinical practice guidelines for pediatric peritoneal dialysis.” Pediatric Nephrology: (2006) 21: 1059-66. PMID: 16819641\   Abstract: Peritoneal dialysis (PD) continues to be an important modality of treatment for children with end-stage renal disease. The Canadian Association of Pediatric Nephrologists recognized the need nationally to review the literature on the delivery of PD in children to provide optimal standardized care. This resulted in the development of the Canadian Clinical Practice Guidelines for pediatric PD. Clinical practice guidelines are a useful adjunct to clinical care. The present review includes recommendations for catheter placement and types, requirement for prophylactic omentectomy, initiation and adequacy of dialysis, PD prescription, and solute clearance. It provides physicians with updated evidence-based recommendations that include consideration towards practicality with the major goal of improved and standardized patient care.   1. European Best Practice Guideline Working Group. “European Best Practice Guidelines for Peritoneal Dialysis.” Nephrology Dialysis Transplantation (2005) 20:ix1-ix37. 2. Chadha V, Blowey DL, Warady BA. “Is growth a valid outcome measure of dialysis clearance in children undergoing peritoneal dialysis?” Peritoneal dialysis international : journal of the International Society for Peritoneal Dialysis (2001) 21 Suppl 3:S179-84. PMID: 11887816    OBJECTIVE:   Our study evaluated growth as a clinical outcome measure of peritoneal dialysis (PD) adequacy in children with end-stage renal disease (ESRD).  DESIGN:  This retrospective single-center study was carried out in our tertiary-care medical center.  PATIENTS:  The study enrolled 24 patients who initiated dialysis after January 1, 1995, and who had been on dialysis for a minimum of 1 year.  RESULTS:  The weekly mean total [PD + residual renal function (RRF)] creatinine clearance (C(Cr)) and Kt/V(urea) were 70.3 +/- 18 L per 1.73 m2 and 3.45 +/- 0.73, respectively. Of the 24 patients, 12 (50%) were anuric. The mean height standard deviation score (SDS) changed to -1.78 at the end of 1 year from -1.58 at baseline. Catch-up growth (positive delta height SDS) was observed in 9 patients (37%), 7 of whom (78%) had residual renal function (RRF). In contrast, only 5 of 15 patients (33%) with a negative deltaSDS for height had RRF (p < 0.025). The mean height SDS in patients with RRF improved to -1.64 from -1.78; in patients without RRF, it worsened to -1.90 from -1.37 (p = 0.01). While the weekly total Kt/V(urea) in patients with RRF (3.53) was similar to that in patients without RRF (3.37, p = 0.6), only the native Kt/V(urea) had a significant (but weak) positive correlation with delta height SDS (r2 = 0.17, p = 0.04). In contrast, the total weekly C(Cr) was significantly higher (p = 0.001) in patients with RRF (81.1 L/1.73 m2) as compared with those without RRF (59.5 L/1.73 m2). However, only the native C(Cr)--and not the dialysis C(Cr)--had a significant (but weak) positive correlation with delta height SDS (r2 = 0.17, p = 0.04).  CONCLUSIONS:  These preliminary data provide evidence for a correlation between solute clearance and growth, with RRF exerting a significant influence on that outcome. The Kt/V(urea) data also appear to contradict the presumed equivalence of PD and native clearance in children with ESRD   1. Morgenstern BZ, Wuhl E, Nair KS, Warady BA, et al. “Anthropometric prediction of total body water in children who are on pediatric peritoneal dialysis.” Journal of the American Society of Nephrology: JASN (2006) 17:285-93. PMID: 16319190   Abstract: Accurate estimation of total body water (TBW) is a critical component of dialysis prescription in peritoneal dialysis (PD). Gold-standard isotope dilution techniques are laborious and costly; therefore, anthropometric prediction equations that are based on height and weight are commonly used to estimate TBW. Equations have been established in healthy populations, but their validity is unclear in children who undergo PD, in whom altered states of hydration and other confounding alterations in normal physiology, particularly retarded growth and pubertal delay, may exist. TBW was measured by heavy water (H2O18 or D2O) dilution in 64 pediatric patients who were aged 1 mo to 23 yr and receiving chronic PD in the United States and Germany to establish and validate population-specific anthropometric TBW prediction equations and to compare the predictive power of these equations with formulas that have been established in healthy children. The best-fitting equations are as follows: For boys, TBW = 0.10 x (HtWt)0.68 - 0.37 x weight; for girls, TBW = 0.14 x (HtWt)0.64 - 0.35 x weight. The height x weight parameter also predicts body surface area (BSA). These equations can be simplified, with slightly less precision, to the following: For boys, TBW = 20.88 x BSA - 4.29; for girls, TBW = 16.92 x BSA - 1.81. TBW is predicted without systematic deviations and equally well in boys and girls, North American and European, obese and nonobese, growth-retarded and normally sized, and pre- and postpubertal children. In contrast, previous anthropometric equations that were derived from healthy children systematically overpredicted TBW and were less precise in this pediatric PD population. In summary, a new set of anthropometric TBW prediction equations that are suited specifically for use in pediatric PD patients have been provided.   1. Bargman JM, Thorpe KE, Churchill DN et al. “Relative contribution of residual renal function and peritoneal clearance to adequacy of dialysis: a reanalysis of the CANUSA study.” Journal of the American Society of Nephrology (2001) 12(10):2158-62.   Abstract: Studies of the adequacy of peritoneal dialysis and recommendations have assumed that renal and peritoneal clearances are comparable and therefore additive. The CANUSA data were reanalyzed in an effort to address this assumption. Among the 680 patients in the original CANUSA study, 601 had all of the variables of interest for this report. Adequacy of dialysis was estimated from GFR (mean of renal urea and creatinine clearance) and from peritoneal creatinine clearance. The Cox proportional-hazards model was used to evaluate the time-dependent association of these independent variables with patient survival. For each 5 L/wk per 1.73 m(2) increment in GFR, there was a 12% decrease in the relative risk (RR) of death (RR, 0.88; 95% confidence interval [CI], 0.83 to 0.94) but no association with peritoneal creatinine clearance (RR, 1.00; 95% CI, 0.90 to 1.10). Estimates of fluid removal (24-h urine volume, net peritoneal ultrafiltration, and total fluid removal) then were added to the Cox model. For a 250-ml increment in urine volume, there was a 36% decrease in the RR of death (RR, 0.64; 95% CI, 0.51 to 0.80). The association of patient survival with GFR disappeared (RR, 0.99; 95% CI, 0.94 to 1.04). However, neither net peritoneal ultrafiltration nor total fluid removal was associated with patient survival. Although these results may be explained partly, statistically, by less variability in peritoneal clearance than in GFR, the latter seems to be physiologically more important than the former. The assumption of equivalence of peritoneal and renal clearances is not supported by these data. Recommendations for adequate peritoneal dialysis need to be reevaluated in light of these observations.   1. Cho Y1, Johnson DW, Craig JC, Strippoli GF, Badve SV, Wiggins KJ. Biocompatible dialysis fluids for peritoneal dialysis. Cochrane Database Syst Rev. 2014 Mar 27;3:CD007554. doi: 10.1002/14651858.CD007554.pub2.   BACKGROUND:   The longevity of peritoneal dialysis (PD) is limited by high rates of technique failure, some of which stem from peritoneal membrane injury. 'Biocompatible' PD solutions have been developed to reduce damage to the peritoneal membrane.  OBJECTIVES:  This review aimed to look at the benefits and harms of biocompatible PD solutions in comparison to standard PD solutions in patients receiving PD.  SEARCH METHODS:  We searched the Cochrane Renal Group's Specialised Register (28 February 2013), through contact with the Trials Search Co-ordinator using search terms relevant to this review. Studies contained in the Specialised Register are identified through search strategies specifically designed for CENTRAL, MEDLINE and EMBASE, and handsearching conference proceedings.  SELECTION CRITERIA:  All randomised controlled trials (RCTs) and quasi-RCTs in adults and children comparing the effects of biocompatible PD solutions (neutral pH, lactate-buffered, low glucose degradation product (GDP); neutral pH, bicarbonate (± lactate)-buffered, low GDP; glucose polymer (icodextrin)) in PD were included. Studies of amino acid-based PD solutions were excluded.  DATA COLLECTION AND ANALYSIS:  Two authors extracted data on study quality and outcomes (including adverse effects). The authors contacted investigators to obtain missing information. Summary estimates of effect were obtained using a random-effects model, and results were expressed as risk ratios (RR) and their 95% confidence intervals (CI) for categorical variables, and mean difference (MD) or standardised mean difference (SMD) and 95% CI for continuous variables.  MAIN RESULTS:  Thirty-six eligible studies (2719 patients) were identified: Neutral pH, lactate-buffered/bicarbonate (± lactate)-buffered, low GDP PD solution (24); icodextrin (12). Allocation methods and concealment were generally incompletely reported, and adequate in only ten studies (27.8%). Patients lost to follow-up ranged from 0% to 83.4%. Neutral pH, low GDP versus conventional glucose PD solutionBased on generally sub-optimal quality evidence, the use of neutral pH, low GDP PD solutions was associated with larger urine volumes at the end of the studies, up to three years of therapy duration (7 studies, 520 patients: MD 126.39 mL/d, 95% CI 26.73 to 226.05). Improved preservation of residual renal function was evident in studies with greater than 12 month follow-up (6 studies, 360 patients: SMD 0.31, 95% CI 0.10 to 0.52). There was no significant effect on peritonitis, technique failure or adverse events with the use of neutral pH, low GDP PD solutions. Glucose polymer (icodextrin) versus conventional glucose PD solutionThere was a significant reduction in episodes of uncontrolled fluid overload (2 studies, 100 patients: RR 0.30, 95% CI 0.15 to 0.59) and improvement in peritoneal ultrafiltration (4 studies, 102 patients, MD 448.54 mL/d, 95% CI 289.28 to 607.80) without compromising residual renal function (4 studies, 114 patients: SMD 0.12, 95% CI -0.26 to 0.49) or urine output (3 studies, 69 patients: MD -88.88 mL/d, 95% CI -356.88 to 179.12) with icodextrin use. A comparable incidence of adverse events with the icodextrin (four studies) was reported.  AUTHORS' CONCLUSIONS:  Based on generally sub-optimal quality studies, use of neutral pH, low GDP PD solution led to greater urine output and higher residual renal function after use exceeded 12 months. Icodextrin prescription improved peritoneal ultrafiltration and mitigated uncontrolled fluid overload. There were no significant effects on peritonitis, technique survival, patient survival or harms identified with their use. Based on the best available evidence, the use of these 'biocompatible' PD solutions resulted in clinically relevant benefits without added risks of harm.   1. Cadnapaphornchai MA1, Teitelbaum I. Strategies for the preservation of residual renal function in pediatric dialysis patients. Pediatr Nephrol. 2014 May;29(5):825-36; quiz 832. doi: 10.1007/s00467-013-2554-0. Epub 2013 Jul 19.   Abstract: In adults with end-stage renal disease (ESRD), the preservation of residual renal function (RRF) has been shown to be associated with decreased mortality and improved control of complications of chronic kidney disease. However, less is known on the benefits of RRF in the pediatric dialysis population. The purpose of this article is to review the clinical significance of RRF and to discuss strategies for the preservation of RRF in children with ESRD.   1. Watanabe A1, Lanzarini VV, Filho UD, Koch VH. Comparative role of PET and Kt/V determination in pediatric chronic peritoneal dialysis.Int J Artif Organs. 2012 Mar;35(3):199-207. doi: 10.5301/ijao.5000070.   INTRODUCTION:   Nutritional state and growth are considered as prognostic markers of chronic peritoneal dialysis (PD) adequacy in pediatric patients. The euvolemia, blood pressure control, and metabolic and electrolytic equilibrium are parameters to be achieved by PD treatment.  OBJECTIVE:  To describe the chronic PD prescription parameters of a cohort of pediatric patients and to compare the obtained hemodynamic, antrophometric and adequacy results with those suggested by the literature.  METHODS:  Retrospective analysis based on clinical records evaluation of 30 pediatric patients undergoing PD for more than 6 months from January 1998 to May 2005.  RESULTS:  In the present study, 17/30 (56.7%) were boys. Chronic kidney disease was secondary to uropathy in 66.7% of the cases. The infusion volume was > 1,000 ml/m2 in 9 patients. The peritoneal membrane was characterized as high (27.8%), high-average (33.3%), low-average (22.2%) and low transporter (16.7%). The weekly urea Kt/V was > 2.1 in all the evaluated patients. Blood pressure parameters above the 95th percentile despite the use of antihypertensive medication were observed in 5/30 patients, four of whom with CKD secondary to glomerulopathy. The initial and final Body Mass Index and weight for height ratio were preserved in 83.3% (25/30) patients.  CONCLUSION:  Elevated indexes of small solutes removal are easily attained in pediatric PD patients and do not imply optimal clinical management do not imply optimal climanagement.   1. Baştuğ F1, Dursun I, Dursun J et al. Could mini-PET be used to instead of 4 h original-PET to assess peritoneal permeability in children on peritoneal dialysis? Ren Fail. 2014 May;36(4):562-6. doi: 10.3109/0886022X.2013.879368. Epub 2014 Jan 23.    BACKGROUND:   Original peritoneal equilibration test (PET) is an implementation that requires hard work for peritoneal dialysis (PD) staff. Therefore, several authors have attempted to validate short and fast PET protocols, with controversial results. The aim of this study was to evaluate the concordance between the mini-PET and original PET in children.  METHODS:  In 26 stable continuous ambulatory PD patients, we performed an original PET with 2.27% (4 h) and a mini-PET with 3.86% glucose PD fluid (1 h) and compared ultrafiltration (UF) and small solute transports obtained with the two methods.  RESULTS:  Twenty-six children, 14 males, mean age 11.4 ± 5.6 (range 2.5-19 years), were included. Meantime on PD at time of enrollment was 35.2 ± 24.5 months (range 6-84 months). Based on the 4-h creatinine D/P data, the number of the patients within each transport category was as follow: high, 5; average, 18; low, 3. Kappa test showed a significant concordance between original PET and mini-PET (k=0.610). Based on the 4-h glucose D/D0 data, the number of the patients within each transport category was as follow: high, 5; average, 17; low, 4. Kappa test showed a moderate agreement between original PET and mini-PET (0.514, p=0.000). When Pearson correlation analysis between original PET and mini-PET was performed, there were significant positive correlations between original 2.27% PET and mini-PET (r=0.720, p=0.000, r=0.638, p=0.000, respectively). When comparing the numeric results of mini-PET and 4 h of original PET for D/Creatinine, by simple regression analysis, we found statistically significant correlation among PETs.  CONCLUSIONS:  In this study, we showed concordance between the mini-PET and original PET. The 3.86% mini-PET is simple and fast methods to assess free water transport. This also gives information about total UF and small solute transports and it is in good agreement with the original PET. |

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**1a.4 OTHER SOURCE OF EVIDENCE**

*If source of evidence is NOT from a clinical practice guideline, USPSTF, or systematic review, please describe the evidence on which you are basing the performance measure.*

**1a.4.1** **Briefly SYNTHESIZE the evidence that supports the measure.** A list of references without a summary is not acceptable.

N/A

**1a.4.2 What process was used to identify the evidence?**

N/A

**1a.4.3.** **Provide the citation(s) for the evidence.**

N/A