

# Bag Exchange in Continuous Ambulatory Peritoneal Dialysis Without Use of a Face Mask: Experience of Five Years

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*This article describes our five-year experience of continuous ambulatory peritoneal dialysis (CAPD) with bag exchanges performed without use of a face mask. The study took place in the renal unit at a university hospital. All patients admitted to the CAPD program from February 1995 to March 2000 were trained to perform bag exchanges without use of a face mask. Occurrence of peritonitis episodes was the outcome of interest.*

*We evaluated 94 patients (52 women, 42 men) with a mean age of  $48 \pm 21$  years and a total follow-up of 50,502 patient days. During that time, 79 episodes of peritonitis occurred in 46 patients, for a peritonitis rate of 0.57 episodes/year. The most frequently isolated micro-organisms were *Staphylococcus epidermidis* in 20 patients (25.3%) and *S. aureus* in 11 patients (13.9%). Renal transplantation was the major cause of drop-out [23 patients (43.4%)], followed by peritonitis [14 patients (26.4%)], death due to cardiovascular complications [9 patients (17.0%)], loss of ultrafiltration [2 patients (3.8%)], and other causes [5 patients (9.4%)]. The probability of being free of peritonitis at 12 months was 0.60, and at 60 months, 0.37.*

*Peritonitis rates during the study period were not different from those reported by other centers, supporting the hypothesis that routine use of a face mask during CAPD bag exchange may be unnecessary.*

Peritonitis is a serious complication of continuous ambulatory peritoneal dialysis (CAPD), and a significant cause of treatment failure. Peritonitis prevention requires a series of procedures, and routine use of a face mask during CAPD bag exchange has been standard practice in several countries for peritonitis prevention. In a preliminary study (1), the peritonitis rate and the probability of remaining free of peritonitis were not different between groups performing bag exchanges with and without use of a mask. The aim of the present study was to describe a five-year experience of CAPD with bag exchanges being performed without the use of a face mask.

This cohort study was performed in the Renal Unit of Hospital São Lucas (a university hospital, in Porto Alegre, Brazil). All patients (n = 94) admitted to the CAPD program between February 1995 and March 2000 were trained to perform bag exchanges without the use of a face mask. Every peritonitis episode was registered. The Y-connector, Ultra Bag (Baxter Hospitalar Ltda., São Paulo, Brazil), and Andy-Plus (Fresenius Medical Care, São Paulo, Brazil) CAPD systems were employed. All patients and their assistants were trained by the same nurse to perform bag

exchanges. The practiced technique involved cleaning components with ethyl alcohol (70%) in a confined environment, and washing hands with glycerin soap for three minutes before starting the procedure. Patients received information regarding peritonitis presentation and measures to be taken in case infection occurred. All patients were also instructed not to talk during bag connections.

An episode of peritonitis was defined as the presence of effluent dialysate turbidity, usually associated with abdominal pain and fever, and a cell count above 100 leukocytes/mL, with more than 50% neutrophils. Peritonitis occurrence was calculated using patient days and episodes per year. Kaplan Meier was used to analyze time to first peritonitis episode. Data were processed and analyzed using SPSS 8.0 (SPSS Inc., Chicago, IL, U.S.A.) for the Windows operating system.

We evaluated 94 patients [52 women (55%), 42 men (45%)]. Mean age was  $48 \pm 21$  years; total follow-up time was 50,502 patient days. Bag exchanges were performed by patients in 65 observations and by assistants in 29 observations. Twenty-five patients were diabetic, and 31 were more than 60 years old.

In of 46 patients, 79 peritonitis episodes occurred, for a peritonitis rate of 0.57 episodes per year. The most frequently isolated micro-organisms were *Staphylococcus epidermidis* [20 patients (25.3%)] and *S. aureus* [11 patients (13.9%)]. *Enterococcus* species was isolated in 7 episodes (8.9%), gram-negative bacilli in 20 (25.3%), *Candida* species in 2 (2.5%), *Mycobacterium tuberculosis* in 1 (1.2%), and mixed peritonitis in 5 (6.3%). In 13 patients (16.5%), cultures were negative.

The probability of remaining free of peritonitis, over time, without a mask was 0.60 at 12 months and 0.37 at 60 months (Figure 1).

Renal transplantation was the chief cause of drop-out [23 patients (43.4%)], followed by peritonitis [14 patients (26.4%)], death due to cardiovascular complications [9 patients (17.0%)], loss of ultrafiltration [2 patients (3.8%)], and other causes [5 patients (9.4%)].

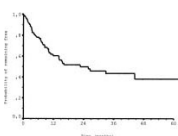


figure 1 Probability of remaining peritonitis-free in patients performing bag exchange without a face mask (KaplanMeier). Survival curve over 60 months of follow-up is depicted.

We previously verified no difference in the probability of developing the first episode of peritonitis without mask and no difference in the total number of episodes of peritonitis between patients performing bag exchange with and without face mask (1). Furthermore, on Cox proportional hazard regression, face mask had no protective effect for the occurrence of the first episode of peritonitis (1). The current study shows that the occurrence of peritonitis in patients performing bag exchanges without a face mask is not different from that reported by other centers (2,3).

Eliminating the face mask would reduce CAPD costs (4,5) and would simplify the bag exchange procedure and the training of patients and assistants, thus adding to therapy success. The face mask may be an added annoyance to unaccustomed individuals during the bag-exchange procedure. Besides, hand contamination may result when the

patient tries to correctly position the mask or involuntarily touches it. Adequate hand-washing, and not the act of wearing face mask, may possibly be the most important factor in infection control (6).

It has long been known that *S. aureus* nasal carriers are also skin carriers (7), and that bacteria may be transferred from hands to the exit site and the CAPD tubing during bag exchange. In this case, the wearing of a mask will not prevent peritonitis. Instead, the mask may be a source of bacterial contamination, from rubbing against the face (8).

The subject of this study use of a face mask and prevention of infection is an important and much neglected issue. McLure et al (9) suggested that wearing a face mask prevented downward dispersal of upper respiratory tract bacteria into agar blood plates during talking and head turning. However, a 50% reduction in surgical wound infection has been reported when masks were not in use (10).

Conflict between evidence and surgical tradition surrounds the use of the face mask (4,11 13). Several studies suggest no difference in the prevalence of surgical wound infection by wearing or not wearing a mask during surgery, when caring for burn patients, or in the settings of an emergency room and percutaneous cardiac catheterization facility (10,13 18). A recent editorial (19) maintains that wearing a mask during surgery has survived because it seems a reasonable approach, even without supportive evidence. Still, it is questionable if the surgical community and society are prepared to reconsider and reassess the value of an age-old, yet unproven, practice. The same reasoning may apply to CAPD patients during bag exchange. Our previous study reported the experience of a single center with a restricted number of patients but it provided the only available evidence on the use of a face mask and CAPD peritonitis prevention (1).

Peritonitis rates reported during our observation period are compatible with those seen in other centers (2,3) and support the hypothesis that routine use of a face mask during CAPD bag exchange may be unnecessary.

- Figueiredo AE, de Figueiredo CE, d Avila DO. Peritonitis prevention in CAPD: to mask or not? *Perit Dial Int* 2000; 20:354 8.
- Diaz Buxo JA, Crawford TL. Peritonitis and antibiotic therapy in patients on cyclic peritoneal dialysis an update. *Adv Perit Dial* 2000; 16:229 32.
- Thodis E, Passadakis P, Panagoutsos S, Bacharaki D, Euthimiadou A, Vargemezis V. The effectiveness of mupirocin preventing *Staphylococcus aureus* in catheter-related infections in peritoneal dialysis. *Adv Perit Dial* 2000; 16:257 61.
- Leyland M, McCloy R. Surgical face masks: protection of self or patient? *Ann R Coll Surg Engl* 1993; 75:1 2.
- Tunevall TG. Postoperative wound infections and surgical face masks: a controlled study [Discussion]. *World J Surg* 1991; 15(3):387 8.
- Stucke V. Care of the infected at risk patient aseptic techniques and basic infection control measures. In: *Microbiology for Nurses: Applications to Patient Care*. 7th ed. London: Baillière Tindall; 1993: 365 408.
- Hare R, Thomas CGA. The transmission of *Staphylococcus aureus*. *Br Med J* 1956; 2:840 4.

- Schweizer RT. Mask wiggling as a potential cause of wound contamination. *Lancet* 1976; 2:1129 30.
  - McLure HA, Talboys CA, Yentis SM, Azadian BS. Surgical face masks and downward dispersal of bacteria. *Anaesthesia* 1998; 53:624 6.
  - Orr NW. Is a mask necessary in the operating theatre? *Ann R Coll Surg Engl* 1981; 63:390 2.
  - Taylor L. Questions and answers. Are face masks necessary in operating theatre and wards? If so, what type do you recommend? *J Hosp Infect* 1980; 1:173 5.
  - Ayliffe GA. Masks in surgery? *J Hosp Infect* 1991; 18:165 6.
  - Ransjö U. Masks: a ward investigation and review of the literature. *J Hosp Infect* 1986; 7:289 94.
  - Ritter MA, Eitzen H, French MLV, Hart JB. The operating room environment as affected by people and the surgical face mask. *Clin Orthop* 1975; 111:147 50.
  - Laslett LJ, Sabin A. Wearing of caps and masks not necessary during cardiac catheterization. *Cathet Cardiovasc Diagn* 1989; 17:148 60.
  - Tunevall TG. Postoperative wound infections and surgical face masks: a controlled study. *World J Surg* 1991; 15(3):383 7.
  - Tunevall TG, Jörbeck H. Influence of wearing masks on the density of airborne bacteria in the vicinity of the surgical wound. *Eur J Surg* 1992; 158:263 6.
  - Mitchell NJ, Hunt S. Surgical face masks in modern operating rooms a costly and unnecessary ritual? *J Hosp Infect* 1991; 18:239 42.
  - Belkin NL. The surgical mask: is it still necessary? *Surgery* 1997; 122:641 2.
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