Original Article

Peritoneal dialysis-related infections recommendations 2005—an important tool for quality improvement

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Abstract

Adequate performance measurement should be based on evidence-based guidelines. The recently published update of the International Society for Peritoneal Dialysis recommendations for peritoneal dialysis-related infections provides an opportunity to define a limited set of quality indicators as suitable for performance measurement and useful as targets for the improvement of dialysis care. Suitable quality indicators seem the incidence of peritonitis (target less than one episode every 18 months) and the percentage of culture-negative episodes (<20%). The lack of uniformity in definitions and the lack of studies providing evidence for firm recommendations are major limitations for further improvements in prevention, diagnosis and outcome of peritoneal dialysis-related infectious complications.

Keywords: performance measurement; peritoneal dialysis-related infections; quality indicators

During the last decades, the outcome of peritoneal dialysis (PD) has improved considerably due to an increase in centre experience, improvements in catheter insertion and post-operative catheter care, and important improvements in connector technology and the composition of the dialysate. Nevertheless, peritonitis is still one of the major complications of this dialysis modality, and contributes significantly to hospitalization, technique failure and even mortality.

Recently, the latest Recommendations of the International Society for Peritoneal Dialysis (ISPD) for the management of peritonitis and exit-site infections have been published [1]. The first guidelines for the treatment of PD-related infections were published in 1987 [2]. They were later revised in 1989, 1993, 1996 and 2000 [3–6]. For every new version of the Recommendations, a Committee of experts was carefully selected. These experts were nephrologists, publishing on PD infections and members with expertise in microbiology, pharmacology, infectious diseases and immunology. The Recommendations provide guidelines for good clinical practice. Due to lack of evidence only a part of these guidelines is evidence based. When evidence is lacking, the opinion of the Committee is recommended.

The usefulness of guidelines depends highly on the feasibility of their implementation. The possibility to demonstrate improvements in outcome is important for the likeliness for guidelines to be adapted by professionals. For the demonstration of improvements in the quality of care the measurement of performance is essential. For performance measurement, it is important to define a limited set of quality indicators preferably related to guidelines [7]. Performance measurement is not only important for the process of systematic improvement of care, but it also provides an opportunity to compare different centres and learn from the experiences of others. In addition, results from performance measurements can provide evidence for future guidelines.

In health care, performance measurement is still in its infancy [8]. Few performance measures have been adequately tested for validity and reliability. It is important that outcome-based performance measures are adjusted for potential co-morbidities and socio-economic risk factors but the current experience with risk adjustment and stratification techniques is limited. Nevertheless, performance measurement is regarded as an important tool to improve outcome of medical care and is increasingly becoming an integral part of health care. The recent guidelines for PD-related infections can be considered as an opportunity to define clinical quality indicators that are suitable for performance measurement and applicable across countries.
Quality indicators for peritoneal dialysis-related infections

For evaluating the incidence and outcome of infections, monitoring is essential. The importance of monitoring infection rates has been recognized since the mid-1800s, when Florence Nightingale measured infection rates at British military hospitals during the Crimean war and Ignaz Semmelweis measured mortality due to puerperal fever in Vienna [9]. It is of interest that monitoring infection rates is still not a common practice in daily clinical care.

Quality indicator for prevention

Initially, the ISPD Recommendations were focused mainly on the treatment of peritonitis and exit-site infections. In the recent ISPD Recommendations, the importance of prevention is stressed as peritonitis prevention is considered as one of the keys to success with PD [1].

According to the ISPD Recommendations, in a PD programme every effort should be made to prevent peritonitis. For the prevention of peritonitis several measures are of importance: adequate catheter placement, dedicated post-operative catheter care, proper exit-site care and antibiotic prophylaxis for procedures. Furthermore, it has been shown that training and retraining of the patients is effective in reducing the rate of exit-site infections and peritonitis. The incidence of peritonitis usually decreases with increased centre experience.

The ISPD Recommendations strongly recommend monitoring all PD-related infections, both peritonitis and exit-site infections, including the presumed cause and cultured organism, as part of a continuous quality improvement programme. The ISPD Recommendations provide several methods for monitoring these PD-related infections [1]. In order to have the possibility to compare the outcome with the literature or with other PD-programmes, infection rates should be uniformly calculated. The calculation as number of infections divided by dialysis-years’ time at risk, and expressed as episodes per year, seems the most appropriate to achieve this goal. These calculations should not only be made for all episodes of peritonitis and exit-site infections, but should also be made for the specific causative organisms.

A quality indicator for prevention is the incidence of peritonitis. Peritonitis can be diagnosed relatively easily as this complication presents with cloudy effluent and/or abdominal pain. Effluent cell count, differential and culture, confirm the diagnosis. As described earlier the incidence of peritonitis can be influenced by preventive measures. The Committee felt that the overall peritonitis-rate should not be not more than one episode every 18 months (0.67 per year at risk). The rate achieved is to some extent dependent on the patient population, but as overall rates as low as 0.29–0.23 per year have been reported, this goal should be feasible.

Theoretically, another quality indicator for prevention could be the rate of exit-site infections. However, compared with peritonitis, the diagnosis of exit-site infection is less well established. An exit-site infection is usually defined by the presence of purulent drainage, with or without erythema around the exit-site. However, pericatheter erythema without purulent drainage can also be an indication of infection. Before the incidence of exit-site infections can be used as a quality indicator, uniform criteria for diagnosis should be used. The recent ISPD Recommendations provide uniform criteria for the diagnosis of exit-site infections, which should be used in the future.

Quality indicator for diagnosis

Another field that can be improved is the diagnosis of peritonitis. In many centres, an unacceptably high rate of culture-negative peritonitis results in difficulties to choose the appropriate antibiotic treatment. As a first step, all patients should be queried on presentation about the use of antibiotics for any other reason, as this is a well-known cause of culture-negative peritonitis. However, of utmost importance for establishing the responsible microorganism is the correct microbiological handling of peritoneal effluent.

To avoid contamination during specimen collection, standardized procedures should be used. In many centres specimens of the PD effluent are taken in the microbiology laboratory under aseptic conditions. Standard culture techniques with blood-culture bottles are used. Culture results can be improved also when the sediment of the 50 ml effluent, after being centrifuged at 3000 g for 15 min, is used for culturing both into solid culture media and into a standard blood-culture medium. This method generally results in a culture-negative rate of <20%.

The output of cultures can be further improved when culture media enriched with Tween-80 are used in order to free intracellular microorganisms from leucocytes, and with the use of media for lipophilic microorganisms. Furthermore, when cultures do not grow even after 1 day, special media and conditions developed for relatively rare causative microorganisms like fungi, mycobacteria, campylobacter, legionella, mycoplasma, ureaplasma and enteroviruses should be used. With this approach, a culture-negative rate below 5% can be obtained [1].

The Committee felt that the rate of culture-negative peritonitis could be used as a quality indicator for the adequacy of diagnosis. Culture-negative peritonitis should be <20% of the episodes. If a programme has a culture-negative peritonitis-rate >20%, the culture methods should be carefully reviewed and improved. This will always require a good coordination with the microbiology laboratory and a step-by-step evaluation of the protocols used.
Quality indicator for treatment

Adequate treatment of peritonitis, timely removal of the catheter in case of refractory or relapsing peritonitis and an awareness of the clinical complications of peritonitis, like malnutrition and fluid-overload, result in lower mortality rates and less morbidity. The mortality rate of peritonitis can be regarded as a possible quality indicator. However, mortality due to peritonitis is not uniformly defined. Is the cause of mortality in a patient dying from myocardial infarction during an episode of peritonitis, ‘peritonitis’ or ‘myocardial infarction’?

The Committee defined death related to peritonitis as death of a patient with active peritonitis, or admitted with peritonitis, or within 2 weeks of a peritonitis episode [1]. Mortality due to peritonitis should be an infrequent event, which is, however, influenced markedly by the case-mix of the patients and by the microorganisms involved. Therefore it seems not justified to use mortality rates due to peritonitis as a quality indicator. Alternative quality indicators for the treatment of PD-related peritonitis are not yet developed.

Challenges for the future

Adequate performance measurement should be based on evidence-based guidelines. One of the problems the Committee was confronted with is the lack of studies providing evidence for firm recommendations. Further clinical trials in PD patients are required, particularly randomized trials assessing different treatment strategies. Furthermore, there is a lack of uniformity in definitions and completeness of data. Standardization of definitions and data collection is of utmost importance for the interpretation and reproducibility of the information provided. It is for this purpose that the ISPD Recommendations also provide guidelines for research in PD-related infections.

An awareness of the guidelines and performance measurement by quality indicators is not a goal in itself. They are only useful when they are part of a continuous, systematic improvement of the quality of care provided to the patients. Improvements in care directly attributable to performance measurement have been repeatedly reported [9], and are also documented in patients suffering from end-stage renal disease [10–12]. However, these studies also point to the difficulties in implementing clinical guidelines in the everyday management of individual patients. It is a challenge for the future to demonstrate performance measurement-related improvements in prevention, diagnosis and outcome of PD-related infectious complications.

Conflict of interest statement. None declared.

References