Renal Team Annotated Bibliography

Contents

Anatomy

Blackburn, Simon C., and Michael P. Stanton. 2014. “Anatomy and Physiology of the Peritoneum.” *Seminars in Pediatric Surgery*, Peritoneal Diseases in Children, 23 (6): 326–30. https://doi.org/10.1053/j.sempedsurg.2014.06.002.

- Describes the anatomy and physiology of the peritoneum, specifically information on the microcirculation of peritoneal fluid and the large absorptive surface of the peritoneum as a way to be exploited in peritoneal dialysis.

Krediet, Raymond T, Bengt Lindholm, and Bengt Rippe. 2000. “PATHOPHYSIOLOGY OF PERITONEAL MEMBRANE FAILURE” Raymond T. Division of Nephrology,1 Department of Medicine, Academic Medical Center, University of Amsterdam, Amsterdam, The Netherlands; Department of Clinical Science,2 Karolinska Institute, Division of Baxter Novum, Huddinge University Hospital, Huddinge; Department of Nephrology,3 University Hospital of Lund, Lund, Sweden” 20: 21.

- Defines “membrane failure” of the peritoneum as ultrafiltration failure/ peritoneal transport failure. Recognizes failure of local host defense mechanisms and the development of peritoneal sclerosis as signs of failure of the peritoneal membrane as well.

Current Standard of Care

Current Clinical Practice

"Global Kidney Care Manufacturers Shift Focus in Wake of Advancing American Kidney Health." 2019. September 12, 2019. https://www.healio.com/nephrology/home-dialysis/news/online/{b6b22f6d-50ec-4f92-b550-dde74606a233}/global-kidney-care-manufacturers-shift-focus-in-wake-of-advancing-american-kidney-health.

- Article detailing the focus in home dialysis, especially focusing on the goal for 80% of new patients on home dialysis by 2025

"Executive Order No. 13,879, 84 Fed. Reg. 33817, Advancing American Kidney Health." 2019. https://www.federalregister.gov/documents/2019/07/15/2019-15159/advancing-american-kidney-health.

- Original Executive Order signed by President Trump for the modernization of kidney care in the USA.

Wang, Hongyue, Xiangtuo Wang, Haichuan Dou, Chenhao Li, Mingji Cui, Chunmei Gu, and Liming Yang. 2018. "Risk Factors for Peritoneal Dialysis–Associated Peritonitis." *European Journal of Inflammation* 16 (January): 2058739218772243. https://doi.org/10.1177/2058739218772243.

- Summarizes the pathogens that cause peritoneal dialysis (PD)-associated peritonitis and to identify risk factors for PD-associated peritonitis.

**"United States Renal Data System. 2018 USRDS Annual Data Report: Epidemiology of Kidney Disease in the United States." 2018. National Institutes of Health, National Institute of Diabetes and Digestive and Kidney Diseases, Bethesda, MD, 2018. https://www.usrds.org/2018/view/Default.aspx.

- Great general resource for comorbidities, risk factors, and drug coverage associated with both CKD and ESRD in the US.

Makhija, Dilip U., Surrey M. Walton, Juan P. Mora, and Rafael M. Sanabria. 2017. "Economic Impact of a Peritoneal Dialysis Continuous Quality Improvement Program in Colombia." *Peritoneal Dialysis International* 37 (2): 165–69. https://doi.org/10.3747/pdi.2016.00111.

- Colombia specific costs of peritonitis and net savings of a continuous quality improvement program.

"Kidney Disease Statistics for the United States | NIDDK." 2016. National Institute of Diabetes and Digestive and Kidney Diseases. December 2016. https://www.niddk.nih.gov/health-information/health-statistics/kidney-disease.

- General overview of CKD in the USA.

**Rajnish, Mehrotra, Olivier Devuyst, Simon Davies, and David W. Johnson. 2016. "The Current State of Peritoneal Dialysis." June 23, 2016. https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5084899/.

- Great general overview of the history of peritoneal dialysis and the improvements that have been made on it. They notable said that efforts have been made in developing interventions to substantially reduce the risk of PD-related peritonitis.

"Detection of Peritonitis in Patients on Peritoneal Dialysis at Home." 2015. September 2015. https://pulse.embs.org/september-2015/detection-of-peritonitis-in-patients-on-peritoneal-dialysis-at-home/.

- Lensless imaging and nanoplasmonic platform technologies have shown great potential for achieving on-site detection of peritonitis in patients on PD.

Sanabria, Mauricio, Martha Devia, Gilma Hernández, Kindar Astudillo, Carlos Trillos, Mauricio Uribe, Catalina Latorre, Astrid Bernal, and Angela Rivera. 2015. "Outcomes of a Peritoneal Dialysis Program in Remote Communities Within Colombia." *Peritoneal Dialysis International : Journal of the International Society for Peritoneal Dialysis* 35 (1): 52–61. https://doi.org/10.3747/pdi.2012.00301.

- Higher risk of peritonitis in patients who were living on less than one times a monthly minimum salary ($p < 0.05$) or who had a dirt, cement, or unfinished wood floor ($p < 0.05$).

Choy, Agnes Shin-Man, and Philip Kam-Tao Li. 2015. "Sustainability of the Peritoneal Dialysis-First Policy in Hong Kong." *Blood Purification* 40 (4): 320–25. https://doi.org/10.1159/000441580.

- A PD-first policy has been implemented in Hong Kong for three decades based on its cost-effectiveness, and has achieved successful outcomes throughout the years. Article highlights three important groups of patients: those with frequent peritonitis, ultrafiltration failure or inadequate dialysis.

Rodriguez, Rudolph A. 2012. "Dialysis and Mortality: Does It Matter Where You Live?" *Clinical Journal of the American Society of Nephrology* 7 (7): 1055–57. https://doi.org/10.2215/CJN.05410512.

- Patients in remote areas were more likely to switch from hemodialysis to peritoneal dialysis and were less likely to suffer peritoneal dialysis technique failure leading to conversion from peritoneal dialysis to hemodialysis.

Mehrotra, Rajnish, Kenneth Story, Steven Guest, and Michelle Fedunyszyn. 2012. "Neighborhood Location, Rurality, Geography, and Outcomes of Peritoneal Dialysis Patients in the United States." *Peritoneal Dialysis International : Journal of the International Society for Peritoneal Dialysis* 32 (3): 322–31. https://doi.org/10.3747/pdi.2011.00084.

- Study of how patients treated with peritoneal dialysis (PD) have a high risk of transfer to hemodialysis (HD). More than 20% of the events occurred within the first 90 days of PD start.

Kerschbaum, Julia, Paul König, and Michael Rudnicki. 2012. "Risk Factors Associated with Peritoneal-Dialysis-Related Peritonitis." *International Journal of Nephrology* 2012. https://doi.org/10.1155/2012/483250.

- Non-modifiable risks: ethnicity, female gender, chronic lung disease, coronary artery disease, congestive heart failure, cardiovascular disease, hypertension, etc. Modifiable risk factors for peritonitis: malnutrition, overweight, smoking, immunosuppression, no use of oral active vitamin D, psychosocial factors, low socioeconomic status, PD against patient's choice, and haemodialysis as former modality.

Jaar, Bernard G, Laura C Plantinga, Deidra C Crews, Nancy E Fink, Nasser Hebah, Josef Coresh, Alan S Kliger, and Neil R Powe. 2009. "Timing, Causes, Predictors and Prognosis of Switching from Peritoneal Dialysis to Hemodialysis: A Prospective Study." *BMC Nephrology* 10 (February): 3. https://doi.org/10.1186/1471-2369-10-3.

- Switching from PD to HD occurs early and the rate is high, threatening long-term viability of PD programs.

Oo, Than N., Tricia L. Roberts, and Allan J. Collins. 2005. "A Comparison of Peritonitis Rates from the United States Renal Data System Database: CAPD versus Continuous Cycling Peritoneal Dialysis Patients." *American Journal of Kidney Diseases* 45 (2): 372–80. https://doi.org/10.1053/j.ajkd.2004.10.008.

- Retrospective study found CAPD to be associated with a slightly lower risk of development of peritonitis than CCPD, even after adjustment.

Farias, Marco G., J. Michael Soucie, William McClellan, and William E. Mitch. 1994. "Race and the Risk of Peritonitis: An Analysis of Factors Associated with the Initial Episode." *Kidney International* 46 (5): 1392–96. https://doi.org/10.1038/ki.1994.410.

- Thus, the increased risk of peritonitis of African American patients treated by CAPD is independent of other demographic, socioeconomic and comorbid characteristics.

Current Clinical Practice: Peritoneal Dialysis

Brown, Edwina A, Peter G Blake, Neil Boudville, Simon Davies, Javier de Arteaga, Jie Dong, Fred Finkelstein, et al. 2020. “International Society for Peritoneal Dialysis Practice Recommendations: Prescribing High-Quality Goal-Directed Peritoneal Dialysis.” *Peritoneal Dialysis International*, January, 0896860819895364. https://doi.org/10.1177/0896860819895364.

- Insight into how PD is prescribed to patients and choosing the correct dialysis modality for the best care and quality of life. Delivery of dialysis is “goal directed” managing the push-pull between the patient achieving personal goals vs clinicians providing high-quality care.

Crabtree, John H., Badri M. Shrestha, Kai Ming Chow, Ana E. Figueiredo, Johan V. Povlsen, Martin Wilkie, Ahmed K. Abdel-Aal, et al. 2019. “CREATING AND MAINTAINING OPTIMAL PERITONEAL DIALYSIS ACCESS IN THE ADULT PATIENT: 2019 UPDATE.” *Peritoneal Dialysis International*, April, pdi.2018.00232. https://doi.org/10.3747/pdi.2018.00232.

- Details of all PD catheter options, their maintenance, and their shortcomings.

“Peritoneal Dialysis - Mayo Clinic.” 2019. April 24, 2019. https://www.mayoclinic.org/tests-procedures/peritoneal-dialysis/about/pac-20384725.

- Basics of PD as told by the Mayo Clinic.

“Infection Control for Peritoneal Dialysis Patients|Natural Disasters and Severe Weather.” 2019. March 14, 2019. https://www.cdc.gov/disasters/icfordialysis.html.

**Salzer, William L. 2018. “Peritoneal Dialysis-Related Peritonitis: Challenges and Solutions.” *International Journal of Nephrology and Renovascular Disease* 11 (June): 173–86. https://doi.org/10.2147/IJNRD.S123618.

- This review goes over challenges and solutions are addressed regarding the pathogenesis, clinical features, diagnosis, treatment, and prevention of peritoneal dialysis-related peritonitis from the viewpoint of an infectious disease physician.

Ye, Hongjian, Qian Zhou, Li Fan, Qunying Guo, Haiping Mao, Fengxian Huang, Xueqing Yu, and Xiao Yang. 2017. “The Impact of Peritoneal Dialysis-Related Peritonitis on Mortality in Peritoneal Dialysis Patients.” *BMC Nephrology* 18 (1): 186. https://doi.org/10.1186/s12882-017-0588-4.

- Peritonitis was independently associated with a higher risk of all-cause, infection-related and cardiovascular mortality, in those patients on peritoneal dialysis longer than 2 years who experienced a peritonitis.

"Peritoneal Dialysis Growth in the U.S. Encounters Unexpected Hurdles." 2017. Healio. February 23, 2017. https://www.healio.com/nephrology/home-dialysis/news/online/{92c09b38-676b-48d7-924d-71106ed1302a}/peritoneal-dialysis-growth-in-the-us-encounters-unexpected-hurdles.

- Unexpected hurdles include lack of adequate physician training, provider infrastructure-related issues, unanticipated financial incentives that had favored use of in-center HD, high rate at which patients abandon these therapies after training due to technique failure, loss or exhaustion of care partners, and technical issues such as access malfunction and loss of ability to maintain volume homeostasis.

Figueiredo, Ana E., Judith Bernardini, Elaine Bowes, Miki Hiramatsu, Valerie Price, Chunyan Su, Rachael Walker, and Gillian Brunier. 2016. "A Syllabus for Teaching Peritoneal Dialysis to Patients and Caregivers." *Peritoneal Dialysis International* 36 (6): 592–605. https://doi.org/10.3747/pdi.2015.00277.

- Recommendation for education of patients using PD for preventing infections, basic PD procedures, and lifestyle as a PD patient.

Workeneh, Biruh, Danielle Guffey, Charles G. Minard, and William E. Mitch. 2015. "Causes for Withdrawal in an Urban Peritoneal Dialysis Program." *International Journal of Nephrology* 2015. https://doi.org/10.1155/2015/652953.

- Findings suggest that there are a number of causes of PD failure and measures to limit peritonitis, patient support, and proper catheter placement. Concentrated efforts to educate and offer peritoneal dialysis to Hispanic and African-American could result in a higher proportion choosing PD as a treatment option.

Cortés-Sanabria, Laura, Brenda E. Rodríguez-Arreola, Victor R. Ortiz-Juárez, Herman Soto-Molina, Leonardo Pazarín-Villaseñor, Héctor R. Martínez-Ramírez, and Alfonso M. Cueto-Manzano. 2013. "Comparison of Direct Medical Costs Between Automated and Continuous Ambulatory Peritoneal Dialysis." *Peritoneal Dialysis International : Journal of the International Society for Peritoneal Dialysis* 33 (6): 679–86. https://doi.org/10.3747/pdi.2011.00274.

- The annual DMCs per patient on PD in this study were US$15 072 in 2008 and US$16 452 in 2010. In both APD and CAPD, 90% of costs were attributable to the dialysis procedure, hospitalizations, and medications.

Jain, Arsh K., Peter Blake, Peter Cordy, and Amit X. Garg. 2012. "Global Trends in Rates of Peritoneal Dialysis." *Journal of the American Society of Nephrology : JASN* 23 (3): 533–44. https://doi.org/10.1681/ASN.2011060607.

- More in-depth statistics about the utilization of PD in various developed and developing countries.

Dalal, Pranav, Harbaksh Sangha, and Kunal Chaudhary. 2011. "In Peritoneal Dialysis, Is There Sufficient Evidence to Make 'PD First' Therapy?" Review Article. International Journal of Nephrology. 2011. https://doi.org/10.4061/2011/239515.

- Argument for the use of PD as the first Renal replacement therapy in the USA (differs from other locations such as Canada, New Zealand, Australia, and Hong Kong).

Current Clinical Practice: Peritonitis

Bolton, Laura. 2019. "Preventing Peritoneal Dialysis Infections | Wounds Research." June 2019. https://www.woundsresearch.com/article/preventing-peritoneal-dialysis-infections.

- Preoperative and perioperative intravenous vancomycin reduced peritonitis risk compared with placebo or cephazolin, but it did not affect early incidence of PD exit site or tunnel infections.

Christina Quist. 2019. "Peritonitis." Cancer Therapy Advisor. February 11, 2019. https://www.cancertherapyadvisor.com/home/decision-support-in-medicine/hospital-medicine/peritonitis-2/.

- Physician-perspective analysis of Peritonitis, its symptoms, and what actions to take.

Redpath Mahon, Allison C., Troy Richardson, Alicia M. Neu, Bradley A. Warady, and SCOPE Investigators. 2019. "Factors Associated with High-Cost Hospitalization for Peritonitis in Children Receiving Chronic Peritoneal Dialysis in the United States." *Pediatric Nephrology (Berlin, Germany)* 34 (6): 1049–55. https://doi.org/10.1007/s00467-018-4183-0.

- Peritonitis causes significant morbidity and mortality in children receiving chronic peritoneal dialysis (CPD). High-cost hospitalizations were associated with the following: age 3–12 years, Hispanic ethnicity, intensive care unit (ICU) stay,

length of stay (LOS), and fungal peritonitis.The median (IQR) cost of hospitalization for the treatment of peritonitis was $13,655 ($7871, $28434) USD.

**Salzer, William L. 2018. “Peritoneal Dialysis-Related Peritonitis: Challenges and Solutions.” International Journal of Nephrology and Renovascular Disease 11 (June): 173–86. https://doi.org/10.2147/IJNRD.S123618.

- List of bacteria that are the most common causes for Peritonitis

Phui, Vui Eng, Clare Hui Hong Tan, Chee Kean Chen, Kee Hoe Lai, Kwek Foong Chew, Hock Hin Chua, Laura Lui Sian Ngu, and Lawrence Wei Soon Hii. 2017. “Causative Organisms and Outcomes of Peritoneal Dialysis-Related Peritonitis in Sarawak General Hospital, Kuching, Malaysia: A 3-Year Analysis.” *Renal Replacement Therapy* 3 (1): 35. https://doi.org/10.1186/s41100-017-0117-8.

- There was an increasing incidence in continuous ambulatory peritoneal dialysis peritonitis over the 3-year study period (0.35 to 0.47 episodes per patient-year). *Streptococcus* sp. was the most common organism among the gram-positive peritonitis while *Pseudomonas* sp. was the most common organism in gram-negative peritonitis.

**Szeto, Cheuk-Chun, Philip Kam-Tao Li, David W. Johnson, Judith Bernardini, Jie Dong, Ana E. Figueiredo, Yasuhiko Ito, et al. 2017. “ISPD Catheter-Related Infection Recommendations: 2017 Update.” *Peritoneal Dialysis International* 37 (2): 141–54. https://doi.org/10.3747/pdi.2016.00120.

- Recommendations for the prevention (catheter design, catheter placement, education) and maintenance of peritonitis (antibiotics and other medical assessments).

Kitterer, Daniel, Joerg Latus, M. Dominik Alscher, and Martin Kimmel. 2016. “Infectious Complications in Peritoneal Dialysis: The Spectrum of Causative Organisms and Recommended Treatment Options.” *Some Special Problems in Peritoneal Dialysis*, September. https://doi.org/10.5772/64005.

- PD-related infections, including peritonitis, exit-site infections (ESI), and tunnel infections, are important complications, resulting in significant morbidity and a 3.5–10.0% risk of death.

**Mehrotra, Rajnish, Olivier Devuyst, Simon J. Davies, and David W. Johnson. 2016. “The Current State of Peritoneal Dialysis.” *Journal of the American Society of Nephrology* 27 (11): 3238–52. https://doi.org/10.1681/ASN.2016010112.

- State of PD around the world, including usage rates, peritonitis rates, policy status, and the future use of PD

**Li, Philip Kam-Tao, Cheuk Chun Szeto, Beth Piraino, Javier de Arteaga, Stanley Fan, Ana E. Figueiredo, Douglas N. Fish, et al. 2016. “ISPD Peritonitis Recommendations: 2016 Update on Prevention and Treatment.” *Peritoneal Dialysis International* 36 (5): 481–508. https://doi.org/10.3747/pdi.2016.00078.

- Recommendations for the prevention of peritonitis, initial presentation, and management of peritonitis.

Higuchi, Chieko, Minoru Ito, Ikuto Masakane, and Hiroshi Sakura. 2016. “Peritonitis in Peritoneal Dialysis Patients in Japan: A 2013 Retrospective Questionnaire Survey of Japanese Society for Peritoneal Dialysis Member Institutions.” *Renal Replacement Therapy* 2 (1): 2. https://doi.org/10.1186/s41100-016-0014-6.

- Overall incidence of PD peritonitis in Japan was relatively low.

**Tantiyavarong, Pichaya, Opas Traitanon, Piyatida Chuengsaman, Jayanton Patumanond, and Adis Tasanarong. 2016. “Dialysate White Blood Cell Change after Initial Antibiotic Treatment Represented the Patterns of Response in Peritoneal Dialysis-Related Peritonitis.” *International Journal of Nephrology* 2016. https://doi.org/10.1155/2016/6217135.

- Study on changes in effluent PD fluid based on antibiotic treatment of Peritonitis.

ShuQi Wang, Fatih Inci, and Utkan Demirci. 2015. “Detection of Peritonitis in Patients on Peritoneal Dialysis at Home.” *IEEE Pulse*, October 22, 2015. https://pulse.embs.org/september-2015/detection-of-peritonitis-in-patients-on-peritoneal-dialysis-at-home/.

- Proposal for early detection of Peritonitis plus possible business ventures (the company that the authors started for PD-focused infection detection products has pivoted to fertility detection products).

Filippone, Antonella, Roberta Cianci, Andrea Delli Pizzi, Gianluigi Esposito, Pierluigi Pulsone, Alessandra Tavoletta, Mauro Timpani, and Antonio Raffaele Cotroneo. 2015. “CT Findings in Acute Peritonitis: A Pattern-Based Approach.” *Diagnostic and Interventional Radiology* 21 (6): 435–40. https://doi.org/10.5152/dir.2015.15066.

- Further elucidation of Peritonitis effects on the peritoneum and how to differentially diagnose the infection using CT, perhaps finding an underlying cause.

***How to Collect a Peritoneal Dialysis Sample for Cell Count and Culture - Mayo Clinic*. 2014. https://www.youtube.com/watch?v=4Iey8vq6CHk.

- Video for the measurement of effluent PD fluid – opaqueness of fluid is very easy to see.

Fan, Xiaoguang, Rong Huang, Juan Wang, Hongjian Ye, Qunying Guo, Chunyan Yi, Jianxiong Lin, et al. 2014. “Risk Factors for the First Episode of Peritonitis in Southern Chinese Continuous Ambulatory Peritoneal Dialysis Patients.” *PLoS ONE* 9 (9). https://doi.org/10.1371/journal.pone.0107485.

- Older age, male, lower educational level and hypoalbuminemia at the commencement of PD were the risk factors associated with the first episode of peritonitis in Southern Chinese CAPD patients.

Szeto, Cheuk-Chun. 2014. “Peritonitis Rates of the Past Thirty Years: From Improvement to Stagnation.” *Peritoneal Dialysis International : Journal of the International Society for Peritoneal Dialysis* 34 (2): 151–53. https://doi.org/10.3747/pdi.2014.00007.

- Article detailing the slowing of the increasing utilization rates of PD.

Van Esch, Sadie van, Raymond T. Krediet, and Dirk G. Struijk. 2014. “32 Years’ Experience of Peritoneal Dialysis-Related Peritonitis in a University Hospital.” *Peritoneal Dialysis International : Journal of the International Society for Peritoneal Dialysis* 34 (2): 162–70. https://doi.org/10.3747/pdi.2013.00275.

- Article about the incidence of peritonitis, pathogens that cause it, outcomes, and trends from 1979 onward at a hospital in the Netherlands.

Figueiredo, Ana Elizabeth, Carlos Eduardo Poli-de-Figueiredo, Franciele Meneghetti, Gonzalo Aejandro Pacheco Lise, Caroline Costa Detofoli, and Luisa Bicca da Silva. 2013. “Peritonitis in Patients on Peritoneal Dialysis: Analysis of a Single Brazilian Center Based on the International Society for Peritoneal Dialysis.” *Brazilian Journal of Nephrology* 35 (3): 214–19. https://doi.org/10.5935/0101-2800.20130034.

- Determination of the rates of Peritonitis in Brazil and specific features of the infected including type of bacteria, whether the patient was diabetic, and patient age.

Pihl, Maria, Julia R. Davies, Ann-Cathrine Johansson, and Gunnel Svensäter. 2013. “Bacteria on Catheters in Patients Undergoing Peritoneal Dialysis.” *Peritoneal Dialysis International : Journal of the International Society for Peritoneal Dialysis* 33 (1): 51–59. https://doi.org/10.3747/pdi.2011.00320.

- Bacteria were common on catheters from patients without symptoms of infection. Up to 4 different bacterial species were found in close association and may represent a risk factor for the future development of peritonitis in patients.

Kocyigit, Ismail, Aydin Unal, Derya Karademir, Sami Bahcebasi, Murat H. Sipahioglu, Bulent Tokgoz, Oktay Oymak, and Cengiz Utas. 2012. “Improvement in Culture-Negative Peritoneal Dialysis-Related Peritonitis: A Single Center’s

Experience." *Peritoneal Dialysis International : Journal of the International Society for Peritoneal Dialysis* 32 (4): 476–78. https://doi.org/10.3747/pdi.2011.00153.

- Best steps to take when evaluating peritonitis, especially infections that were culture negative - most likely a process mistake at the lab or misdiagnosis of infection.

Martin, Luis C., Jacqueline C. T. Caramori, Natalia Fernandes, Jose C. Divino-Filho, Roberto Pecoits-Filho, and Pasqual Barretti. 2011. "Geographic and Educational Factors and Risk of the First Peritonitis Episode in Brazilian Peritoneal Dialysis Study (BRAZPD) Patients." *Clinical Journal of the American Society of Nephrology* 6 (8): 1944–51. https://doi.org/10.2215/CJN.11431210.

- Educational level and geographic factors as well as race and center size are associated with risk for the first peritonitis, independent of socioeconomic status, PD modality, and comorbidities.

Asicioglu, Ebru, Arzu Kahveci, Elif Ari Bakir, Atilla Bulur, Hakki Arikan, Mehmet Koc, Serhan Tuglular, and Cetin Ozener. 2010. "Unusual Presentation of Peritonitis with Persistent Clear Aspirate: A Case Report." *Journal of Medical Case Reports* 4 (November): 383. https://doi.org/10.1186/1752-1947-4-383.

- Strange case about a patient who experienced peritonitis without the effluent fluid cloudiness.

Chow, Kai Ming, Cheuk Chun Szeto, Kitty Kit-Ting Cheung, Chi Bon Leung, Sunny Sze-Ho Wong, Man Ching Law, Yiu Wing Ho, and Philip Kam-Tao Li. 2006. "Predictive Value of Dialysate Cell Counts in Peritonitis Complicating Peritoneal Dialysis." *Clinical Journal of the American Society of Nephrology* 1 (4): 768–73. https://doi.org/10.2215/CJN.01010306.

- Older article demonstrating that WBC count is the best way to predict the onset of Peritonitis.

Akman, Sema, Vedat Uygun, and Ayfer Gur Guven. 2005. "Value of the Urine Strip Test in the Early Diagnosis of Bacterial Peritonitis." *Pediatrics International* 47 (5): 523–27. https://doi.org/10.1111/j.1442-200x.2005.02119.x.

- Strip test might be a valuable test to diagnose bacterial peritonitis through the detection of both WBC and PMN in peritoneal dialysis patients.

Penders, Joris, Tom Fiers, Annemieke M. Dhondt, Geert Claeys, and Joris R. Delanghe. 2004. "Automated Flow Cytometry Analysis of Peritoneal Dialysis Fluid." *Nephrology Dialysis Transplantation* 19 (2): 463–68. https://doi.org/10.1093/ndt/gfg552.

- Another article regarding the detection of Peritonitis using WBC count – bacterial counts are unreliable.

Ro, Yuuki, Chieko Hamada, Hiroaki Io, Kayo Hayashi, Ichiro Hirahara, and Yasuhiko Tomino. 2004. “Rapid, Simple, and Reliable Method for the Diagnosis of CAPD Peritonitis Using the New MMP-9 Test Kit.” *Journal of Clinical Laboratory Analysis* 18 (4): 224–30. https://doi.org/10.1002/jcla.20027.

- Usages of MMP-9 test kit for detection of Peritonitis instead of measuring WBCs.

Cropper, Elizabeth, Sandie Coleclough, Sally Griffiths, Sharon Saunders, Julie Williams, and Peter A. Rutherford. 2003. “Rapid Diagnosis of Peritonitis in Peritoneal Dialysis Patients.” *Journal of Nephrology* 16 (3): 379–83.

- Episodes of peritonitis are associated with higher risk of peritoneal membrane failure. This study examined the utility of a rapid peritonitis diagnosis method (Periscreen).

Özener, Emel Akoğlu, and A. Süha Yalçin. 1998a. “Early Detection of Peritonitis in Continuous Ambulatory Peritoneal Dialysis Patients by Use of Chemiluminescence: Evaluation of Diagnostic Accuracy by Receiver-Operating Characteristic Curve Analysis.” *Clinical Chemistry* 44 (8): 1680–84.

- Measurement of Peritonitis using chemi-luminescence of WBCs (anti-microbial activity).

Michelle, J Alfa, P. Degagne, N. Olson, and G.K.M. 1997. “Improved Detection of Bacterial Growth in Continuous Ambulatory Peritoneal Dialysis Effluent by Use of BacT/Alert FAN Bottles. | Journal of Clinical Microbiology.” April 1997. https://jcm.asm.org/content/35/4/862.short.

- On the basis of case definitions for peritonitis, the sensitivities and specificities of the methods detecting bacteria in effluent with FAN and BTAn bottles and with BD bottles and BA-MAC were 81.1 and 98.8% and 74.5 and 96.5%, respectively.

Holmes, Clifford J., Sharon L. Lewis, Winnie Y. Kubey, and Dennis E. Van Epps. 1990. “Comparison of Peritoneal White Blood Cell Parameters From Continuous Ambulatory Peritoneal Dialysis Patients With a High or Low Incidence of Peritonitis.” *American Journal of Kidney Diseases* 15 (3): 258–64. https://doi.org/10.1016/S0272-6386(12)80771-2.

- Measuring WBC counts in patients with different incidence of Peritonitis – there were no differences found.

Fenton, P. 1982. “Laboratory Diagnosis of Peritonitis in Patients Undergoing Continuous Ambulatory Peritoneal Dialysis.” *Journal of Clinical Pathology* 35 (11): 1181–84. https://doi.org/10.1136/jcp.35.11.1181.

- Older article regarding the detection of Peritonitis.

Current Product Offerings

**“Stay•safe and Biofine.” n.d. Accessed March 12, 2020. https://www.freseniusmedicalcare.com/en/healthcare-professionals/home-therapies/staysafe-and-biofine/.

- Product page for the stay safe as well as some technical features and analysis regarding lowering infection

**“Stay Safe System Overview.” 2019. Fresenius Medical Care. October 2019. https://fmcna.com/products/home-dialysis-equipment/peritoneal-dialysis-devices/stay-safe-overview/.

- Another Product page for the Stay-safe organizer and procedures for how to use it

“Baxter - Peritoneal Dialysis.” 2019. 2019. https://renalcare.baxter.com/therapies/peritoneal-dialysis.

- Product page for Baxter’s PD devices; almost all of them are automated cyclers and data-collection tools.

Nesbitt, Hal. 2019. “Finalist: Utilizing Optical Interrogation Methods for Early Diagnosis of Peritonitis in Peritoneal Dialysis Patients.” 2019. https://www.kidneyx.org/PrizeCompetitions/PastCompetitions/redesigndialysisphaseiproposal135.

- Stanford’s submission to Phase I Kidney X using optical sensors in the PD drainage tube to detect infection.

**“FDA 510(k) Pre-Market Notification for Fresenius Stay-Safe.” 2018. https://www.accessdata.fda.gov/cdrh_docs/pdf17/K173593.pdf.

- 510k for the Fresenius Stay-safe and tubing -- great reference for testing performed and form examples

Patents

Moissl, Ulrich, Paul Chamney, Peter Wabel, Tobias Groeber, and Sebastian Wieskotten. 2019. Organizer für die Peritonealdialyse und medizinisches System. Germany DE102018113322A1, filed June 5, 2018, and issued December 5, 2019. https://patents.google.com/patent/DE102018113322A1/en?q=peritoneal+dialysis&q=organizer&oq=peritoneal+dialysis+organizer.

- Original patent for the Fresenius Stay-Safe organizer.

**Elbadry, Aly R., Eric Hsiang Yu, Ahmad Naim Saleh, and Michael Austin Snyder. 2019. Sensor monitoring system for in-dwelling catheter based treatments. United States US20190358387A1, filed December 14, 2018, and issued November 28, 2019. https://patents.google.com/patent/US20190358387A1/en?q=peritonitis&q=detector&oq=peritonitis+detector&page=1.

- A possible competitor Gastroklenz Inc. with a newly filed patent that senses possible infections during drainage of the effluent fluid and uploads data to some web-based application.

**Gerber, Martin T., and Christopher M. Hobot. 2018. Peritoneal dialysis fluid testing system. United States US20180193546A1, filed March 7, 2018, and issued July 12, 2018. https://patents.google.com/patent/US20180193546A1/en?q=peritonitis&q=detector&oq=peritonitis+detector.

- Medtronic's filing for a PD cycler with a built-in fluid sensor for evaluating effluent fluid for infection and biomarkers

Britton, Andrea (Krensky), Donald Busby, Eric Callahan, Robert Childers, Peter Hopping, Seyed Khorashahi, William Reese, Randall Sharo, Debra Toczko, and Li Yue. 2017. Peritoneal dialysis systems and methods having graphical user interface. United States US9775939B2, filed August 14, 2013, and issued October 3, 2017. https://patents.google.com/patent/US9775939B2/en?q=peritoneal+dialysis&q=organizer&oq=peritoneal+dialysis+organizer.

- Baxter's filing for a PD cycler and tube organizer.

Biewer, John A., and Alan Wandesforde. 2017. Organizer anchor assembly for dialysis system. United States US20170246442A1, filed February 21, 2017, and issued August 31, 2017. https://patents.google.com/patent/US20170246442A1/en?q=peritoneal+dialysis&q=organizer&oq=peritoneal+dialysis+organizer.

- An alternative filing for Fresenius' Stay-safe organizer and tubing organization – was abandoned.

Landherr, Frank J., Lynn E. Jensen, and Jay M. Lan. 2014. Early stage peritonitis detection apparatus and methods. United States US8801652B2, filed July 23, 2007, and issued August 12, 2014. https://patents.google.com/patent/US8801652B2/en?q=peritonitis&q=detector&oq=peritonitis+detector.

- Effluent evaluation system and flow path, detecting scattering caused by extra WBCs from peritonitis.

Wang, Shuqi, Utkan Demirci, Bin Ye, and Ragip Akbas. 2013. System and method for integration of mobile device imaging with microchip elisa. World Intellectual Property Organization WO2013010178A1, filed July 16, 2012, and issued January 17, 2013. https://patents.google.com/patent/WO2013010178A1/en?q=peritonitis&q=detector&oq=peritonitis+detector&page=1.

- Chemical testing for peritonitis, measurement testing by sensors on a microchip and relayed to a mobile device.

Lundtveit, Loren, Jose Alvaro, Joseph Bowman, Dan O'Sullivan, and Stan Thompson. 2003. One-piece tip protector and organizer. United States US20030220599A1, filed May 24, 2002, and issued November 27, 2003. https://patents.google.com/patent/US20030220599A1/en?q=peritoneal+dialysis&q=organizer&oq=peritoneal+dialysis+organizer.

- Baxter's filing for a PD tube organizer system.

Pathology

Honda, Kazuho, Chieko Hamada, Kunio Kawanishi, Masaaki Nakayama, Masanobu Miyazaki, Yasuhiko Ito, and on behalf of the Peritoneal Pathology Study Committee of Japanese Society of Peritoneal Dialysis (JSPD). 2017. "Significance of New Membrane Formation in Peritoneal Biopsies of Peritoneal Dialysis Patients: A Case–Control Study." *Renal Replacement Therapy* 3 (1): 33. https://doi.org/10.1186/s41100-017-0115-x.

- New membrane formation starts insidiously in peritoneal membrane damaged by PD treatment, but does not necessarily lead to the development of encapsulating peritoneal sclerosis (EPS).

Cravedi, Paolo, and Giuseppe Remuzzi. 2013. "Pathophysiology of Proteinuria and Its Value as an Outcome Measure in Chronic Kidney Disease." *British Journal of Clinical Pharmacology* 76 (4): 516–23. https://doi.org/10.1111/bcp.12104.

- Proteinuria should be considered a valuable surrogate end point for clinical trials in patients with chronic renal diseases and a target for reno- and cardioprotecive strategies.

Yung, Susan, and Tak Mao Chan. 2011. "Pathophysiology of the Peritoneal Membrane during Peritoneal Dialysis: The Role of Hyaluronan." Review Article. Journal of Biomedicine and Biotechnology. 2011. https://doi.org/10.1155/2011/180594.

- Discusses the contribution of mesothelial cells to peritoneal membrane alterations that are induced by PD and the putative role of hyaluronan in these processes.

**Devuyst, Olivier, Peter J. Margetts, and Nicholas Topley. 2010. “The Pathophysiology of the Peritoneal Membrane.” *Journal of the American Society of Nephrology* 21 (7): 1077–85. https://doi.org/10.1681/ASN.2009070694.

- Great overview of pathophysiology of peritoneal membrane and how improvements in biomedical research and technology can contribute to better PD preservation and outcomes.

Milner, Quentin. 2003. “Pathophysiology of Chronic Renal Failure.” *BJA CEPD Reviews* 3 (5): 130–33. https://doi.org/10.1093/bjacepd/mkg130.

- This review will concentrate on the more common pathophysiological changes of relevance to anaesthesia.

Ejaz, A. Ahsan, Peter M. Fitzpatrick, Alan J. Durkin, Andrzej Wasiluk, William E. Haley, Melissa J. Goalen, Todd S. Ing, and Prince K. Zachariah. 1999. “Pathophysiology of Peritoneal Fluid Eosinophilia in Peritoneal Dialysis Patients.” *Nephron* 81 (2): 125–30. https://doi.org/10.1159/000045266.

- Peritoneal fluid eosinophilia has to be differentiated from other diagnostic considerations such as bacterial peritonitis and unusual presentations of spontaneous bacterial peritonitis.

Ronco, C., M. Feriani, S. Chiaramonte, A. Brendolan, L. Bragantini, P. Conz, R. Dell’Aquila, M. Milan, and G. La Greca. 1990. “Pathophysiology of Ultrafiltration in Peritoneal Dialysis.” *Peritoneal Dialysis International: Journal of the International Society for Peritoneal Dialysis* 10 (2): 119–26.

- Membrane failure, reduction in peritoneal blood flow, excessive lymphatic reabsorption catheter malposition, and fluid sequestration are the most common causes of ultrafiltration loss.

Physiology

Hill, Nathan R., Samuel T. Fatoba, Jason L. Oke, Jennifer A. Hirst, Christopher A. O’Callaghan, Daniel S. Lasserson, and F. D. Richard Hobbs. 2016. “Global Prevalence of Chronic Kidney Disease – A Systematic Review and Meta-Analysis.” *PLoS ONE* 11 (7). https://doi.org/10.1371/journal.pone.0158765.

- General quantitative study of all things CKD: statistics, risk factors, geography, etc.

**Ditsawanon, P., and P. Aramwit. 2015. “Preserving the Peritoneal Membrane in Long-Term Peritoneal Dialysis Patients.” *Journal of Clinical Pharmacy and Therapeutics* 40 (5): 508–16. https://doi.org/10.1111/jcpt.12318.

- Potential new solution of preserving the peritoneal membrane for curbing PD failure; still very early on in studies.

Schnaper, H. William. 2014. “Remnant Nephron Physiology and the Progression of Chronic Kidney Disease.” *Pediatric Nephrology (Berlin, Germany)* 29 (2). https://doi.org/10.1007/s00467-013-2494-8.

- Great in depth scientific article on the physiology of the nephron and how it contributes to CKD.