Peritoneal dialysis care during the COVID-19 pandemic, Thailand
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**Problem** The coronavirus disease 2019 (COVID-19) pandemic could affect health service provision of less urgent interventions, such as peritoneal dialysis for chronic kidney disease patients.

**Approach** To assess how peritoneal dialysis centres in Thailand adapted their provision of care, we invited medical directors and peritoneal dialysis managers to respond to an online survey on 1 July 2021. We asked whether they had modified or deferred their training, catheter insertion or removal, intravenous supplements, follow-up and home visits, and workload.

**Local setting** Patients needing dialysis receive peritoneal dialysis free of charge in Thailand. As of 31 December 2020, 240 peritoneal dialysis centres in Thailand have provided care to 32,284 patients.

**Relevant changes** At 24.6% (29/118) of centres, educational sessions for patients were modified. Catheter insertion continued at 71.9% (82/114) of centres. Few facilities (19.7%; 23/117) continued to perform peritoneal equilibration tests as usual. On-site intravenous injections were mostly transferred to health centres close to the patients’ homes. Most centres reduced their outpatient follow-up visits (51.7%; 61/118) and stopped visiting patients at home (66.9%; 79/118). Peritoneal dialysis nurses reported an increased workload at 62.7% (74/118) of centres, and in many instances (66.1%; 78/118) were providing nursing care to COVID-19 patients and administering COVID-19 vaccines.

**Lessons learnt** Health-care providers altered clinical care activities to protect their patients from COVID-19. However, further evidence is needed on the consequences of such alteration in care. To prepare for future pandemics, actors need to explore nonconventional peritoneal dialysis care as well as financial and nonfinancial incentive mechanisms for such care.

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**Introduction**

The coronavirus disease (COVID-19) pandemic has challenged health systems worldwide. In Thailand, the pandemic has gradually affected the health-care provision for other diseases than COVID-19, including peritoneal dialysis for patients with chronic kidney diseases. These patients, as other people living with comorbidities, are more likely to experience more severe COVID-19 and die of the disease.¹

As of 30 September 2021, 379 peritoneal dialysis patients had been infected with COVID-19 in the country. Of these, 118 died in the hospital or within 3 months after the onset of infection, 144 recovered, and 117 were still hospitalized (the Peritoneal Dialysis Advisory Board, Nephrology Society of Thailand, unpublished data, 1 October 2021). Furthermore, the massive influx of COVID-19 patients to intensive care units increased the risk of critically ill peritoneal dialysis patients being denied intensive treatment, despite the fact that most dialysis patients had a chance of survival when treated properly. Decreasing living organ donation and a decline in deceased transplant donation also increased the risk of dying for patients waiting for a kidney transplant.

As a nonurgent intervention, peritoneal dialysis services for people with kidney disease were also affected by the overwhelmed health system. Here we describe how peritoneal dialysis centres in Thailand adapted their services to protect their patients during the COVID-19 pandemic.

**Local setting** Thailand’s universal coverage scheme provides financial support for selected health-care services to the majority of Thai citizens. In 2008, the Peritoneal Dialysis First policy was added to the scheme to ensure that patients with chronic kidney diseases have access to free-of-charge dialysis care. Continuous ambulatory peritoneal dialysis is provided as the first-line dialysis modality, whereas the patients with peritoneal dialysis contraindication or a history of technical failure associated with peritoneal dialysis can receive haemodialysis without additional payment. Patients who are medically suitable for peritoneal dialysis can choose haemodialysis as the first-line treatment, but they have to fully self-fund dialysis-related costs.²⁻⁴ Medications, including short-acting erythropoiesis-stimulating agents, as well as 2-litre manual glucose-based dialysates (capped at five bags daily), are fully reimbursed if they are listed in the Thai National List of Essential Medicine.

The policy has triggered an increase in the number of peritoneal dialysis patients and dialysis centres. In 2016, the prevalence and incidence of patients needing peritoneal dialysis were 26,450 (395 per million population) and 10,783 (161 per million population), respectively.¹ The proportion of peritoneal dialysis patients among total dialysis population has increased from 5.5% (1198/21,839) before 2008 to 30.7% (26,450/86,116) in 2016.²⁻⁴

As of 31 December 2020, there were 3,228 peritoneal dialysis patients, 1,176 nephrologists, 637 peritoneal dialysis nurses and 240 peritoneal dialysis centres in Thailand. These centres are usually located in a designated area of a hospital, separated from the outpatient department, and are run by a peritoneal dialysis nurse under supervision of a nephrologist. Most facilities make nurse-led home visits, nurses from 54.5% (12/22) of the facilities visit all patients, while nurses from 45.5% (10/22) of facilities visit selected patients.³

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pated in the study. A total of 22 peritoneal
dialysis facilities, each of which provide treat-
tment to at least 20 peritoneal dialysis patients.6,7

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Approach

To assess how peritoneal dialysis centres
adapted to the changed circumstances,
on 1 July 2021 we invited medical direc-
tors and peritoneal dialysis managers
from centres across Thailand to partici-
pate in an one-time online survey about
service provision during the pandemic. If
representatives from the same
centre provided conflicting responses to
the survey, we communicated with both
to solve the conflict.

Under normal circumstances, new
patients receive both individual and
and group trainings on-site. However, dur-
ing the outbreak, centres could reduce
the number of training days and the
hours of training per day. The on-site
training and group activities could be
replaced by virtual or already available
video-assisted training modules.

For implantation or replacement
of the catheter, some clinics only per-
duced these services to health-care fac-
cilities for patients uncomfortable with
self-administration.

The centre could also increase the
interval of the regular outpatient follow-
up visits or change to a hybrid between
in-person and virtual follow-up. The
outpatient centre implemented essential
measures, such as physical distancing and
minimizing contact time. In-centre
peritoneal dialysis catheter exit-site
dressing was done only for patients
with complications. Home visits by a
peritoneal dialysis nurse could either be
stopped or only performed for patients
with post-peritonitis.

Relevant changes

A cohort of 22 peritoneal dialysis centres
showed that, compared with 2019, the
number of catheter insertions signifi-
cantly reduced during 2020 (Table 1).6,7

Catheter removal and re-insertion
remained relatively unchanged because
delaying such intervention might harm
patients and increase mortality.6 Hospital-
ization of patients significantly reduced by
10% (from 895 hospital-
izations to 805), presumably due to
the reallocation of beds to COVID-19
patients (Table 1).

In total 198 professionals responded
to our survey, covering 118 centres. The
survey revealed that the peritoneal
dialysis centres took different actions
to protect their patients from acquiring
COVID-19, and many of the actions were
to reduce the person-to-person in-
teractions. For example, 75.4% (89/118)
of centres attempted telemedicine
for the peritoneal dialysis nurses, whereas
65/117) only performed
the procedure when clinically necessary.

Further research is needed to investigate
either reduced the training duration or
changed to video-assisted training or
e-learning technology.

The majority of centres continued
to do catheter insertion (71.9%; 82/114),
while 24.6% (28/114) only performed
the procedure when clinically necessary.
Few centres (19.7%; 23/117) continued
to perform peritoneal equilibration
tests as usual; most centres (55.6%;
65/117) only performed this procedure
in selected patients, including patients
with ultrafiltration failure or inadequate
dialysis. On-site intravenous injections
were mostly transferred to health cen-
tres close to the patients’ homes. Only
32.2% (38/118) of the centres continued
the regular outpatient follow-up visits,
whereas 51.7% (61/118) increased the
follow-up interval and 16.1% (19/118)
switched to video conferencing, text
messaging or telephone calls (Table 2).

The low uptake of virtual follow-up
could be explained by the fact that 71.8%
(84/117) of the centres did not have full
teleconferencing facilities for provider-
patient communication.

Home visits made by a perito-
neal dialysis nurse were stopped by
66.9% (79/118) of centres, while 15.3%
(18/118) of centres still visited their pa-
tients and 17.8% (21/118) of centres only
visited patients with post-peritonitis
(Table 2).

More than half of the centres (62.7%;
74/118) reported an increased workload
for the peritoneal dialysis nurses, whereas
4.2% (5/118) reported the opposite. More
than half (66.1%; 78/118) of the nurses had
to perform nonperitoneal dialysis
functions, such as providing nursing care
to COVID-19 patients and administering
COVID-19 vaccines. The majority of cen-
tres (94.9%; 112/118) did not encounter
a problem with shipment of dialysis bags
during the pandemic.

Lessons learnt

Besides increased risk of severe CO-
VID-19, patients on peritoneal dialysis
in Thailand have experienced changes in
practices and procedures linked to their
care during the pandemic (Box 1). To
substitute outpatient and home visits,
some centres attempted telemedicine
but the efficacy of this approach is un-
clear because of the poor patient compli-
ance, poor internet access – especially
on the patient side – and unclear financial
incentives to the health-care providers.

Further research is needed to investigate

Table 1. Characteristics of peritoneal dialysis care, Thailand, 2019–2020

| Variable                  | 2019 (n = 2482) | 2020 (n = 3496) | P
|--------------------------|----------------|----------------|-----
| New cases                | 1281 (51.6)    | 1027 (29.4)    | <0.001
| Catheter insertion       | 1271 (51.2)    | 1027 (29.4)    | <0.001
| Catheter re-insertion    | 7 (0.3)        | 6 (0.2)        | 0.37
| Catheter removal         | 42 (1.7)       | 41 (1.2)       | 0.09
| Hospitalization          | 895 (36.1)     | 805 (23.0)     | <0.001
| Death                    | 124 (5.0)      | 137 (3.9)      | 0.05

Note: The data is from the Peritoneal Dialysis Outcomes and Practice Patterns Study, which have surveyed 22 peritoneal dialysis facilities, each of which provide treatment to at least 20 peritoneal dialysis patients.6,7
if telemedicine is a suitable option for patients on peritoneal dialysis, since an effective physical assessment must be done in person. Pitting oedema, cuff and tunnel infections require a physical examination, and cloudy dialysate fluid needs a close-up visual inspection. However, several precise monitoring solutions are available, such as digital weight recording devices and remote patient monitoring devices with pulse oximeters to assess fluid retention. Financing mechanisms for nonconventional peritoneal dialysis care through telemedicine should be further explored.

As the first two COVID-19 waves only affected three and one peritoneal dialysis patients, respectively, experts hypothesized that many centres were not fully prepared for the large wave starting on 23 April 2021, although recommendations on care for noninfected peritoneal dialysis patients were published in May 2020. Nevertheless, to protect their patients from acquiring COVID-19, health-care providers at most centres reduced or modified medical-care activities as they saw appropriate. However, some of these approaches might have negatively affected the clinical care process for some patients, and the patients might not fully understand how the changes in care would affect them. Hence, further evidence is needed on the consequences of nonconventional disease-specific care. Changes in care also had to be supported by the already fixed global budget, and key performance indicators could be adversely affected by the COVID pandemic.

Peritoneal dialysis patients infected with COVID-19 faced additional challenges since the government had mandated that patients had to be admitted to the hospital that made the diagnosis. Some of these hospitals are unable to provide peritoneal dialysis care, and even if patients were admitted to a peritoneal dialysis-equipped facility, many patients had to transfer from manual peritoneal dialysis to either automated peritoneal dialysis or haemodialysis. This transfer might put the patients at risk of retaining salt and middle-molecule toxins, despite equivalence in the effectiveness of manual and automated modalities being demonstrated in meta-analysis studies.

To prepare for future pandemics, peritoneal dialysis centres need to explore innovative approaches for education as well as physical and laboratory assessments of patients. Furthermore, the public health insurance schemes should introduce financial and nonfinancial incentive mechanisms for nonconventional peritoneal dialysis care, including telemedicine activities, and relevant professional associations should develop guidelines for the care of patients with chronic diseases during infectious outbreaks.

### Table 2. Changes in service provision of peritoneal dialysis centres during the COVID-19 outbreak, Thailand, Jul–Aug 2021

| Service | Responding centres (n = 240) | No change | Deferred | Modified |
|---------|-----------------------------|-----------|----------|----------|
| Patient training | 118 (49.2) | 89 (75.4) | 1 (0.8) | 28 (23.7) |
| Catheter insertion | 114 (47.5) | 82 (71.9) | 4 (3.5) | 28 (24.6) |
| Catheter removal | 118 (49.2) | 98 (83.1) | 7 (5.9) | 13 (11.0) |
| Visit | | | | |
| Outpatient | 118 (49.2) | 38 (32.2) | 61 (51.7) | 19 (16.1) |
| Home | 118 (49.2) | 18 (15.3) | 79 (66.9) | 21 (17.8) |
| Peritoneal equilibration test | 117 (48.8) | 23 (19.7) | 29 (24.8) | 65 (55.6) |

**COVID-19: coronavirus disease 2019.**

1. No. of peritoneal dialysis centres in Thailand.
2. Modified practices were either shortening the duration, increasing the interval or switching to telemedicine.
3. Catheter insertion was performed only when clinically necessary.
4. Transferred to health centres close to the patients’ home.
5. Only visited post-peritonitis patients.
6. Only performed when clinically necessary.
7. Only 84 facilities provided iron supplement injections to their patients before the pandemic.
8. Only 12 facilities provided nutritional supplement injections to their patients before the pandemic.

Notes: Inconsistencies in some values may arise due to rounding. We obtained the data from the Continuous Ambulatory Peritoneal Dialysis Centre Activity Survey.

### Box 1. Summary of main lessons learnt

- An infectious disease outbreak could reduce the number of nonurgent interventions, such as catheter Insertion for peritoneal dialysis.
- The efficacy of using telemedicine as a substitute for outpatient and home visits is unclear due to poor patient compliance, poor internet access and unclear financial incentives to the health-care providers.
- While health-care providers have been trying to reduce or modify medical care activities as they see appropriate, further evidence is needed on the consequences of such alterations in care.

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Interventions de dialyse péritonéale en période de pandémie de COVID-19, Thaïlande

Problème La pandémie de maladie à coronavirus 2019 (COVID-19) a d'importantes répercussions sur les services de santé, d'interventions moins urgentes, telles que les dialysations péritonéales, pour les patients atteints de maladies rénales chroniques.

Approche Afin d'évaluer comment les centres médicaux procèdent à des dialysations péritonéales en Thaïlande, nous avons adressé des questionnaires à des responsables de centres de santé ayant réalisé des dialyses péritonéales.

Environnement local En Thaïlande, les patients nécessitant une dialyse bénéficient gratuitement d’une dialyse péritonéale. Au 31 décembre 2020, 240 centres thaïlandais réalisant des dialysations péritonéales ont fourni des prestations à 32 284 patients.

Changements significatifs Dans 24,6% (29/118) des centres, les séances éducatives destinées aux patients ont été modifiées. L’insertion de cathéters s’est poursuivie dans 71,9% (82/114) des centres. Peu de centres (19,7% ; 23/117) ont continué à effectuer le test d’équilibrage péritonéal comme à leur accoutumé. Les injections intraveineuses sur place ont été transférées pour la plupart dans des centres de santé proches du domicile des patients. La plupart des centres ont réduit leurs visites de suivi ambulatoire (51,7% ; 61/118) et ont cessé de rendre visite aux patients à leur domicile (66,9% ; 79/118). Le personnel infirmier chargé de réaliser des dialysations péritonéales a signalé une augmentation de sa charge de travail dans 62,7% (74/118) des centres et, dans de nombreux cas (66,1% ; 78/118), il fournissait des soins infirmiers aux patients atteints de la COVID-19 et vaccinait contre la COVID-19.

Leçons tirées Les prestataires de soins de santé ont modifié leurs activités cliniques pour protéger leurs patients contre la COVID-19. Cependant, de nouvelles mesures supplémentaires sont nécessaires sur les conséquences d’une telle modification du schéma de soins. Pour se préparer aux futures pandémies, les acteurs de la santé doivent envisager des interventions de dialyse péritonéale non conventionnelles ainsi que des mécanismes d’incitation financière et non financière pour ces soins.
Резюме

Лечение перитонеальным диализом во время пандемии COVID-19, Таиланд

Проблема Пандемия коронавирусной инфекции 2019 года (COVID-19) может повлиять на оказание медикусанитарной помощи при состояниях, требующих менее срочных вмешательств, таких как перитонеальный диализ у пациентов с хронической болезнью почек.

Подход Для оценки изменения условий оказания помощи в центрах перитонеального диализа в Таиланде директорам медицинских учреждений и руководителям центров перитонеального диализа было предложено принять участие в электронном опросе мнений, проведенном 1 июля 2021 года. В ходе опроса уточнялось, изменено или оставлено его обучение, установка или удаление катетера, добавки к растворам для внутреннего введения, последующее наблюдение и посещения на дому, а также рабочая нагрузка.

Местные условия Пациенты, нуждающиеся в диализе, получают лечение перитонеальным диализом в Таиланде бесплатно. По состоянию на 31 декабря 2020 года 240 центров перитонеального диализа в Таиланде оказали помощь 32 284 пациентам.

Осуществленные перемены В 24,6% (29/118) центров диализа в Таиланде оказали помощь 32 284 пациентам.

Установка катетеров продолжалась в 71,9% (82/114) центров. В немногих учреждениях (19,7%; 23/117) тест перитонеального равновесия проводился в обычном режиме. Проведение процедур внутреннего введения лекарственных средств на месте в основном переносилось в медицинские центры, расположенные недалеко от домов пациентов. Большинство центров сократили число контрольных посещений (51,7%; 61/118) и перестали посещать пациентов на дому (66,9%; 79/118). Медсестры, проводящие перитонеальный диализ, сообщили о возросшей нагрузке в 62,7% (74/118) центров, и в многих случаях (66,1%; 78/118) они обеспечивали сестринский уход за пациентами с COVID-19 и вводили вакцины против COVID-19.

Выводы Поставщики медицинских услуг изменили виды медицинской помощи для защиты пациентов от COVID-19. Однако необходимы дополнительные данные о последствиях такого изменения ухода. Для подготовки к будущим пандемиям учащимся необходимо изучить нетрадиционные методы лечения перитонеальным диализом, а также механизмы финансового и нефинансового стимулирования такого лечения.

References

1. Nopsopon T, Kittrakulrat J, Takkavatakarn K, Eiamsitrakoon T, Kanjanabuch T, Pongpirul K. Covid-19 in end-stage renal disease patients with renal replacement therapies: a systematic review and meta-analysis. PLoS Negl Trop Dis. 2021 Jun 15;15(6):e0009156. doi: http://dx.doi.org/10.1371/journal.pntd.0009156 PMID: 34129609
2. Chuengsaman P, Kasemvut P, PD first policy, Thailand's Response to the Challenge of Meeting the Needs of Patients With End-Stage Renal Disease. Semin Nephrol. 2017 May;37(3):287–95. doi: http://dx.doi.org/10.1016/j.semin nephrol.2017.02.008 PMID: 28532557
3. Tantivess S, Wearingyong P, Chuengsaman P, Peerawattananon Y. Universal coverage of renal dialysis in Thailand promise, progress, and prospects. BMJ. 2013 Jan 31;346 jan31 1:f462. doi: http://dx.doi.org/10.1136/bmj.f462 PMID: 28532557
4. Kanjanabuch T, Takkavatakarn K. Global dialysis perspective. Thailand. Kidney360. 2020;1(7):671–5. doi: http://dx.doi.org/10.34067/KID.0000762020
5. Nataaatmadja M, Zhao J, McCullough K, Fuller DS, Cho Y, Krishnasamy R, et al. International peritoneal dialysis training practices and the risk of peritonitis. Nephrol Dial Transplant. 2021 Oct 1;gfab298. doi: http://dx.doi.org/10.1093/ndt/gfab298 PMID: 34634100
6. Perl J, Davies SJ, Lambie M, Pisoni RL, McCullough K, Johnson DW, et al. The Peritoneal Dialysis Outcomes and Practice Patterns Study (PDOPPS): unifying efforts to inform practice and improve global outcomes in peritoneal dialysis. Perit Dial Int. 2016 May-Jun;36(3):297–307. doi: http://dx.doi.org/10.3747/pdi.2014.00288 PMID: 26526049
7. Kanjanabuch T, Puapatnanukul P, Nakee G, Lorvintun P, Tangjittrong K, Pongsriruang P, et al; International and Thailand PDOPPS Steering Groups. Implementation of PDOPPS in a middle-income country: early lessons from Thailand. Perit Dial Int. 2021 Mar 11;36(3):297–307. doi: http://dx.doi.org/10.3747/pdi.2020.00171 PMID: 33076584
8. Ram R, Swarnalatha G, Neela P, Murty KV. Fungal peritonitis in patients on continuous ambulatory peritoneal dialysis: a single-centre experience in India. Nephron Clin Pract. 2008;110(4):c207–12. doi: http://dx.doi.org/10.1159/000167867 PMID: 18974651

9. [Recommendations for peritoneal dialysis patients and caregivers during the COVID-19 pandemic]. Thailand PD Newsletter. 2020 Jan-Jun;5(10):1–3. Thai.

10. Pongpirul K, Kanjanabuch T, Puapatanakul P, Chuengsaman P, Dandecha P, Kingwatanakul P, et al.; Steering Committee, Advisory Board of CAPD, the Nephrology Society of Thailand. National feasibility survey of peritoneal dialysis key performance indicators in Thailand from provider perspective. Nephrology (Carlton). 2020 Jun;25(6):483–90. doi: http://dx.doi.org/10.1111/nep.13668 PMID: 31577374

11. Borrelli S, La Milia V, De Nicola L, Cabiddu G, Russo R, Provenzano M, et al.; Study group Peritoneal Dialysis of Italian Society of Nephrology. Sodium removal by peritoneal dialysis: a systematic review and meta-analysis. J Nephrol. 2019 Apr;32(2):231–9. doi: http://dx.doi.org/10.1007/s40620-018-0507-1 PMID: 29978446

12. Rabindranath KS, Adams J, Ali TZ, MacLeod AM, Vale L, Cody J, et al. Continuous ambulatory peritoneal dialysis versus automated peritoneal dialysis for end-stage renal disease. Cochrane Database Syst Rev. 2007 Apr 18;(2):CD006515. doi: http://dx.doi.org/10.1002/14651858.CD006515 PMID: 17443624