APCN×TSN 2025
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A 10-Year Journey of Continuous Ambulatory Peritoneal Dialysis (CAPD) Peritonitis: Lessons from Dr. Saiful Anwar Hospital, Malang, Indonesia

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Disclosure of Conflict of Interest

All authors have nothing to declare for this study

Background

Continuous Ambulatory Peritoneal Dialysis (CAPD)

is an effective renal replacement therapy for patients with **end-stage renal disease (ESRD)**

Peritonitis

is defined as **inflammation of the serous membrane** lining the abdominal cavity and its organs

Dialysis-related peritonitis remains a major complication and a key challenge to the long-term success of peritoneal dialysis

- **Mortality Rate 5%**
  Mortalilty in 16% of infected patients
- Severe, refractory, or prolonged CAPD peritonitis→ **Peritoneal dialysis failure, switching to hemodialysis, and increased mortality**

OBJECTIVE **To analyze the etiological characteristics of CAPD peritonitis**, a major cause of mortality over ten years at Dr. Saiful Anwar Hospital, Malang

1. Bach N, et al. *BMC Nephrol.* 2025;26(1,
2. Nardelli L, et al. *BMC Nephrol.* 2024;25(1):1-9.
3. Song P, et al. *Front Med (Lausanne).* 2022;9:799110.

Methods

Study Design: Retrospective descriptive study

Study Site: CAPD Unit, Dr. Saiful Anwar General Hospital, Malang, Indonesia.

Data Source: Medical record review of CAPD patients

Target Population: ESRD patients undergoing Continuous Ambulatory Peritoneal Dialysis (CAPD)

Inclusion Criteria

- ESRD patients who underwent CAPD catheter insertion at Dr. Saiful Anwar Hospital
- Treatment period: August 2014 – December 2024
- Declared deceased with CAPD-related peritonitis as the cause of mortality

Exclusion Criteria

- ESRD patients on CAPD who deceased due to causes other than peritonitis

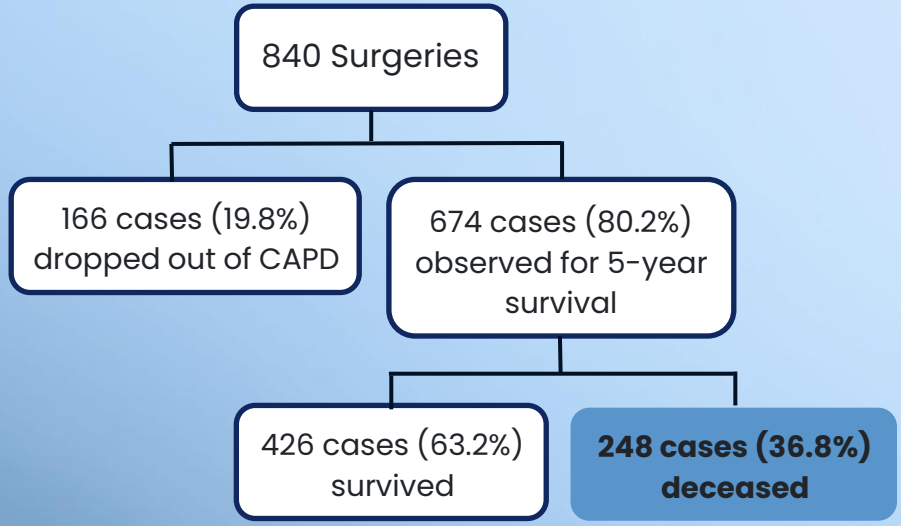
Diagnosis Criteria for CAPD-Related Peritonitis

Diagnosis is established if **at least two** of the following criteria are met:

1. Abdominal pain or cloudy peritoneal dialysate fluid
2. Leukocytosis in dialysate fluid (White blood cell count > 100 cells/μL with > 50% PMN cells)
3. Identification of pathogenic bacteria by culture of peritoneal dialysate fluid

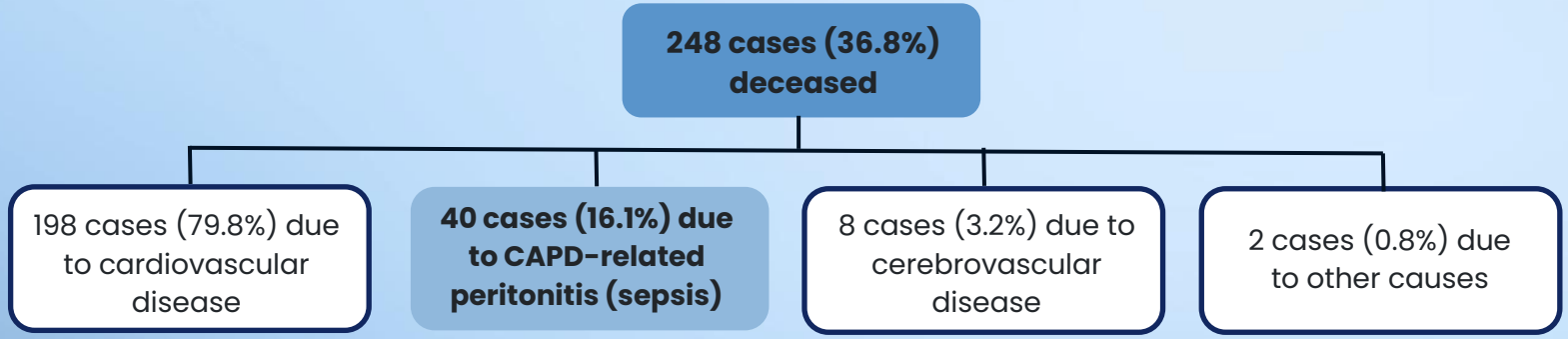
*Li PKT, Chow KM, Cho Y, et al. ISPD peritonitis guideline recommendations: 2022 update on prevention and treatment. *Peritoneal Dialysis International*. 2022;42(2):110-153

Results



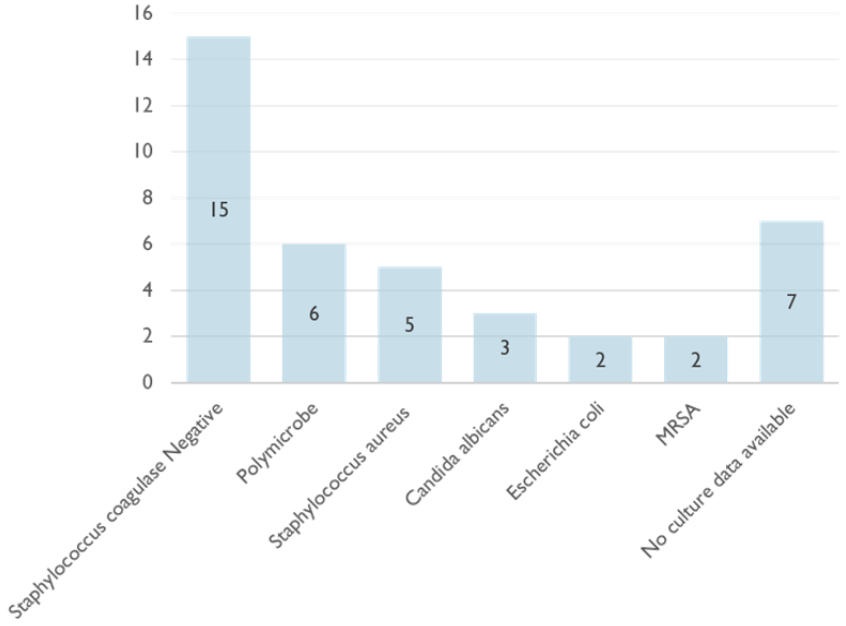
Characteristics	N=674	(%)
Gender		
Male	389	58.8
Female	285	41.2
Age, years		
<12	11	1.6
12-25	61	9.1
26-45	195	28.9
46-59	287	42.6
>60	120	17.8
Comorbid		
Hypertension	396	57.7
Hypertension and DMT2	278	42.3

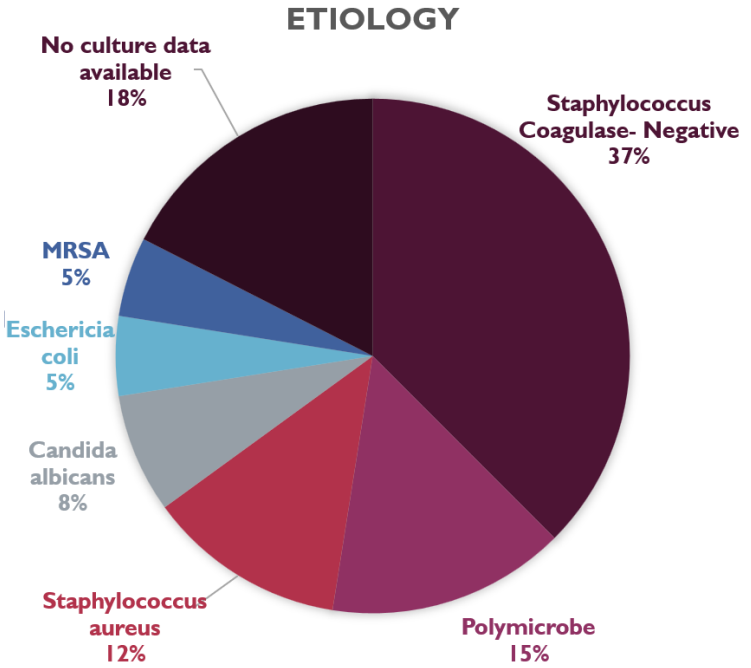
Results


248 cases (36.8%) deceased
198 cases (79.8%) due to cardiovascular disease
40 cases (16.1%) due to CAPD-related peritonitis (sepsis)
8 cases (3.2%) due to cerebrovascular disease
2 cases (0.8%) due to other causes

Results

Etiology of CAPD-related Peritonitis





Discussion

Staphylococcus Coagulase-Negative

- **Most common cause** of CAPD-related peritonitis in deceased patients → **37% cases**
  - **Similar findings** in Bach et al. (Vietnam), Nardelli et al. (Italy), Song et al. & Guo et al. (China) — Gram-positive, coagulase-negative Staphylococcus **up to 87%**
- Normal skin flora, mainly S. epidermidis, the most frequent PD-related pathogen.
  - Often causes **persistent and recurrent peritonitis → may require catheter removal and replacement**

Polymicrobial Infection

- Defined as **isolation of >1 organism** in a single peritonitis episode; more frequent in patients with prior peritonitis history
  - **Gram-positive** polymicrobial infections (~20%) → **better prognosis**, higher cure and catheter retention rates
  - **Gram-negative, anaerobic, or fungal infections → poorer outcomes**, higher rates of catheter removal and transfer to hemodialysis
- **15% of polymicrobial pathogens found in this study**
  - **Similar findings** in Bach et al. (Vietnam), 7 cases (8%) of CAPD peritonitis due to polymicrobial infection

1. Bach N, et al. *BMC Nephrol.* 2025;26(1).
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4. Guo S, et al. *Front Med (Lausanne).* 2023;10:1132695.

Discussion

Staphylococcus aureus

- **5 cases (12 %) identified in this study**
  - Bach et al. (Vietnam): S. aureus was the most common coagulase-positive Staphylococcus causing CAPD peritonitis → **clinically severe peritonitis due to multiple virulence factors**
- **Associated with poor outcomes**
  - 20% recurrence rate
  - 23% catheter removal
  - 18% transfer to hemodialysis
  - 2% mortality

Candida albicans

- **3 cases (8%) identified in this study**
  - Fungal peritonitis incidence in CAPD ranges from <5%–15%; **Candida spp. cause >90% of episodes, mostly C. albicans.**
- **Difficult to treat effectively, often leading to:**
  - High catheter removal rates
  - Permanent transfer to hemodialysis
  - Poor patient outcomes

*ISPD guidelines recommend **immediate catheter removal** once fungal peritonitis is diagnosed, followed by **2 weeks of antifungal** therapy*

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Discussion

Escherichia coli

- **2 cases (5%) identified in this study**
  - Bach et al. (Vietnam): E. coli caused 14 cases (8%) of CAPD peritonitis
  - Guo et al. (China): E. coli was the **most common multidrug-resistant organism** (MDRO), responsible for 79 cases (54%)
- Clinical presentation **tends to be more severe**, with fever, abdominal pain, nausea, vomiting, and diarrhea
- **Prior antibiotic therapy** is a major risk factor for Gram-negative enteric peritonitis

Methicillin-Resistant Staphylococcus aureus (MRSA)

- **2 cases (5%) identified in this study.**
  - Guo et al. (China): MRSA caused 34 cases (23%) of CAPD peritonitis
- **MRSA is associated with worse outcomes compared to other multidrug-resistant *S. aureus* strains:**
  - Causes more severe peritonitis
  - Leads to longer hospital stays
  - Results in higher mortality rates

***Rising antimicrobial resistance complicates empirical antibiotic selection**, which should be adapted to local CAPD center conditions as recommended by ISPD guidelines*

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Conclusions

The substantial mortality rate linked to CAPD peritonitis highlights the **critical need for enhanced infection prevention strategies and prompt targeted interventions**

Improving CAPD patient education, reinforcing aseptic techniques, and refining antibiotic stewardship programs are imperative to reducing peritonitis-related deaths and improving long-term patient outcomes.

Future research should focus on **developing predictive models for high-risk patients** and **evaluating the effectiveness of emerging antimicrobial therapies**.