



ISPD Asia-Pacific Chapter Newsletter, August 2020

VOLUME 18, ISSUE 2

Special Announcement: Cancellation of ISPD Asia Pacific Chapter Meeting 2021

With the COVID-19 pandemic, foreseeable difficulties of travel, and multiple international conferences in the coming year, the ISPD Asia-Pacific Chapter and the Indonesian Society of Nephrology have come to the mutual agreement that 10th Asia Pacific Chapter Meeting of the International Society for Peritoneal Dialysis, originally scheduled on 21-23 October 2021 at Bali, Indonesia, will be cancelled.

Chapter News

Meeting and conference

We receive from Professor Yasuhiko Ito the finalized financial statement of the 9th Asia Pacific Chapter Meeting of International Society for Peritoneal Dialysis, held at Nagoya, Japan in September 2019.

Call for further meeting

The ISPD Asia Pacific Chapter has announced the call for bidding for hosting the 11th Asia Pacific Chapter Meeting of the International Society of Peritoneal Dialysis, which is expected in 2023. The formal announcement has been posted in the April 2020 issue of the ISPD Asia Pacific Chapter newsletter.

Scholarship and fellowship

Since the last council meeting, we have updated the procedure of application for the ISPD Asia-Pacific Chapter Scholarships and the list of centers that accept and train ISPD APC Scholarship recipients. With the COVID-19 crisis, clinical attachment programs are all suspended, and we foresee new application for the Scholarships will be low in the coming year.

Work ahead

Given the COVID-19 pandemic and the ISPD Glasgow conference will be postponed to March 2021, there is a concern of conference overload and industrial partner contribution. The Asia Pacific Chapter will work together with the ISPD Council as well as the Indonesian Society of Nephrology so as to iron out the arrangement.

Prepared by: CC Szeto, Coordinator, ISPD Asia Pacific Chapter

News from the ISPD

Join the ISPD !

Visit <https://ispd.org/memberships/> to join the ISPD or renew your membership.

Membership benefits of the International Society for Peritoneal Dialysis include:

- print and/or online subscription to Peritoneal Dialysis International
- Receipt of PD News
- Online access to ISPD Guidelines
- Special registration fees at ISPD Congress, Chapter Meetings and the Annual Dialysis Conference
- Application for ISPD Scholarships and Grants

Membership for developing countries can be done at advantageous rates, by

Upcoming Meetings

18th Asian Pacific Congress of Nephrology

2-4 October 2020

Hong Kong Convention & Exhibition Centre, Hong Kong.

Abstract submission deadline:
December 15, 2019

Website: <http://www.apcn2020.hk>

ISPD / EuroPD Joint Congress

27-30 March 2021

Scottish Event Campus (SEC), Glasgow, Scotland

Abstract Submission Deadline: 13 November 2020 (for new or updated abstracts)

grouping members by institution or region geographical area. Write to admin@ispd.org for more information.

Asia-Pacific Chapter Scholarship

This is a scholarship to support up to 3 months training in clinical PD for doctors and nurses from Asia-Pacific region. Deadline for application for each round: twice a year at 30 June or 31 December. **The next deadline is 31 December 2020.** Details and application procedures can be found under the Regional Chapters – Asia-Pacific Chapter, at the ISPD website.

Early Registration Deadline: 18 December 2020

Website: <http://ispd-europd2020.com/>

ISN World Congress of Nephrology

15-18 April 2021

Montreal, Canada

Abstract submission: 29 May – 18 November 2020

Registration opens: 20 July 2020

Website: <https://www.theisn.org/wcn21>

Society News from New Zealand

The TEACH-PD trial is set to begin randomisation across the 11 New Zealand PD units within the coming month. The electronic New Zealand PD Registry will form a central data entry component of this trial. As you will be aware, TEACH-PD is an investigator-initiated trial assessing the use of training modules for both PD nurse trainers and incident PD patients undertaking PD training.

The New Zealand PD Registry group are also planning a bid for the 2023 ISPD – Asia/Pacific chapter conference. We await the result of discussions at ANZSN council in July regarding this.

Dr Walaa W.M. Saweirs

Consultant Nephrologist and Honorary Senior Lecturer, University of Auckland

Chair of NZPD Registry

Email: walaa.saweirs@northlanddhd.org.nz



Special Article

Dialysis Management in Thailand during the Era of Pandemic COVID-19 Crisis

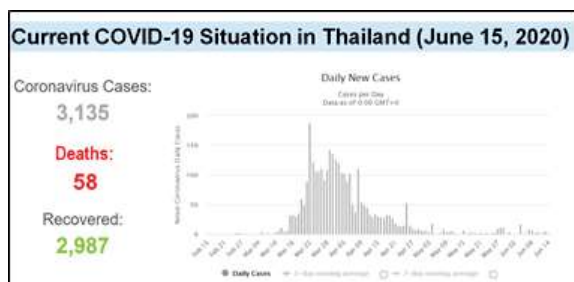
Thanee Eiamsitrakoon, M.D., Chulabhorn International College of Medicine,
Thammasat University, Thailand

Talerngsak Kanjanabuch, M.D., Professor of Medicine, Chulalongkorn University,
Thailand

On behalf of the Peritoneal Dialysis Steering Subcommittee, Nephrology Society of
Thailand

Thailand was one of the first countries with a confirmed COVID-19 case outside China in mid-January 2020. The number of cases was increasing sharply in March [1]. Instead of a sudden closure of all businesses in the country, the Thai government deployed a "soft" lockdown to control the pandemic. The country border was secured, international and interprovincial transports were stopped, a curfew from 10 p.m. to 4 a.m. was executed and all establishments were shut apart from takeaway places, markets, hospitals, and other essential services.

Public campaigns to create culturally hygienic practices were carried out by persuasion to wear face masks, use hand sanitizers, observe social distancing, and stay at home with millions of efforts of village health volunteers and various media [2]. Besides, coercive measures were also deployed, including contact tracing, quarantining a suspected person, self-isolating those with a positive test, and confining international travelers in state quarantine centers. The voluntary compliance of citizens to the campaigns was high, given that Thailand ranks the top among 6 ASEAN countries surveyed wearing facemasks in public (95%) and using hand sanitizer (89%) [3]. In addition, traffic density was at only 15-20% capacity, which meant people were staying at home [2]. As of June 15, 2020, there are 3130 infections and 58 fatalities with a 92% recovery rate [1].



Dialysis patients are inevitably at high risk and need to be protected from this communicable disease. With many efforts of multiple health authorities and organizations, recommendations for dialysis patients and healthcare providers have been launched in April 2020. Unnecessary peritoneal dialysis (PD) visits are avoided while teleclinics are arranged. Patients' medications are refilled via mail. Healthcare providers are advised to share updated information and prevention measures of COVID-19, monitor their patients' health, and conduct remote consultation. The recommendations also provide protective measures for sanitation and alternative materials in case of a shortage of supplies using available household products as well as emphasize the management of PD waste, especially from suspected and documented COVID-19 cases. Until now, there has been only one PD case and no hemodialysis patients infected with COVID-19 from a total of a hundred thousand of Thai dialysis populations [4]. Unfortunately, an infected PD case was dead from an uncontrolled multi-organ failure, albeit receiving multiple antiviral agents.

In conclusion, the lesson of Thailand for the PD society is that a combination of voluntary compliance of citizens, including dialysis patients, and the voluntary service of the grassroots public health activists with the close cooperation of multiple health authorities make a difference in era of pandemic crisis.

References

1. Worldometer.info [Internet]. US [updated 2020 Jun 15; cited 2020 Jun 15]. Available from: <https://www.worldometers.info/coronavirus/>.
2. Walden Bello. How Thailand Contained COVID-19 [Internet]. 2020 [cited 2020 Jun 15]. Available from: <https://fpif.org/how-thailand-contained-covid-19/>.
3. Kanjanabuch T, Takkavatakarn K. Global dialysis perspective: Thailand. Kidney360. April 2020 DOI: <https://doi.org/34067/KID.0000762020>

4. You.gov [Internet]. UK: Imperial College London [updated 2020 Apr 27; cited 2020 Jun 15]. Available from <https://th.yougov.com/en-th/news/2020/05/19/thais-most-likely-wear-facemasks-asean/>

Acknowledgments

We would like to special thanks Nopparat Maeboonruen, R.N., King Chulalongkorn Memorial Hospital, BKK, Sucheera Dinmuang, R.N., Bamnetnarong Hospital, Chaiyaphum, and Wannaporn Thavornsiripat, R.N. Yasothon Hospital, Yasothon, Thailand for providing pictures, Col. Adisorn Lumpaopong, M.D., Phramongkutklao Hospital and College of Medicine, BKK Thailand for providing national figures of COVID-19 infection in dialysis patients, and Kanokrat Petsijun, M.D. Chumporn Hospital, Chumporn, Thailand for providing the infected PD patient's information.

Research News from Asia-Pacific Region

Minimally invasive 'pull technique' for peritoneal dialysis catheter removal

Jian Wang, Xiaosheng Li, Fengxia Zhang

Department of Nephrology, The First Affiliated Hospital of Gannan Medical University, Ganzhou, China



Correspondence to:

Jian Wang

E-mail: wangjian@gmu.edu.cn

The "pull technique" has been intermittently and sparsely reported on since 1990. It consists of pulling the catheter until the silicone tube detaches from the Dacron cuff, allowing the catheter to be pulled out while retaining the cuff in the abdominal wall [1–5]. This technique has several advantages, including its noninvasiveness and that it is quickly accomplished at the bedside. Although it is recommended by an ISPD guideline/recommendation (2019 update) [6], some physicians still worry about its

range of application and accompanying complications, such as infection of the retained cuff or breakage.

Altogether, 24 PD catheter (Covidien, USA) removals in 24 patients were reviewed during the period from July 2018 to October 2019 in our hospital. A little different with the noninvasive pull technique, we dissected the PD catheter's superficial cuff by electronic knife and retained the deep cuff by pull technique. There are four major steps involved when removing the PD catheter using the pull technique (Figure 1).

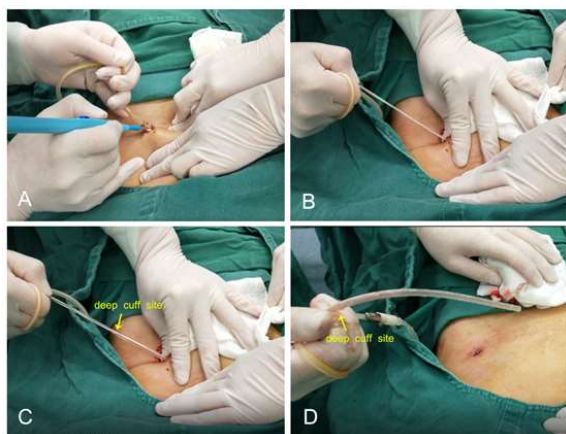


Figure 1—Procedure to remove a peritoneal dialysis catheter using the 'pull technique'. A) An electric knife is used to separate the subcutaneous cuff after local anesthesia. B) The left hand fixes the abdominal wall while the right hand pulls intermittently on the silicone tube. C) After it yields, the intra-abdominal catheter is slowly pulled out. D) The silicone tube is then examined for its mechanical integrity.

All patients' catheters were successfully removed with no breakage, no conspicuous bleeding (>5 ml) during the operations. The average time for catheter removal was 4.13 ± 1.26 min. Only a tunnel opening about 1 cm remained after the removal. No incision or retained cuff became infected during the follow-up period (1.1–15.6 months, median 6.9 months). Ultrasonographic images showed that the retained deep cuffs of two peritonitis patients were in the rectus sheath after operation, with no obvious hemorrhage. On the 20-day follow-up, images showed that fibrous tissue had developed around the deep cuffs, with no obvious signs of infection. One straight Tenckhoff catheter was tested and was found to have a peak pull force of 12.21 pounds during the pulling procedure, and it took 12.85 pounds to detach the superficial cuff in vitro. Five other Tenckhoff catheters were tested for maximum tensile force against breakage. The maximum tensile force of the silicone tube ranged from 18.20 to 23.59 pounds (mean 21.48 pounds).

The very early researches [1, 5] showed high infection rate for the retained cuffs. With the positive results from subsequent studies, however, the technique has attracted a "second look." Only one superficial cuff (of 57 retained cuffs) became infected in Quiroga et al.'s study [2], and Grieff et al. [4] found that 2.2% (1/46) retained

superficial cuffs were infected with no deep cuff infections. Our study found no retained cuff infections. Superficial cuff dissection and deep cuff retention during the pull technique is a highly practical method for reducing the infection rate of retained cuffs.

Previous studies described the details of the “pull” with sustained, smooth traction applied [2–4, 7]. Nameirakpam et al. [3] reported that, with sustained traction, the removal of 4 of 30 catheters resulted in failure (the reasons for which were not stated) and Shroff et al. [7] reported that 2 of 41 catheters snapped at the site of the deep cuff. Our tests showed that the peak pull traction was 12.21 pounds during the operation, which was not far from the maximum tensile force (mean 21.48 pounds) for catheter breakage. Sustained traction may cause excessive force and result in catheter breakage because the separation of the catheter from the cuff takes time. We experienced breakage in the site of superficial cuff with sustained traction during an vitro experiment with a discarded catheter. The reason may be excessive force or the silicon tube was aging without flexibility. We therefore changed the sustained traction to intermittent traction, with the result that there was no further catheter breakage in any of our patients.

Only one (2.6%) of 38 peritonitis patients with a retained superficial cuff became infected in the studies by Nameirakpam et al. [3] and Grieff et al. [4]. Our study showed no retained deep cuff infections in any of the 12 patients with peritonitis. Quiroga et al. [2] removed PD catheters of 31 post-kidney-transplant patients, with only one case of an infected retained subcutaneous cuff. Our data showed that there was no deep cuff infection after PD catheter removal in six kidney transplant patients. We deem that the catheter removal by pull technique is suitable for peritonitis patients or who are on an immunosuppressant.

In addition, pull technique method may increase the risk of haemorrhage, while removing the PD catheter in patient whose intra-abdominal catheter was wrapped with omentum or fixed with thread. Similarly it should not be applied in the presence of a tunnel infection.

In conclusion, using the pull technique to remove implanted PD catheters from patients who have undergone superficial cuff dissection and have retained deep cuffs is safe, practical, and minimally invasive. We recommend that the technique be used routinely to remove PD catheters.

References

1. Elkabir JJ, Riaz AA, Agarwal SK, Williams G. Delayed complications following Tenckhoff catheter removal. *Nephrol Dial Transplant*. 1999; 14:1550-2.
2. Quiroga IM, Baboo R, Lord RH, Darby CR. Tenckhoff catheters post-renal transplantation: The 'pull' technique? *Nephrol Dial Transplant*. 2001; 16:2079-81.
3. Nameirakpam S, Naorem SS, Naorem S. A simple sustained traction method for continuous ambulatory peritoneal dialysis (CAPD) catheter removal. *J Clin Diagn Res*. 2016; 10:PL01.
4. Grieff M, Mamo E, Scroggins G, Kurchin A. The 'Pull' technique for removal of peritoneal dialysis catheters: A call for Re-Evaluation of practice standards. *Perit Dial Int*. 2017; 37:225-229.
5. Atkinson RC, Rubin J. Complications of Tenckhoff catheters post removal. *ASAIO Trans*. 1990; 36:M501-2.
6. Crabtree JH, Shrestha BM, Chow KM, Figueiredo AE, Povlsen JV, Wilkie M, et al. Creating and maintaining optimal peritoneal dialysis access in the adult patient: 2019 update. *Perit Dial Int*. 2019; 39:414-436.
7. Shroff S, Pandey S, Abraham S, Soundarrajan P. A Simple Closed 'Pull and Jerk' Technique for CAPD Catheter Removal. <https://www.medindia.net/articles/capd-catheter-removal.asp>; 2006

Comparison of Dietary Behaviors in Hemodialysis and Peritoneal Dialysis Patients

Seonmi Kim (1), Dong-Ryeol Ryu (2)

(1) Department of Internal Medicine, Seoul National University Hospital, Seoul, Korea

(2) Department of Internal Medicine, Ewha Womans University Seoul Hospital, Seoul, Korea



Correspondence to:

Dong-Ryeol Ryu, M.D., Ph.D.

E-mail: dr Ryu@ewha.ac.kr

Nutritional factors are associated with high mortality and morbidity in dialysis patients; protein-energy wasting (PEW) is regarded as an important nutritional factor

in dialysis [1]. Hemodialysis (HD) and peritoneal dialysis (PD) patients may have different diet patterns and variable nutritional status. According to differences in the nature of these types of dialysis, dietary counseling usually differs for HD and PD [2]. Therefore, we recently published an article comparing dietary behavior and nutrient intake in HD and PD patients using the Semi-quantitative Food Frequency Questionnaire (Semi-FFQ) at Ewha Womans University Mokdong Hospital in Seoul, Korea [3].

We analyzed data from 30 HD patients (19 males and 11 females) and 30 PD patients (16 males and 14 females) from December 2016 to May 2017. The mean age of HD patients was higher than that of PD patients (HD: 58.5 ± 9.1 years, PD: 49.3 ± 9.7 years, $p=0.001$). The duration of dialysis was not significantly different between the two groups (HD: 50.9 ± 52.3 months, PD: 63.4 ± 56.4 months, $p=0.377$). We also compared the anthropometric values of each group. Mean body mass index of PD patients was higher than that of HD patients (HD: 23.1 ± 4.0 kg/m², PD: 25.6 ± 4.2 kg/m², $p = 0.02$), as was hand grip strength (HD: 20.6 ± 9.3 kg, PD: 25.6 ± 8.1 kg, $p = 0.034$). Changes in nutritional status assessed by subjective global assessment during the first year showed that there were four (13.3%) moderately to severely malnourished PD patients, while none of the HD patients were moderately to severely malnourished.

Dietary behavior was obtained using the self-report questionnaire, which consisted of 10 items on patient dietary behaviors [4]. There were significant differences between the two groups in six of the 10 items. The frequency of meals per day, intake of milk, sugary foods, and fried foods was higher in the HD group than the PD group. In the dietary behavior survey, HD patients scored higher than PD patients on most questions, with a higher score indicating healthier eating habits.

We designed the Semi-FFQ for Korean dialysis patients and found it to be a reliable tool for the assessment of HD patient nutrient intake along with the 7-day dietary record [5]. A Semi-FFQ including 47 food items commonly reflected in dialysis patients' diets was presented, and the food items listed in the questionnaire were based on the Korean Health and Nutrition Survey. The HD group exhibited significantly higher consumption of dietary carbohydrates (HD: 231.98 ± 55.40 g, PD: 176.87 ± 54.66 g, $p < 0.001$), fat (HD: 40.97 ± 13.07 g, PD: 32.75 ± 12.71 g, $p=0.016$), protein (HD: 62.92 ± 25.39 g, PD: 50.60 ± 19.65 g, $p=0.040$), and micronutrients than the PD group. A comparison of nutrient-intake-to-recommended-allowance ratio between the HD and PD groups [6] revealed that the HD group showed higher nutrient intake than the PD group. The energy-intake-to-recommended-allowance ratio in both HD and PD patients was low, but was higher in the PD group than the HD group (HD: 1547.45 ± 380.83 kcal [$79.8 \pm 26.1\%$], PD: 1203.37 ± 387.78 kcal

[53.5±19.6%], $p = 0.001$). However, considering energy intake from dialysate glucose [7], it is likely that the total energy intake of the PD group was similar to that of the HD group.

In this study, we compared the dietary behaviors and nutrient intake of HD and PD patients, and found that PD patients had worse dietary behaviors and lower dietary intake compared to HD patients based on the Semi-FFQ. Neither HD nor PD patients consumed adequate amounts of energy and protein compared to the recommended allowance, but this was particularly evident in the PD group. More intensive nutritional intervention may be needed for PD patients. Multiple factors contribute to PEW in dialysis patients, and individualized therapeutic approaches are needed that will ensure better outcomes and good quality of life.

References

1. Carrero JJ, Stenvinkel P, Cuppari L, et al. Etiology of the protein-energy wasting syndrome in chronic kidney disease: a consensus statement from the International Society of Renal Nutrition and Metabolism (ISRNM). *J Ren Nutr*. 2013; 23(2):77-90.
2. de Luis Román D, Bustamante J. Nutritional aspects in renal failure. *Nefrologia*. 2008; 28(3):333-42.
3. Kim, S., Kang, B., Kim, H. et al. Comparison of hemodialysis and peritoneal dialysis patients' dietary behaviors. *BMC Nephrol*. 2020: 21(91).
4. Kim JH, Lee MJ, Moon SJ, et al. Ecological analysis of food behavior and life-styles affecting the prevalence of depression in Korea. *Korean J Nutr*. 1993; 26(9):1129-37.
5. Ryu DR, Kim JH, Kim HJ, Kyung MS, Park JT. Comparison between semi-quantitative frequency methods and 7-day dietary records methods in food and nutrition intake status for hemodialysis patients. *Korean J Community Nutr*, 2017. **22**(5): p. 426-440.
6. Kopple JD. National kidney foundation K/DOQI clinical practice guidelines for nutrition in chronic renal failure. *Am j Kidney Dis*. 2001; 37 Suppl 2:S66-70.
7. Grodstein GP, Blumenkrantz MJ, Kopple JD, Moran JK, Coburn JW. Glucose absorption during continuous ambulatory peritoneal dialysis. *Kidney Int*. 1981; 19(4):564-7.

Management and outcomes of culture-negative peritonitis

Htay Htay (1), David W Johnson (2,3,4,5)

(1) Department of Renal Medicine, Singapore General Hospital, Singapore; (2) Australia and New Zealand Dialysis and Transplant (ANZDATA) Registry; (3) Department of Nephrology, Princess Alexandra Hospital, Brisbane, Australia; (4) Australasian Kidney Trials Network, Diamantina Institute, University of Queensland, Brisbane, Australia; (5) Translational Research Institute, Brisbane, Australia



Correspondence to:

Dr Htay Htay

Email: htay.htay@singhealth.com.sg

Peritoneal dialysis (PD)-related peritonitis is a serious complication and the outcomes are usually dependent on the causative organisms [1]. However, culture-negative peritonitis is not uncommon, accounting for 9 -25% of all episodes of peritonitis (2–4). Generally, culture-negative peritonitis was reported to have superior outcomes compared to culture-positive peritonitis [2–4]. However, it was unclear whether this applied to all subtypes of culture-positive peritonitis.

We conducted a study that included all episodes of PD-related peritonitis in Australia between 2004 to 2014 using the data from the Australia and New Zealand Dialysis and Transplant (ANZDATA) Registry [5]. The primary outcome was to compare the odds of a medical cure for culture-negative peritonitis with those of different subgroups of culture-positive peritonitis. Medical cure was defined as an episode of peritonitis achieving cure with antibiotics without complications. The secondary outcomes were to compare peritonitis complications, including peritonitis-related catheter removal, hemodialysis (HD) transfer, recurrent/relapsed peritonitis, hospitalization, and peritonitis-related death between culture-negative and culture-positive peritonitis. The study also examined predictors of culture-negative peritonitis and the associations between initial antibiotic regimen, duration of antibiotics, and outcomes of culture-negative peritonitis. Peritonitis was defined as per the ISPD Guideline [6] and relapsing peritonitis was treated as part of the original episode.

The primary and secondary outcomes were analyzed by multivariable mixed-effects logistic regression in which patients and centers were included as random effects to account for having multiple episodes of peritonitis in the same patient and patients clustering in the same center. Age, gender, ethnicity, BMI, smoking status, the presence of diabetes mellitus, cardiovascular disease, chronic lung disease, PD as initial kidney replacement therapy, and causative organisms for peritonitis were included in the multivariable logistic regression models.

The study included 11,122 episodes of peritonitis in 5367 patients from 51 PD centers in Australia during the period of 2004 to 2014. Of these, 1760 (16%) episodes were culture-negative peritonitis and 77% (1358/1760) episodes achieved medical cure. Culture-positive peritonitis had lower odds of medical cure [*Staphylococcus aureus* (odds ratio [OR] 0.62; 95% confidence interval [CI] 0.52 – 0.73), *Pseudomonas* species (OR 0.20; 95% CI 0.16 – 0.26), other Gram-negative organisms (OR 0.48; 95% CI 0.41 – 0.56), polymicrobial organisms (OR 0.30; 95% CI 0.25 – 0.35), fungi (OR 0.02; 95% CI 0.01 – 0.03), and other organisms (OR 0.61; 95% CI 0.49 – 0.76)] except for peritonitis due to other (non-staphylococcal) Gram-positive organisms (OR 1.11; 95% CI 0.97 – 1.28) which had similar odds of cure compared with culture-negative peritonitis.

A total of 183 episodes (10.4%) of culture-negative peritonitis had peritonitis-related catheter removal. Most culture-positive peritonitis had higher odds of catheter removal [*Staphylococcus aureus* (OR 2.14; 95% CI 1.72 – 2.65), *Pseudomonas* species (OR 8.37, 95% CI 6.44 – 10.9), other Gram-negative organisms (OR 2.76, 95% CI 2.28 – 3.34), polymicrobial organisms (OR 5.47; 95% CI 4.50 – 6.63), fungi (OR 60.3; 95% CI 41.9 – 86.8), and other organisms (OR 2.38; 95% CI 1.81 – 3.1)], except for other (non-staphylococcal) Gram-positive organisms (OR 0.87; 95% CI 0.72 – 1.05) compared with culture-negative peritonitis. Similar findings were observed for the outcomes of transfer to HD. Culture-negative peritonitis had similar odds of relapsing/recurrent peritonitis compared with culture-positive peritonitis. There was a total of 52 (3.7%) culture-negative peritonitis-related death. Culture-negative peritonitis had lower odds of mortality than peritonitis due to *Pseudomonas* species, other Gram-negative organisms, polymicrobial organisms, and fungi, but had higher odds of mortality than other (non-staphylococcal) Gram-positive organisms and had a similar odds of mortality to *Staphylococcus aureus* peritonitis. A total of 60% of culture-negative peritonitis required hospitalization. Culture-negative peritonitis had the lowest odds of hospitalization compared with culture-positive peritonitis. Older age and late referral to nephrologists were identified as having a lower risk of culture-negative peritonitis compared with culture-positive peritonitis.

In total, 90.2% of culture-negative peritonitis were treated with at least two antibiotics initially, either cefazolin (47.2%) or vancomycin (42.2%) for Gram-positive organisms and gentamicin (69.7%) for Gram-negative organisms. Episodes of culture-negative peritonitis treated initially with cefazolin and gentamicin had a higher odds of cure and lower odds of relapsing peritonitis than a vancomycin-based regimen.

The association between the duration of antibiotic therapy and outcomes was assessed in 1158 episodes of culture-negative peritonitis. There were no significant differences in outcomes of peritonitis between episodes treated with durations of 14 days and 21 days, whilst prolonged antibiotic treatment (>21 days) had lower odds of medical cure (OR 0.58; 95% CI 0.39 – 0.86) and higher odds of relapsing/recurrent peritonitis (OR 3.42; 95% CI 1.97 – 5.92) compared with episodes treated with antibiotics for 14 days.

Outcomes of culture-negative peritonitis were reported to be superior to those of culture-positive peritonitis in previous studies [2–4]. This study demonstrated that not all culture-positive peritonitis episodes had poorer outcomes than culture-negative peritonitis. Among episodes not responding to antibiotics, culture-negative peritonitis had higher odds of mortality than other (non-staphylococcal) Gram-positive peritonitis. The course of culture-negative peritonitis may not always be benign and this may be related to the fastidious or virulent organisms which are difficult to culture using routine culture medium [7].

The study also demonstrated that cefazolin and gentamicin combination therapy had higher odds of achieving medical cure and lower odds of relapsing/recurrent peritonitis compared with a vancomycin-based regimen. This finding may relate to the class effect of antibiotics itself or to the timing of administration, daily versus every 3 to 5 days based on the trough level, with a risk of underdosing in the latter. ISPD guidelines recommend treating culture-negative peritonitis with 2 weeks of antibiotics (6). This largest series of culture-negative peritonitis to date also demonstrated that episodes treated beyond 2 weeks of antibiotics did not offer any additional benefits and might be harmful if the treatment duration is prolonged beyond 3 weeks.

In summary, the study demonstrated that culture-negative peritonitis had superior outcomes compared to different subtypes of culture-positive peritonitis, except for non-staphylococcal Gram-positive peritonitis. Culture-negative peritonitis treated with a combination of cefazolin and gentamicin had superior outcomes compared to vancomycin-based regimens. Prolonging antibiotics beyond 2 weeks did not confer any additional benefits in outcomes and might lead to poorer outcomes if antibiotics

are extended beyond 3 weeks. Future prospective study is needed to confirm these findings.

References

1. Cho Y, Badve S V., Hawley CM, McDonald SP, Brown FG, Boudville N, et al. Peritoneal dialysis outcomes after temporary haemodialysis transfer for peritonitis. *Nephrol Dial Transplant*. 2014 Oct 1;29(10):1940–7.
2. Szeto C-C, Wong TY-H, Chow K-M, Leung C-B, Li PK-T. The clinical course of culture-negative peritonitis complicating peritoneal dialysis. *Am J Kidney Dis*. 2003 Sep;42(3):567–74.
3. Fahim M, Hawley CM, McDonald SP, Brown FG, Rosman JB, Wiggins KJ, et al. Culture-Negative Peritonitis in Peritoneal Dialysis Patients in Australia: Predictors, Treatment, and Outcomes in 435 Cases. *Am J Kidney Dis*. 2010 Apr;55(4):690–7.
4. Chen K-H, Chang C-T, Weng S-M, Yu C-C, Fang J-T, Huang J-Y, et al. Culture-Negative Peritonitis: A Fifteen-Year Review. *Ren Fail*. 2007 Jan 7;29(2):177–81.
5. Htay H, Cho Y, Pascoe EM, Hawley C, Clayton PA, Borlace M, et al. Multicentre registry data analysis comparing outcomes of culture-negative peritonitis and different subtypes of culture-positive peritonitis in peritoneal dialysis patients. *Perit Dial Int J Int Soc Perit Dial*. 2020 Jan 7;40(1):47–56.
6. Li PK-T, Szeto CC, Piraino B, de Arteaga J, Fan S, Figueiredo AE, et al. ISPD Peritonitis Recommendations: 2016 Update on Prevention and Treatment. *Perit Dial Int*. 2016 Nov 18;36(5):481–508.
7. Bunke M, Brier ME, Golper TA. Culture-negative CAPD peritonitis: the Network 9 Study. *Adv Perit Dial*. 1994;10:174–8.

Supporting PD patient care at home in a viral pandemic through remote dialysis monitoring

Rachael C Walker (1) & Suetonia C Palmer (2)

(1) Eastern Institute of Technology, Gloucester St, Taradale, Napier, New Zealand

(2) University of Otago, Christchurch, New Zealand



Corresponding to:

Rachael Walker, PhD, NP, MN, RN

E-mail: rwalker@eit.ac.nz

The novel coronavirus pandemic causing Covid-19 has highlighted the benefits of home -based dialysis for patients who need to physically distance to reduce disease risk and who are at high risk of Covid-19 complications and mortality. Hemodialysis units have struggled to accommodate physical distancing due to limited space and enable adequate patient isolation in facilities not prepared to manage an infectious disease epidemic. Other units have reduced hemodialysis hours to maintain adequate cleaning and staff and patient cohorting and to restrict patient to patient contact. In contrast, home dialysis patients have not encountered these challenges, and have continued their dialysis prescription while maintaining physical distancing.

Despite the benefits of home-based dialysis in the context of a viral pandemic, challenges arise due to virtual consultations and remote medical care that include ensuring that home-based dialysis patients are adequately monitored and supported through stay at home conditions and reduced physically-based hospital care [1]. Remote peritoneal dialysis monitoring that automatically sends electronic data from the automated dialysis cyclor (fill volume and time, dwell time, drain volume and time, and ultrafiltration volume) direct to dialysis clinical management systems through a cloud-based platform provides a potential solution to this problem. Remote monitoring enables dialysis staff to make changes to the dialysis prescription and can be supplemented by clinical data provided by patients such as body weight, blood pressure and symptoms. Remote monitoring for PD patients specifically enables patients to receive a clinically appropriate dialysis prescription at home, avoid clinic appointments and anticipate and potentially prevent issues that may require hospitalisation during the Covid-19 pandemic. During the pandemic, some clinicians have recommended that CAPD patients transfer to APD to minimise the risk of infection and allow remote monitoring [2].

Empirical research has documented the advantages of remote monitoring to patients on PD. Remote monitoring improves health status and reduces attendance in emergency services [3], hospitalisation rates and length of stay [4]. Clinicians experienced in using remote monitoring in caring for patients on PD (prior to the Covid-19 pandemic) reported improved decision-making based on real-time access to clinical data. Clinicians also were more likely to promote and maintain patients on

PD as monitoring could increase patient reassurance through continual surveillance and supported patient confidence at home [5]. These are important factors to consider when patients may be more anxious at home during lock-down periods and not able to access face-to-face assessments.

From a patient perspective, there are also potential advantages to remote monitoring on PD that may be particularly important during the Covid-19 pandemic. Patients have reported that remote monitoring has taught them to pay attention to signs and symptoms that may indicate a change in their condition. Specifically, remote monitoring gave reassurance that dialysis was going well and they were not “missing” any problems, alleviated the burden of being solely responsible for their dialysis [6]. This may be particularly important at a time of heightened stress such as in a pandemic, as patients contemplating home dialysis report concerns around safety, isolation and support [7,8].

Remote monitoring may address the specific deficits of pandemic healthcare including loss of face to face consultations and patient isolation required through physical distancing. Patient and clinician centered research confirm that remote monitoring directly supports home-based dialysis through reassurance, enhanced anticipation of dialysis issues, and reduction in isolation. These clinical features may be particularly relevant during the coronavirus pandemic as extended physical distancing is required to reduce transmission risk and substantially alters dialysis models of care.

References:

1. El Shamy O, Sharma S, Winston J, Uribarri J. Peritoneal Dialysis During the Coronavirus 2019 (COVID-19) Pandemic: Acute Inpatient and Maintenance Outpatient Experiences. *Kidney Medicine*. 2020.
2. Lai X-L, Wang H-Y, Guo Z-Y. Recommendations for prevention and management of COVID-19 in peritoneal dialysis patients. *Chronic Diseases and Translational Medicine*. 2020.
3. Morosetti M, Peccerillo M, Famà MI. Clinical and social advantages of remote patient monitoring in home dialysis. *Giornale Italiano di Nefrologia: Organo Ufficiale Della Societa Italiana di Nefrologia*. 2020;37(2).
4. Sanabria M, Buitrago G, Lindholm B, Vesga J, Nilsson L-G, Yang D, et al. Remote Patient Monitoring Program in Automated Peritoneal Dialysis: Impact on Hospitalizations. *Peritoneal Dialysis International*. 2019;39(5):472-8.

5. Walker RC, Tong A, Howard K, Palmer SC. Clinicians' experiences with remote patient monitoring in peritoneal dialysis: A semi-structured interview study. *Peritoneal Dialysis International*. 2020:0896860819887638.
6. Walker Rachael C. T, A., Howard, K., Darby, N., & Palmer SC. Patients' and Caregivers' Expectations and Experiences of Remote Monitoring for Peritoneal Dialysis: A Qualitative Interview Study. *PDI* (In Press).
7. Walker RC, Howard K, Morton RL, Palmer SC, Marshall MR, Tong A. Patient and caregiver values, beliefs and experiences when considering home dialysis as a treatment option: a semi-structured interview study. *Nephrology Dialysis Transplantation*. 2015:gfv330.
8. Tong A, Lesmana B, Johnson DW, Wong G, Campbell D, Craig JC. The perspectives of adults living with peritoneal dialysis: thematic synthesis of qualitative studies. *Am J Kidney Dis*. 2013;61(6):873-88.

Serum galactomannan index for the rapid diagnosis of fungal peritonitis in patients with peritoneal dialysis

Talerngsak Kanjanabuch, M.D.

Division of Nephrology, Department of Medicine, Faculty of Medicine,

Chulalongkorn University, Bangkok 10330, Thailand



Correspondence to:

Professor Talerngsak Kanjanabuch

E-mail: golfnephro@hotmail.com

Fungal peritonitis is associated with high rates of technique failure (40%) and mortality (15-50%) [1,2]. Early detection of fungal pathogens allowing for prompt treatment may improve patient survival. Thus this narrative highlights an early experience in using serum galactomannan (GM), a fungal cell wall component, in the diagnosis of fungal peritonitis, which has been recently published in *Kidney International Report* 2019. Dec 21;5(4):530-4, [3] entitled "Serum galactomannan index for the rapid diagnosis of fungal peritonitis in patients with peritoneal dialysis." Serum GM, which is shed from fungi during their growth and death [4], has been

used to aid in the diagnosis of systemic and invasive fungal infections, as well as in monitoring the treatment response and relapse of fungal infection, particularly of the respiratory system [4]. As a proof of concept, the potential value of serum GMI in diagnosing and risk-stratifying PD patients with fungal peritonitis was assessed in the case-cohort study, conducted in 22 Thai PD centers. PD patients with fungal peritonitis were considered as "study cases" (23 cases), whereas PD patients with and without bacterial peritonitis served as "active controls" (21 cases) and "healthy non-peritonitis controls" (19 cases), respectively. GM index (GMI) was derived from dividing the optical density (OD) of GM by the mean OD of the cutoff control. Analyses of Receiver Operating Characteristic (ROC) curves were performed to define an appropriate cutoff for diagnosing fungal peritonitis.

Serum GMI in patients with fungal peritonitis was significantly higher than that in patients with the bacterial peritonitis and the non-peritonitis controls without peritonitis (median, 0.85 [interquartile range: IQR, 0.43–1.75] vs. 0.45 [IQR, 0.35–0.79] vs. 0.43 [IQR, 0.34–0.47], respectively; $p=0.036$) (Figure 1a). To differentiate fungal peritonitis from non-fungal peritonitis (including bacterial peritonitis and non-peritonitis), a serum GMI cutoff value of ≥ 0.56 provided the best diagnostic accuracy with 65% sensitivity, 85% specificity, 4.4 positive likelihood ratio, and 0.4 negative likelihood ratio. At this cutoff point, the calculated area under the curve from the receiver operating characteristic curve analysis for serum GMI was 0.73 (95% confidence interval, 0.58–0.87) (Figure 1b). This study has a limitation that the number of patients in this proof-of-concept study was relatively small; such that a much larger study would be required to confidently establish the utility of serum GMI as a diagnostic biomarker for fungal peritonitis. Second, the results of this study may not generalize to populations on PD outside Thailand in whom the incidence of fungal peritonitis is appreciably lower.

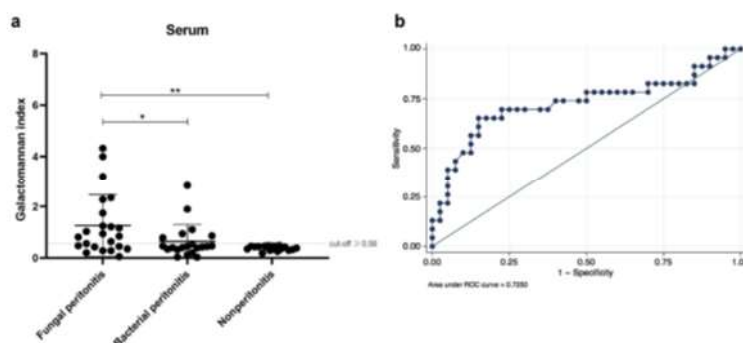


Figure 1. Serum galactomannan index measurements in PD patients with fungal peritonitis, bacterial peritonitis, and non-peritonitis controls (a). Receiver operating characteristic (ROC) curves of serum galactomannan assays

for fungal peritonitis (b).

*p < 0.01, **p < 0.001.

In conclusion, serum GMI is a promising biomarker for the diagnosis of fungal peritonitis in patients on PD, particularly in conjunction with other parameters such as wet smear, fungal culture, and polymerase chain reaction.

References

1. Miles R, Hawley CM, McDonald SP, et al. Predictors and outcomes of fungal peritonitis in peritoneal dialysis patients. *Kidney Int.* 2009;76(6):622-8.
2. Matuszkiewicz-Rowinska J. Update on fungal peritonitis and its treatment. *Perit Dial Int* 2009;29(suppl 2):S161-5.
3. Li PK-T, Szeto CC, Piraino B, et al. ISPD Peritonitis recommendations: 2016 update on prevention and treatment. *Perit Dial Int* 2016; 36:481-508.
4. Chamroensakchai T, Manuprasert W, Puapatanakul P, et al. Serum Galactomannan Index for the Rapid Diagnosis of Fungal Peritonitis in Patients with Peritoneal Dialysis. *Kidney Int Rep.* 2019 Dec 21;5(4):530-534.

Financial implications of dialysis modalities in the developing world: A Chinese perspective

Jing Liu, Xiaxi Zeng, Ping Fu

Division of Nephrology, Kidney Research Institution, West China Hospital of Sichuan University; West China Biomedical Big Data Center, Sichuan University; Chengdu, Sichuan, China



Correspondence to:

Xiaoxi Zeng

Email: zxx5012@163.com / zengxiaoxi@wchscu.cn

End-stage renal disease (ESRD) is associated with adverse prognoses and heavy economic burdens worldwide. Dialysis is the mainstream renal replacement therapy (RRT) for incidence ESRD patients. In China, patients on hemodialysis (HD) and peritoneal dialysis (PD) consumed 2.08% and 0.34% of the overall Urban Basic Medical Insurance (UBMI) expenditure, despite with a relatively low prevalence of ESRD that requires HD (0.15%) and PD (0.02%) in UBMI-covering individuals [1]. The disease burden of ESRD and associated resource consumption might further rise due to increased incidence of chronic kidney disease and risk factors (ie. aging, hypertension and diabetes). Given the limited financial and clinical resources, the economic evaluation of dialysis and the choice of the most cost-effective modality is of paramount significance.

To evaluate the cost-effectiveness of different dialysis modalities in China, we conducted a Markov model-based study. Using a Markov model from the health system perspective, hypothetical ESRD patients were assumed to firstly enter the HD state in the HD-first model, or the PD state in the PD-first model. Then, according to annual transition probabilities, over a time horizon of 10 years, these patients were modelled to transit among four discrete states, namely HD, PD, kidney transplantation and an absorbing state, death. Parameter inputs, including transition probabilities, costs and health utility inputs as measured by quality adjusted life years (QALYs) in the model were mainly obtained from available publications and data released from national or regional RRT registries. The costs and QALYs of the HD- or PD-first strategies were compared and incremental cost-effectiveness ratio (ICER) was calculated. The strategy revealing lower costs and higher QALYs, or ICER within the predefined willingness to pay (WTP) thresholds (three times GDP per capita in China, 2017) was considered cost-effective [2]. We calculated net monetary benefit (NMB) by multiplying QALYs by the WTP value and subtracting the costs. Scenario and sensitivity analyses were conducted to assess the robustness and uncertainty of the results.

In all three scenarios, PD-first strategy absolutely dominated HD-first strategy with lower cost and higher health utilities over a 10-year time horizon. For example, in the base-case scenario in which parameters were mainly based on data of Chinese population, compared with PD, HD-first strategy was associated with ¥81,081 increased cost and 0.13 decrease in QALYs. The incremental NMB of PD over HD was ¥88,589 and ¥103,604 for WTP values of one and three times GDP per capita, respectively.

The one-way sensitivity analyses revealed several parameters had considerable influence on the NMB, among which direct costs of HD and the utilities of HD and

PD were the most influential variables (Figure 1). In addition, changing the inputs of five parameters, including the annual mortality of HD and PD, the utility of HD and PD, and the direct cost of HD, could reverse the cost-effectiveness of PD over HD. In the two-way sensitivity analysis focusing on the utilities of HD and PD, the utility of HD had to be at least 0.148 better than PD to make HD as the optimal strategy. In the probabilistic sensitivity analysis, given the simultaneous uncertainty in all the parameters, PD was about 72% likely to be considered cost-effective as compared to HD, regardless of the WTA for AQLYs.

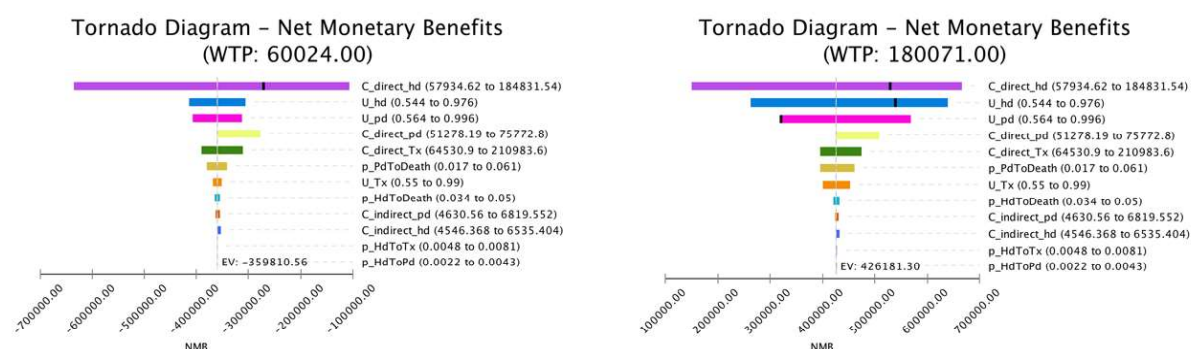


Figure 1. Tornado diagrams reflecting the effect of variables on net monetary benefits of different dialysis modalities when WTP = 1 x GDP per capita or 3 x GDP per capita. Direct costs and health utility of HD and PD were the top four most sensitive variables. WTP: willingness-to-pay; GDP: gross domestic product; HD: hemodialysis; PD: peritoneal dialysis; C_direct_hd: annual direct cost of hemodialysis; U_hd: health utility of hemodialysis; U_pd: health utility of peritoneal dialysis; C_direct_pd: annual direct cost of peritoneal dialysis; C_direct_Tx: annual direct cost of kidney transplant recipients; P_PdToDeath: annual death probability from PD; U_Tx: health utility of kidney transplantation; P_HdToDeath: annual death probability from HD; C_indirect_hd: annual indirect cost of hemodialysis; C_indirect_pd: annual indirect cost of peritoneal dialysis; P_HdToPd: annual transition probability from HD to PD; P_HdToTx: annual transition probability from HD to kidney transplantation; WTP: willingness-to-pay for a Quality-Adjusted Life-year.

The findings of the study that PD is more cost-effective than HD as the initiating RRT modality are instructive for health policies and clinical decision making in the Chinese mainland. The study indicated PD-first strategy should be encouraged and advocated given the current healthcare settings in China. The results were consistent with previous studies from Singapore [3] and Spain [4], in which PD was more cost-

effective than HD. Besides, Neil N et al. utilized budget impact analysis to estimate country-specific, 5-year financial impacts of shifts from HD to PD on total dialysis costs, and found increasing PD could effectively reduce healthcare costs for all the included high-income, upper-middle-income, and lower-middle-income countries [5].

However, Although PD was considered more cost-effective than HD as many previous cost-effectiveness studies demonstrated, it should be recognized that hemodialysis was currently the predominant modality in majority of countries [6], including China. The cause for the underutilization of PD is multifactorial and might be associated with socioeconomic status, education levels, access to healthcare [7]. According to the scenario and sensitivity analysis of our study, for patients choosing HD over PD due to lack of access to PD, reducing the direct costs of HD and improving the quality-of-life and survival of HD patients, can make the HD-first strategy more cost-effective.

In conclusion, this study indicates that, for ESRD patients, initiation with PD is cost-effective compared with HD. Sensitivity analyses revealed the direct costs of HD, and mortality and health utilities of HD and PD patients are the key influential variables for the health economics comparison between these two RRT modalities. Further research is warranted to evaluate the cost-effectiveness of emerging community and home-based dialysis modalities in China.

Reference

1. Zhang L, Zhao MH, Zuo L, et al. China kidney disease network (CK-net) 2015 annual data report. *Kidney Int Suppl (2011)* 2019; 9(1): e1–e81.
2. Robinson LA, Hammitt JK, Chang AY, et al. Understanding and improving the one and three times GDP per capita cost-effectiveness thresholds. *Health Policy Plan* 2017; 32(1): 141–145.
3. Yang F, Lau T and Luo N. Cost-effectiveness of haemodialysis and peritoneal dialysis for patients with end-stage renal disease in Singapore. *Nephrology* 2016; 21(8): 669–677.
4. Villa G, Fernandez-Ortiz L, Cuervo J, et al. Cost-effectiveness analysis of the Spanish renal replacement therapy program. *Perit Dial Int* 2012; 32(2): 192–199.
5. Neil N, Walker DR, Sesso R, et al. Gaining efficiencies: resources and demand for dialysis around the globe. *Value Health* 2009; 12(1): 73–79.

6. Saran R, Robinson B, Abbott KC, et al. US Renal Data System 2018 Annual Data Report: epidemiology of kidney disease in the United States. *Am J Kidney Dis* 2019;73(3)(suppl 1):Svii-Sxxii, S1-S772.
7. Liu ZH. Nephrology in China. *Nat Rev Nephrol* 2013; 9(9): 523–528.