Αυτοματοποιημένη Περιτοναϊκή Κάθαρση: Πότε και για Ποιους

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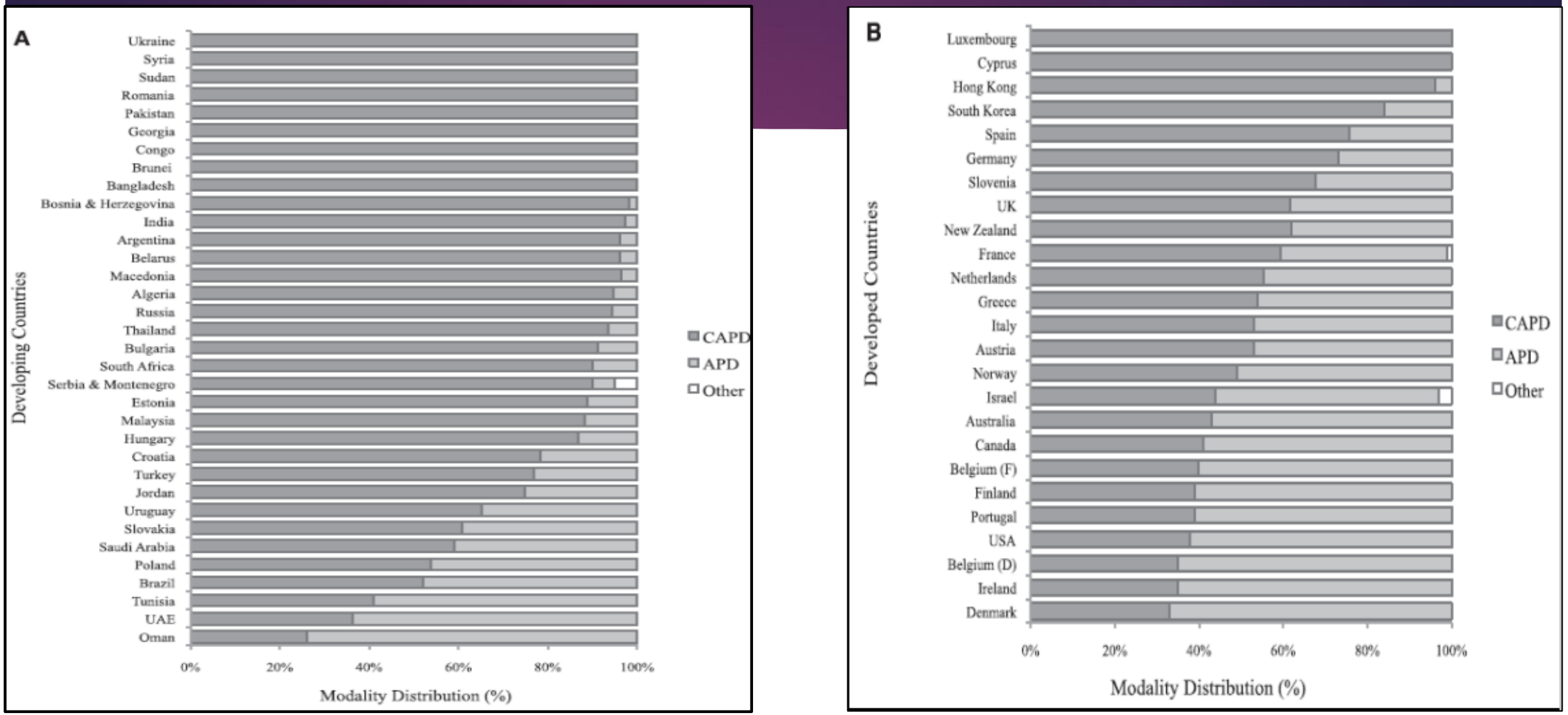
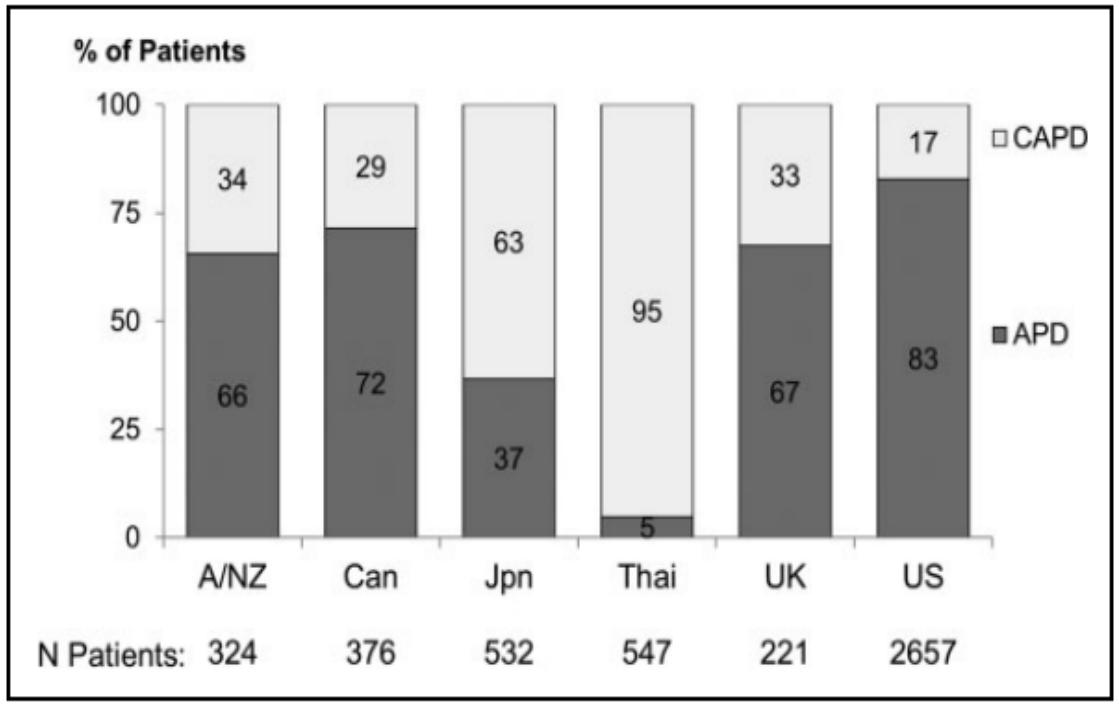
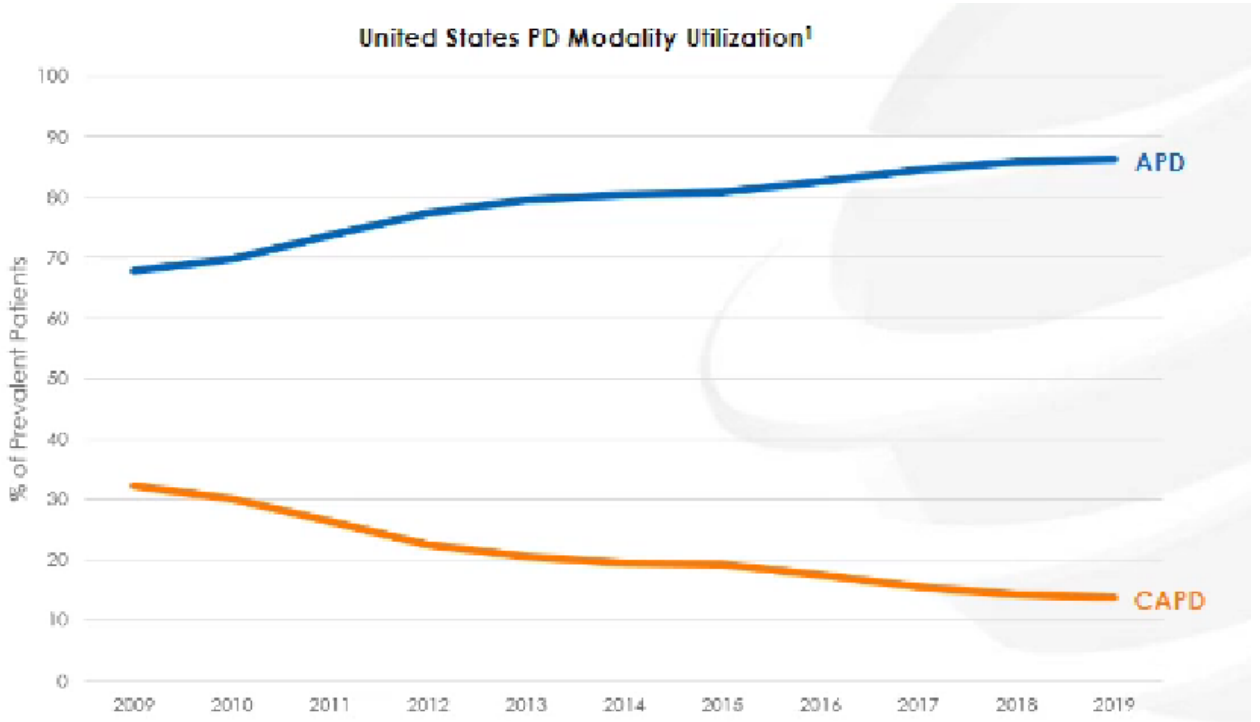
APD vs CAPD use



Jain AK et al, J Am Soc Nephrol 2012

CAPD utilization is declining





Wang A et al. Perit Dial Int. 2020 May;40(3):310-319

[1]USRDS Annual Report 2021

APD is popular in the developed world

- The increased use of APD observed in the developed world is mainly driven **by patient's preference and better cycler design**

Tang SCW and Lai KN, Nat Clin Pract Nephrol 2007

- APD has apparent lifestyle benefits but in the absence of strong data its increased use **is supported by technology rather than medical evidence**

Blake PG, Perit Dial Int 2006

Advantages/Disadvantages of APD

1. Patient/Technique survival
2. Volume status
3. Preservation of residual kidney function
4. Peritonitis
5. Mechanical complications
6. Phosphate removal
7. Quality of life
8. Employment
9. Special populations
10. Cost

1. Patient/Technique survival

- **U.S.A (USRDS)**

66,381 incident pts (1996-2004)

No difference in mortality and technique failure

Mehrotra R et al. Kidney Int 2009

- **EUROPE (NECOSAD)**

87 APD and 562 CAPD incident pts

No difference in overall mortality and technique failure

Michels WM et al, Clin J Am Soc Nephrol 2009

- **BRAZIL (BRAZPD)**

2,890 incident PD pts (>90d)

Higher mortality rate in CAPD patients
No difference was observed for technique failure

Beduschi G et al, Plos One 2015

- **TAIWAN**

161 APD and 121 CAPD incident pts

Better patient and technique survival in APD pts <65yo

Sun CY et al, Perit Dial Int 2011

- **AUSTRALIA & NEW ZEALAND (ANZDATA)**

4128 pts

No difference in patient survival technique failure

Badve SV et al, Kidney Int 2008

Superior survival of high transporters treated with automated *versus* continuous ambulatory peritoneal dialysis

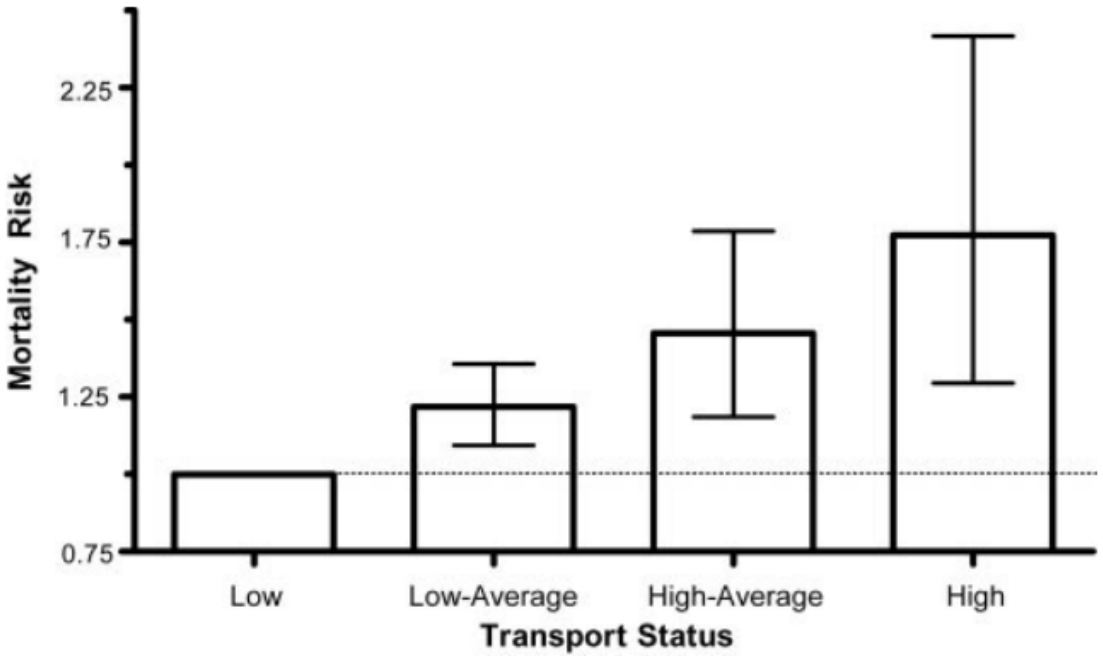
4128 pts
ANZDATA
1999-2004
>90d PD

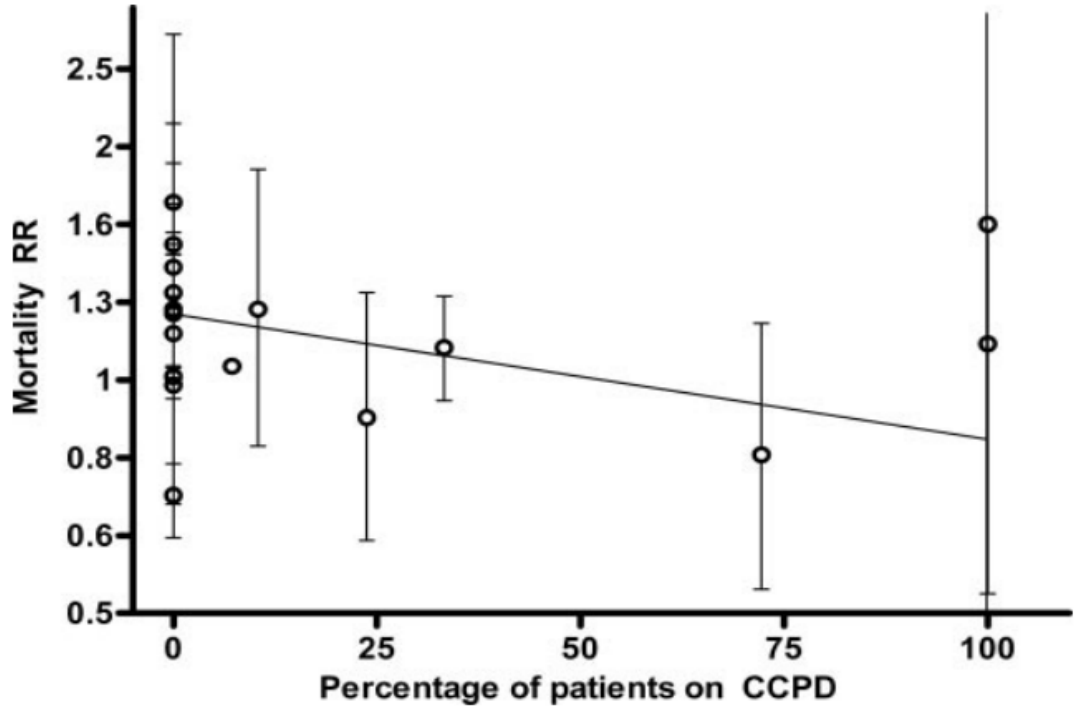
	Univariate analysis			Multivariate analysis		
Transport group	HR	95% CI	*P*	HR	95% CI	*P*
High (n = 628)	0.57	0.35–0.94	0.03	0.56	0.35–0.87	0.01
High-average (n = 1936)	0.98	0.72–1.34	0.9	1.08	0.81–1.45	0.6
Low-average (n = 1146)	0.70	0.46–1.07	0.1	0.98	0.66–1.45	0.9
Low (n = 196)	2.21	1.24–3.93	0.007	2.19	1.02–4.70	0.04

Johnson DW et al, Nephrol Dial Transplant 2010

Meta-Analysis: Peritoneal Membrane Transport, Mortality, and Technique Failure in Peritoneal Dialysis

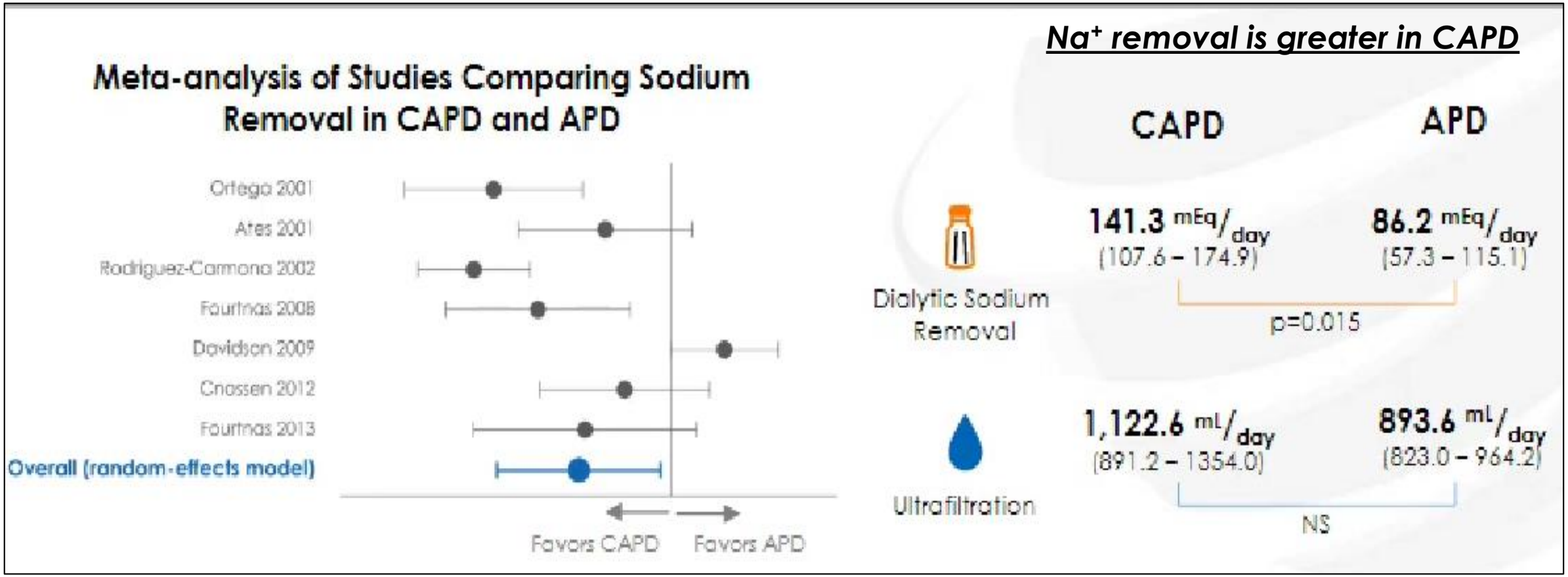
Meta-analysis
20 studies





Brimble KS et al. J Am Soc Nephrol. 2006 Sep;17(9):2591-8

2. Achievement of euvolemia



Borelli S et al. J Nephrol. 2019 Apr;32(2):231-239

Comparison of Volume Overload with Cycler-Assisted *versus* Continuous Ambulatory Peritoneal Dialysis

Table 2. Comparisons of volume status by CAPD and CCPD[a]

Parameter	CCPD (n = 68)	CAPD (n = 90)	P
Mean (SD)			
ECFV/TBW (%)	51.8 (5.7)	51.9 (4.4)	0.929
systolic BP	132.9 (19.1)	129.9 (17.4)	0.323
diastolic BP	78.6 (10.5)	76.4 (11.3)	0.223
% of Patients			
BP medication use	69.3	58.8	0.174
diuretic use	39.8	33.8	0.446
peripheral edema	36.4	38.2	0.810

[a]ECFV, extracellular fluid volume; TBW, total body water.

Characteristic	CAPD (n = 90)	CCPD (n = 68)	P
Mean (SD)			
age (yr)	56.7 (15.8)	56.2 (15.6)	0.858
time on dialysis (mo)	24.2 (20.7)	29.6 (17.3)	0.001
weekly Kt/V	2.20 (0.45)	2.24 (0.48)	0.588
dialysis prescription (L/d)	8.265 (1.088)	9.498 (1.625)	<0.001
nighttime exchanges (n)	N/A	3.7 (0.6)	N/A
time on CCPD (h)	N/A	8.9 (0.7)	N/A
residual CrCl (L/wk)	39.4 (30.2)	38.2 (32.9)	0.822
dialysate CrCl (L/wk)	43.8 (8.4)	43.9 (7.8)	0.924
ultrafiltration (ml/d)	572 (1013)	811 (661)	0.092
residual GFR (ml/min)	4.3 (3.5)	4.1 (3.7)	0.745
urine volume (ml/d)	654 (498)	682 (673)	0.761
D/P creatinine	0.69 (0.10)	0.75 (0.08)	<0.001
urine Na (mmol/d)	42.7 (26.9)	31.1 (24.2)	0.006
dialysate Na concentration (mmol/L)	125 (13)	124 (14)	0.580
dialysate Na removal (mmol/d)	66.1 (127.5)	98.7 (82.0)	0.069
total Na removal (mmol/d)	109 (124)	130 (75)	0.232
weight (kg)	75.3 (17.6)	75.0 (16.1)	0.933
LBM	63 (16)	59 (11)	0.068
protein catabolic rate	0.88 (0.24)	0.84 (0.19)	0.243
Charlson comorbidity index	5.9 (2.3)	6.1 (2.5)	0.538
albumin (g/L)	35.7 (4.6)	35.3 (3.6)	0.615
hemoglobin (g/L)	115.8 (11.9)	114.7 (10.2)	0.521
calcium (corrected for albumin; mmol/L)	2.36 (0.19)	2.33 (0.15)	0.478
phosphorous (mmol/L)	1.70 (0.36)	1.74 (0.34)	0.480
parathyroid hormone (pmol/L)	30.8 (26.2)	30.0 (20.6)	0.818
Na (mmol/L)	136.9 (3.2)	135.9 (3.0)	0.039
CRP	8.5 (11.4)	8.8 (12.2)	0.895
% of patients			
male gender	57.8	50.0	0.331
CCPD patients with additional daytime exchange	48.5	N/A	N/A
icodextrin use	55.6	77.9	0.002
ischemic heart disease	23.3	22.1	0.850
peripheral vascular disease	12.2	16.2	0.477
cerebrovascular disease	13.3	10.3	0.561
diabetes	40.0	54.4	0.072
hypertension	77.8	73.5	0.536

Davison S et al. Clin J Am Soc Nephrol. 2009 Jun;4(6):1044-50

Fluid Status in Peritoneal Dialysis Patients: The European Body Composition Monitoring (EuroBCM) Study Cohort

- 639 patients from 28 PD centers in 6 countries
- Volume status assessed with BIA
- Only 40% euvolemic
- Multivariate analysis included patients from countries with **unrestricted availability of all PD modalities and fluid types**

Multivariate linear regression for Relative ΔTissue Hydration from the subgroup of patients from Belgium, France and UK

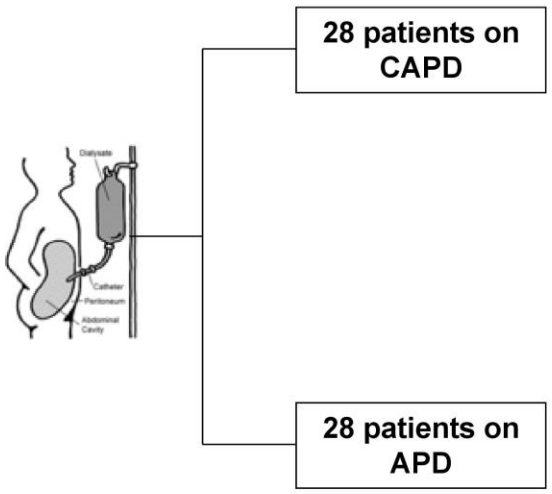
Parameter	Coefficient	95% CI		p-value
Intercept	**30.27**	20.65	39.88	<0.0001
Age (per year)	**0.10**	0.05	0,16	0.0002
Sex (female vs male)	**−3.04**	−4.55	−1.52	0.0001
Albumin per g/l	**−0.75**	−0.91	−0.59	<0.0001
BMI per kg/m^2	**−0.66**	−0.83	−0.50	<0.0001
Diabetes (vs no diabetes)	**4.86**	3.14	6.59	<0.0001
Systolic BP (per mmHg)	**0.09**	0.05	0.12	<0.0001
Glucose at least once 2.5% vs. 1.5% only	**−0.73**	−2.56	1.11	0.80
Glucose at least once 3.86/4.25% vs. 1.5% only	**5.18**	2.62	7.74	<0.0001
Not included due to p>0.1				
Ultrafiltration				0.86
Urine output				0.66
Hypertension stage				0.41
NYHA Stage				0.39
Liver disease				0.56
Time on PD per month				0.25
Transport status				0.83
Type of PD solution				0.12
PD modality				0.27

Wim VB et al. PLoS One. 2011 Feb 24;6(2):e17148

BP control

A comparative analysis of ambulatory BP profile and arterial stiffness between CAPD and APD

Case-control design: matching for age, gender and diabetic status



Parameter	CAPD	APD	P value
ECW/TBW	0.48±0.1	0.47±0.1	0.78
Antihypertensive medications	2.2±1.1	2.5±0.7	0.17
24-h brachial SBP (mmHg)	129.0±17.3	128.1±14.2	0.83
24-h aortic SBP (mmHg)	116.9±16.4	116.4±11.6	0.87
24-h AIx(75) (%)	24.8±8.9	22.5±9.1	0.36
24-h PWV (m/sec)	9.1±2.4	8.8±2.1	0.61

CONCLUSION: No difference between PD modalities in volume status, antihypertensive medication use, ambulatory BP and in severity of arterial stiffness.

Vaios V et al. J Hum Hypertens 2021

3. Preservation of Residual Kidney Function

Summary of studies comparing the decrease in RRF between CAPD and APD patients

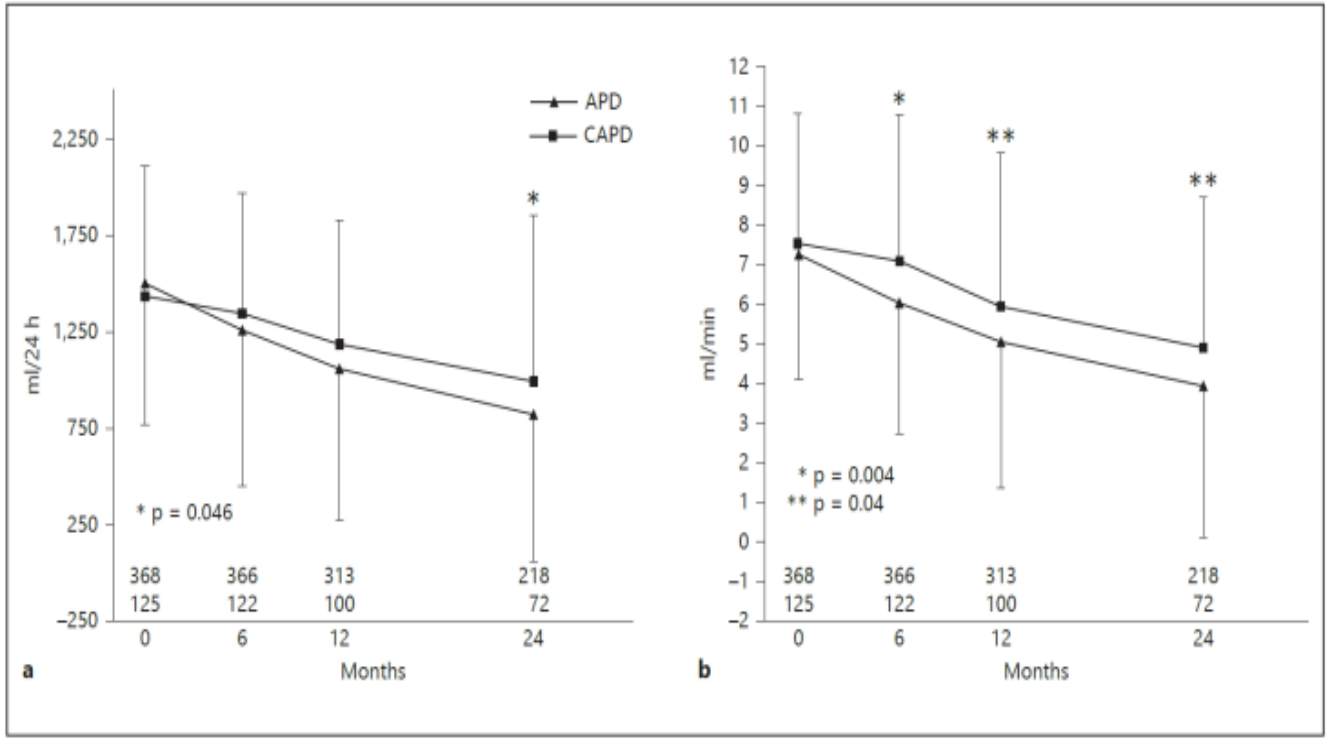
References	Type of study/duration	No. of patients CAPD/APD	Loss of RRF in APD
Hiroshige *et al.*[77]	Prospective, nonrandomized/6 m	5/13	Faster
Hufnagel *et al.*[78]	Prospective, observational/12 m	18/36	Faster
Hidaka and Nakao[74]	Observational/up to 42 m or anuria	27/7	Faster
Rodríguez-Carmona *et al.*[79]	Prospective, observational/>24 m	53/51	Faster
Parikova A (2005)[a]	Prospective/18 m	65/36	Faster
Fernández Rodríguez AM (1998)	Prospective sequential (CAPD—CPD–TPD)	45	Equal
Bro *et al.*[82]	Prospective, randomized/6 m	17/17	Equal
Singhal *et al.*[85]	Prospective, 27 ± 14 m	242	Equal
De Fijter *et al.*[81]	Prospective, randomized/24 m	11/13	Equal
Moist *et al.*[5]	Registry	1032	Equal
Gallar *et al.*[86]	Prospective/12 m	11/9	Equal
Holley *et al.*[84]	Retrospective database	184	Equal
Jansen *et al.*[8]	Necosad registry, prospective/12 m	243	Equal
Johnson *et al.*[59]	Prospective/78 m	146/12	Equal
Petras DI (2005)[a]	Retrospective	24/14	Equal
Gallar P (2005)[a]	Acute study	10/14	Equal
Ramos Bodi V (2006)[b]	Retrospective study/36 m	70	Equal

APD, automated peritoneal dialysis; CAPD, continuous ambulatory peritoneal dialysis; RRF, residual renal function.
[a]Communication to EuroPD Congress (Praha, 2005).
[b]Communication to Latinoamerican and Spanish Congress (Madrid, 2006).

Marron B et al. Kidney Int Suppl. 2008 Apr;(108):S42-51

Compared decline of residual kidney function in patients treated with automated peritoneal dialysis and continuous ambulatory peritoneal dialysis: a multicenter study

493 patients (368 CAPD, 125 APD)
24 months follow up



Perez-Fontan M et al. Nephron Clinical Practice. 2014; 128(3-4): 352-360

Probability of anuria during follow-up

	Univariate		p
	anuria (n = 44)	no anuria (n = 449)	
Gender, % males	43.2	65.7	0.003
Cholesterol, mg/dl	195.7±72.1	172.4±47.4	0.046
GFR, ml/min	5.5±3.3	7.7±3.3	<0.001
24-hour urine volume, ml	1,006.1±553.4	1,479.5±661.0	<0.001
Origin other than primary, %	26.5	5.1	<0.001
Total volume infused, ml/24 h	7,797.7±2,578.5	6,821.4±1,981.7	0.018
Number of exchanges per day	4.1±0.9	3.5±0.8	<0.001
Peritoneal glucose load, g/24 h	111.8±47.6	87.5±36.8	<0.001
APD as initial modality, %	50.0	22.7	<0.001
CV event during follow-up, %	30.2	16.8	0.028
Peritonitis during follow-up, %	55.8	36.9	0.015

Decline of GFR during follow-up

	Multivariate		p
	OR	95 % CI	
Baseline GFR (× ml/min)	1.29	1.19–1.38	<0.001
Age (× year)	0.98	0.97–0.99	0.005
Origin other than incident	2.68	1.29–6.13	0.019
Baseline proteinuria (× g/24 h)	1.25	1.10–1.43	0.001
Baseline mean blood pressure (× mm Hg)	1.02	1.01–1.04	0.054
Baseline number of antihypertensives	1.21	1.01–1.48	0.048
CV event during follow-up	2.27	1.29–4.02	0.005
Baseline icodextrin	0.67	0.44–1.02	0.062
APD starting modality			
All	1.06	0 .65–1.71	0.83
Baseline GFR >7.5 ml/min	0.64	0.34–1.20	0.16
Baseline GFR ≤7.5 ml/min	2.26	1.09–4.82	0.023

4. Peritonitis rates

- Fewer connections and disconnections are required for APD
- Leukocyte function improves during a long dwell of PD dialysate, such as in CCPD

Wilson J and Nissenson AR, Semin Dial 2002

- Peritoneal mesothelial cells exhibit improved function after several hours of peritoneal membrane rest, which resembles “dry” daytime in NIPD

Tomo T et al, Artif Org 2005

Peritonitis in APD vs CAPD

- Spain, single center, 1989-1998, 328 pts
- Incidence of peritonitis was higher in CAPD than in APD (adjusted difference 0.20 episodes/ patient/year, 95% confidence interval 0.08 - 0.32)
- **APD better than CAPD**

Rodriguez-Carmona A et al, Perit Dial Int 1999

- Scotland, 10 PD units, 38000 pt-months
- CAPD: 1/17.6 m, APD: 1/22.3 m
- **APD better than CAPD**

Brown MC et al, Perit Dial Int 2011

- Canada, 4247 pts,1996-2005, 2555 episodes
- **No difference**

Nessim SJ et al, Clin J Am Soc Nephrol 2009

- Brazil, 2890 pts, 2004-2011
- CAPD: 0.23 episodes per patient-year, APD: 0.26 episodes per patient-year
- **No difference**

Beduschi G et al, Plos One 2015

- Australia, 6959 pts, 2003-2011, Median f-up 1.9 y
- **No difference**
- Lower hazard of developing Gram-positive peritonitis with APD than CAPD- borderline significance (HR, 0.90; 95% CI, 0.80 to 1.00; P=0.05)

Lan P et al, Clin J Am Soc Nephrol 2014

- Kuwait, single center, 341pts, 2005-2014
- CAPD:1/29 m, APD: 1/38 m ($p < 0.05$)
- **APD better than CAPD**

El-Reshaid W et al, Ren Fail 2016

Peritoneal Dialysis–Related Infection Rates and Outcomes: Results From the Peritoneal Dialysis Outcomes and Practice Patterns Study (PDOPPS)

Peritoneal Dialysis-Related Infection Rates and Outcomes

Population	Facility Attributes	Peritonitis Outcomes
PDOPPS 2014-2017 7,051 patients on PD 209 facilities in 7 countries	Country	All countries combined: 0.28 episodes/pt-yr Aus-NZ 0.35 · Thailand 0.40 Canada 0.29 · UK 0.38 Japan 0.27 · USA 0.26
		All countries combined: RR (CI)
	↑ APD use (per 10 percentage point greater use)	0.95 (0.91-1.00)
	Antibiotics at catheter insertion	0.83 (0.69-0.99)
	PD training duration ≥ 6 days	0.81 (0.68-0.96)
	Exit-site antibiotic ointment	0.79 (0.62-1.01)

CONCLUSION: Several potentially modifiable facility treatment practices may reduce the risk of peritonitis among adults undergoing peritoneal dialysis.

Jeffery Perl, Douglas S. Fuller, Brian A. Bieber, et al (2020)

@AJKDonline | DOI: 10.1053/j.ajkd.2019.09.016

AJKD AMERICAN JOURNAL OF KIDNEY DISEASES

Perl J et al. Am J Kidney Dis. 2020 Jul;76(1):42-53

Variation in PD-related Peritonitis Outcomes in the PDOPPS

Population

PDOPPS
2014-2017

126 facilities in 7 countries

1,190 patients on PD

1,631 peritonitis episodes

Cure Outcome

Cure: defined as successful treatment with antimicrobials alone + NO relapse/recurrence, PD catheter removal, death, HD transfer

Predictors

Patient level: age, sex, race, biochemistry (albumin, potassium, & sodium), residual urine volume, PD vintage, smoking, PD modality, DM, heart disease, previous peritonitis, concomitant exit-site infection

Facility level: size (per 10), % use of icodextrin , % use of low-GDP solutions, use of exit-site prophylaxis, antibiotic use at PD catheter insertion

Cure achieved in 65% of all episodes - no difference in adj OR of cure by country

Associations with cure in mixed-effects logistic models, all countries combined: adjusted OR (CI)

APD use (vs CAPD) 1.36 (1.02-1.82)

Aminoglycoside use vs 3rd-generation cephalosporin 3.95 (1.23-12.68)

Icodextrin use (per 10 percentage point > use) 1.06 (1.01-1.12)

Ciprofloxacin use vs 3rd-generation cephalosporin (for Gram-negative peritonitis) 5.73 (1.07-30.61)

Gram-negative vs Gram-positive 0.41 (0.30-0.57)

Culture-negative vs Gram-positive 0.73 (0.54-1.01)

CONCLUSION: Outcomes following peritonitis vary by patient characteristics, peritonitis characteristics, and modifiable peritonitis treatment practices.

Muthana Al Sahlawi, Junhui Zhao, Keith McCullough, et al (2021)
@AJKDonline | DOI: 10.1053/j.ajkd.2021.03.022
AJKD AMERICAN JOURNAL OF KIDNEY DISEASES

Al Sahlawi M et al. Am J Kidney Dis. 2022

5. Mechanical complications (Peritoneal leakage, Hernias)

- Intraperitoneal pressure is reduced by more than 50% in the supine position

- Increased PD dialysate volume during the night dwell and lower or even no dialysate volume during daytime (dry day) could be proven beneficial for patients who cannot tolerate high intraperitoneal pressure

K/DOQI Guidelines, Am J Kidney Dis 2006

- In this sense, APD could be a satisfactory alternative to surgical repair of hernias

Tang SCW and Lai KN, Nat Clin Pract Nephrol 2007

Automated *vs* continuous ambulatory peritoneal dialysis: a systematic review of randomized controlled trials

Outcome analysed	No. of studies	No. of patients	Results			
			Relative risk[a]	95% CIs	Weighted mean difference[b]	95% CIs
Hernias	2	107	1.26	0.32–5.01	–	–
PD fluid leaks	2	107	1.06	0.11–9.83	–	–
Hydrothoraces	1	82	1.00	0.06–15.45	–	–
All-cause PD catheter removal	1	82	0.64	0.27–1.48	–	–
PD catheter removal due to peritonitis	1	85	1.31	0.31–5.46	–	–
All-cause mortality	2	122	1.49	0.51–4.37	–	–
Kt/V	2	49	–	–	0.12	−0.22 to 0.47
Weekly creatinine clearance	1	52	–	–	−6.60	−24.19 to 10.99
Endogenous creatinine clearance	2	49	–	–	−0.17	−1.66 to 1.32

[a]Relative risk <1 favours experimental intervention (APD); relative risk >1 favours control intervention (CAPD).
[b]Weighted mean difference >0 favours experimental intervention (APD); weighted mean difference <0 favours control intervention (CAPD).

Rabindranath KS et al, Nephrol Dial Transplant 2007

6. Phosphate removal

Retrospective
380 pts (84 CAPD, 287 APD)

- Greater peritoneal phosphate clearance is achieved with CAPD prescriptions
- Slower peritoneal transporters should be advised to choose CAPD to improve serum phosphate control

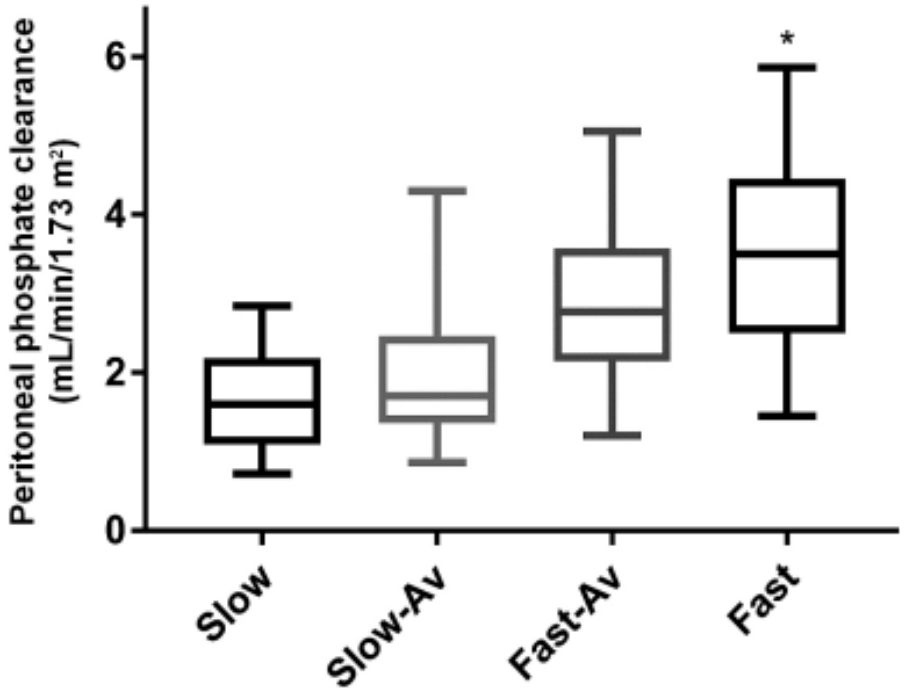
TABLE 3
Univariate and Multivariate Analysis of Determinants of Higher Peritoneal Phosphate Removal[a]

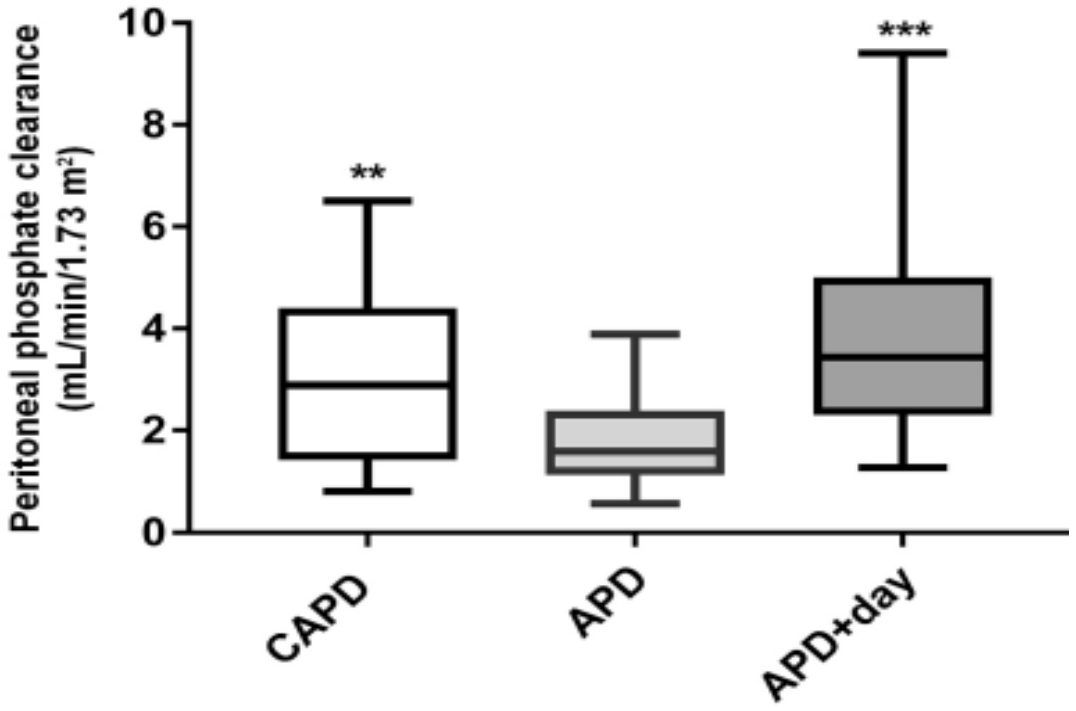
		Univariate analysis			Multivariate analysis		
		OR	95% CI	*p*	OR	95% CI	*p*
Male	Yes	1					
	No	1.29	0.85–1.96	0.23			
Diabetes Mellitus	Yes	1			1		
	No	1.46	0.91–2.34	0.12	0.86	0.47–1.66	0.66
Age		1.02	1–1.03	0.005	1.02	1.007–1.04	0.006
BSA		0.46	0.17–1.2	0.11	0.32	0.09–1.08	0.06
APD	Yes	1			1		
	No	0.23	0.13–0.43	<0.0001	0.33	0.15–0.70	0.004
Long dwell time	Yes	1			1		
	No	8.57	4.5–16.12	<0.0001	6.5	3.01–13.77	<0.0001
High ECW/TBW	Yes	1			1		
	No	1.87	1.14–3.07	0.001	0.85	0.43–1.68	0.64
nPNA		0.7	0.3–1.65	0.42			
F-FA D/P Pi	Yes	1			1		
	No	3.2	2.07–4.94	<0.00001	2.98	1.71–5.20	0.0001
Alb		0.95	0.91–0.99	0.022	0.97	0.94–1.01	0.08
CRP		1	0.99–1.01	0.47			
24-h PD UF		5.38	3.16–9.17	<0.0001	4.65	2.42–8.92	<0.0001

Courivaud C et al, Perit Dial Int 2016

Phosphate removal (2)

451 pts
135 CAPD, 108 APD, 198 CCPD





Davenport A, Adv Perit Dial 2017

7. Quality of life

NECOSAD study
486 CAPD and 64 APD pts
Incident
3 y follow up
No major differences

Differences in Pattern, and Mean Differences in Quality of Life, Over Time, Maximum Follow-Up of 3 Years

	p Value for difference in pattern[a]		Mean difference in scores over time[b] (95% confidence interval)	
	Crude	Adjusted[c]	Crude	Adjusted[c]
Short Form 36				
Physical summary score	0.64	0.80	0.04 (−2.06 to 2.14)	0.05 (−2.26 to 2.36)
Mental summary score	0.03	0.06	—	—
Social function	0.66	0.52	−2.08 (−7.55 to 3.38)	6.51 (−1.63 to 14.65)
Physical function	0.75	0.70	2.26 (−3.57 to 8.09)	−3.39 (−8.76 to 1.99)
Role function emotional	0.03	0.05	—	—
Role function physical	0.68	0.71	7.06 (1.37 to 15.49)	3.55 (−4.69 to 11.79)
General health	0.63	0.63	−0.36 (−4.79 to 4.07)	−1.39 (−5.77 to 3.00)
Vitality	0.19	0.24	2.01 (−2.44 to 6.46)	−0.06 (−4.44 to 4.33)
Mental health	0.37	0.47	0.71 (−3.37 to 4.79)	−0.54 (−4.66 to 3.59)
Bodily pain	0.87	0.95	0.03 (−5.19 to 5.25)	−2.17 (−7.29 to 2.94)
KDQOL				
Burden of kidney disease	0.99	0.96	−1.17 (−6.90 to 4.56)	−2.50 (−8.21 to 3.20)
Cognitive function	0.07	0.08	−1.78 (−5.79 to 2.23)	−2.43 (−6.50 to 1.65)
Dialysis staff encouragement	0.01	0.01	—	—
Effects of kidney disease	0.20	0.21	1.06 (−2.44 to 4.55)	0.13 (−3.30 to 3.56)
Overall health rating	0.26	0.20	−0.54 (−3.80 to 2.73)	−1.69 (−4.92 to 1.54)
Patient satisfaction	0.59	0.58	−4.13 (−8.88 to 0.61)	−3.75 (−8.66 to 1.15)
Sexual function	0.48	0.49	9.89 (2.03 to 17.75)	6.33 (−0.99 to 13.65)
Sleep	0.29	0.29	3.17 (−1.15 to 7.48)	1.40 (−2.97 to 5.76)
Social support	0.74	0.78	−0.74 (−5.31 to 3.82)	−1.90 (−6.51 to 2.71)
Symptoms/problems	0.56	0.57	0.06 (−3.18 to 3.30)	−1.39 (−4.61 to 1.84)
Work status	0.38	0.57	5.16 (−2.81 to 13.13)	1.79 (−5.77 to 9.35)
Quality of social interaction	0.62	0.55	−1.37 (−4.67 to 1.92)	−1.45 (−4.78 to 1.89)

Michels WM et al, Perit Dial Int 2011

Health-Related Quality of Life in Patients Treated with Continuous Ambulatory Peritoneal Dialysis and Automated Peritoneal Dialysis in Singapore

Singapore
Cross-sectional
266 pts (145 CAPD, 121 APD)
APD: better physical health and less bothered by dialysis-related symptoms

Table 2 Coefficients of the independent predictor variables for HRQOL scores in peritoneal dialysis patients

Independent variable	Dependent variable						
	Component summary score			KDCS subscale			Health utility
	PCS	MCS	KDCS	Symptoms	Effects	Burden	EQ-5D
CAPD	Ref.						
APD	2.81*	−0.56	2.63	6.90**	4.78	−3.78	0.039

Yang F et al, Pharmacoeconomics 2018

Comparison of Cost-Utility Between Automated Peritoneal Dialysis and Continuous Ambulatory Peritoneal Dialysis

Mexico
Incident
123 pts (77 CAPD, 46 APD)
Significantly better QoL
in APD compared to the CAPD group

Table 3. Comparison of HRQOL measured by KDQOL-SF questionnaire, between groups

Dimensions	CAPD	APD	*p*
KDQOL, mean (95% CI)			
Kidney disease component summary	53 (51–55)	66 (63–69)	<0.0001
SF-36, mean (95% CI)			
Mental component summary	53 (47–59)	77 (73–81)	<0.0001
Physical component summary	41 (37–45)	62 (56–67)	<0.0001

Corte-Sanabria L et al, Arch Med Res 2013

A Systematic Review and Meta-Analysis of Utility-Based Quality of Life in Chronic Kidney Disease Treatments

Meta-analysis
190 studies included
Pre-dialysis CKD, HD, CAPD, APD, Tx

Modality	Mean utility	P value
APD	0.80	0.02 (vs. CAPD)
CAPD	0.72	
HD	0.69	0.08 (vs. PD)

quality-adjusted life years. However, although useful, quality-adjusted life years are often criticized for not taking into account the views and preferences of the individuals with the medical conditions. A measurement called a utility solves this problem. Utilities are a numerical value (measured on a 0 to 1 scale, where 0 represents death and 1 represents full health) of the strength of an individual's preference for specified health-related outcomes, as measured by "instruments" (questionnaires) that rate direct comparisons or assess quality of life.

"Within the dialysis population, the highest utility of the sub-modalities **was reported by those on home-based automated peritoneal dialysis**. This finding suggests that the management of patients on automated peritoneal dialysis is beneficial in CKD care"

Wyld M et al, Plos One 2012

Quality of sleep

- APD is associated with more sleeping problems compared to those on CAPD and with a higher frequency of daytime drowsiness

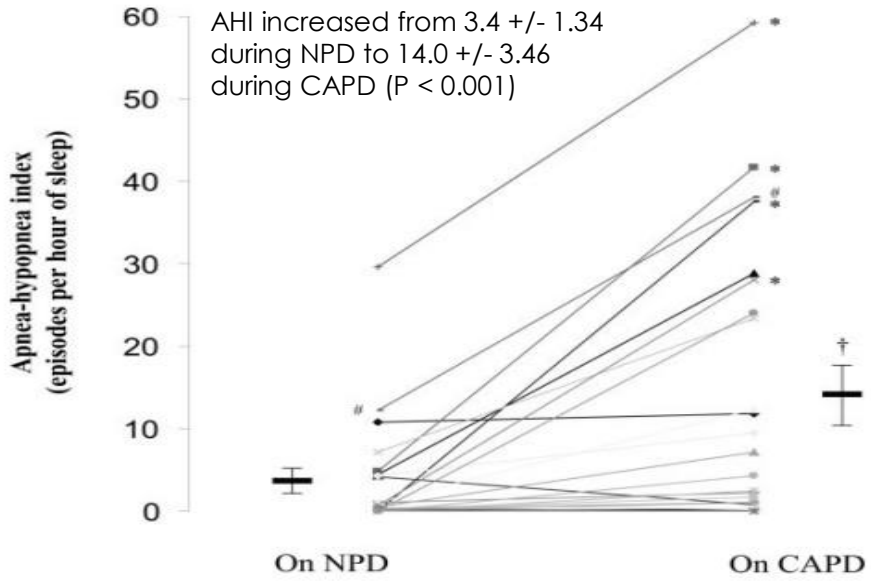
Bro et al, Perit Dial Int 1999

Bilgic A et al. Ther Apher Dial 2011

Alleviation of Sleep Apnea in Patients with Chronic Renal Failure by Nocturnal Cycler–Assisted Peritoneal Dialysis Compared with Conventional Continuous Ambulatory Peritoneal Dialysis

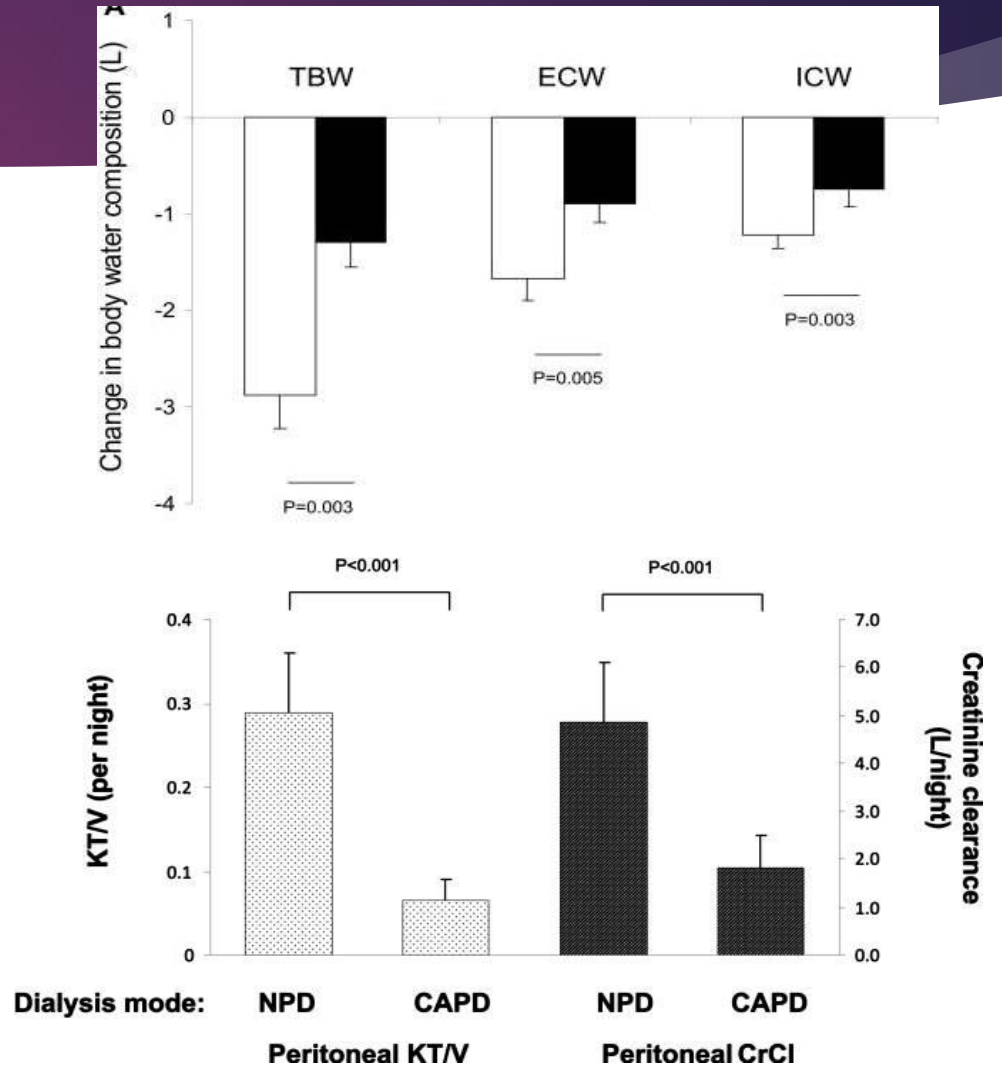
AHI	NPD Group (n = 23)		CAPD Group (n = 23)		P
	n	%	n	%	
≥5	20	87.0	21	91.3	NS
≥10	17	73.9	21	91.3	NS
≥15	12	52.2	21	91.3	0.007

[a]AHI, apnea-hypopnea index.



Tang SCW et al, J Am Soc Nephrol 2006

Improvement in Sleep Apnea during Nocturnal Peritoneal Dialysis Is Associated with Reduced Airway Congestion and Better Uremic Clearance



Tang SCW et al, Clin J Am Soc Nephrol 2009

8. Employment

Finnish Registry for Kidney Diseases
Prevalent
15-64 yo
N = 2,637

Table 3. Multivariate Model of Factors Predicting Employment of RRT Patients

Variable	PRR (95% CI)	*P*
Treatment modality[a]		<0.001
Home HD (n = 47)	1.87 (1.26-2.64)	0.001
CAPD (n = 70)	0.73 (0.34-1.26)	0.3
APD (n = 122)	2.14 (1.59-2.83)	<0.001
Functioning transplant (n = 714)	2.30 (1.85-2.92)	<0.001

Helantera I et al, Am J Kidney Dis 2012

Automated peritoneal dialysis in Hong Kong: There are two distinct groups of patients

Incident
180 CAPD, 90 APD
Median f-up 21.9m

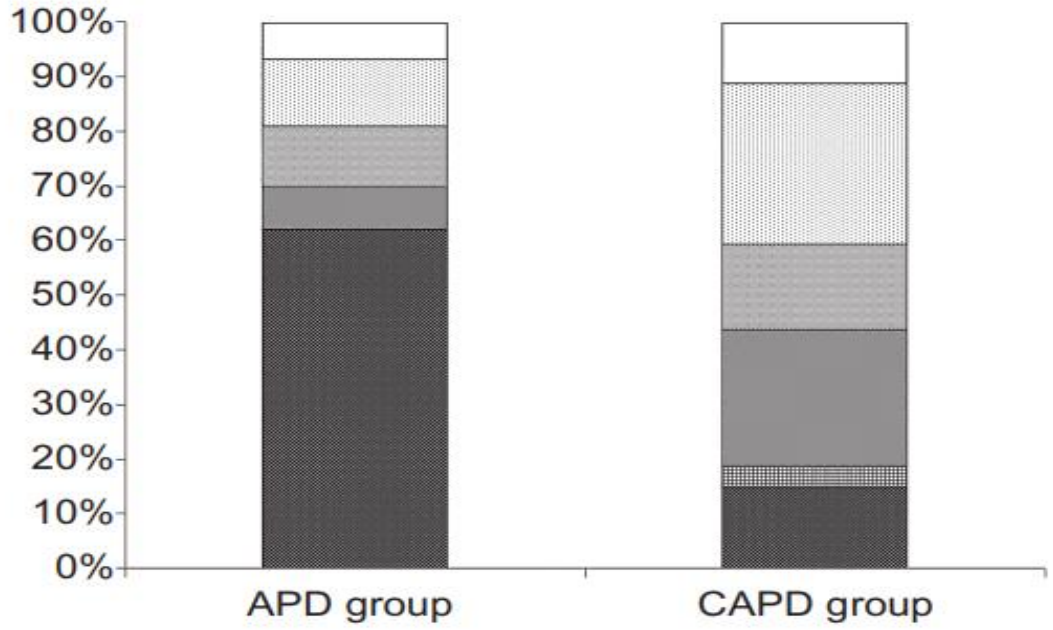
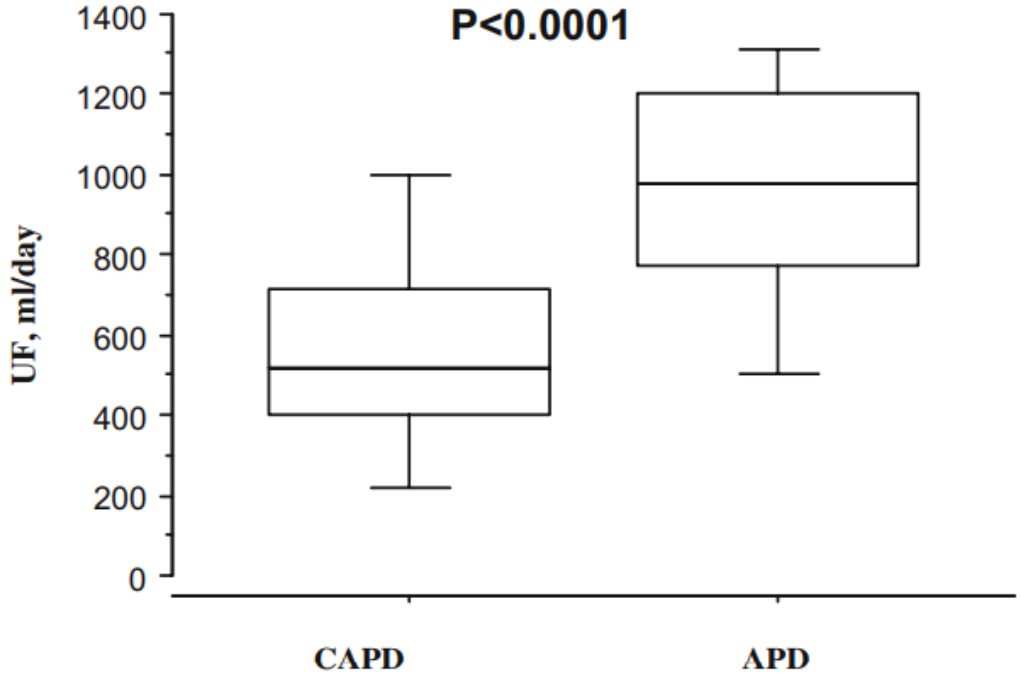


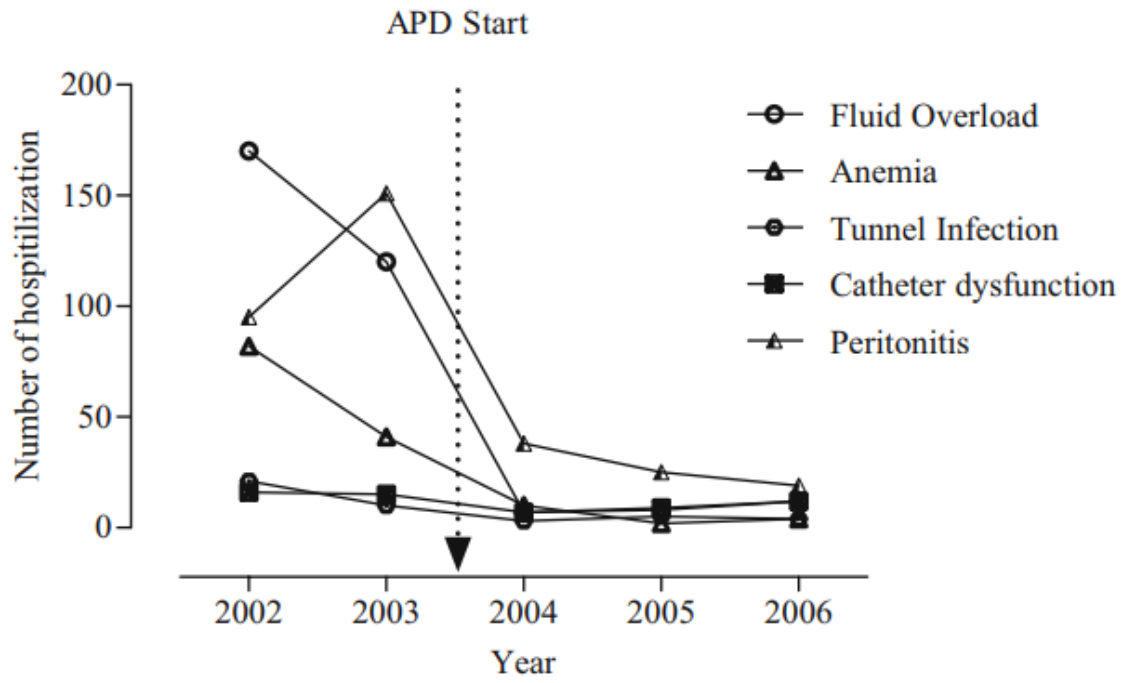
Fig. 2 Comparison of employment status between the two groups (overall χ^2 test, $P < 0.0001$). □, unfit to work; ▨, retire; ▩, unemployed; ■, housewife; ▦, part-time; ▩, full time.

Kwan B et al, Nephrology 2013

9. Special populations
Children

Automated peritoneal dialysis as the modality of choice: a single-center, 3-year experience with 458 children in Mexico





Velasco RF et al, Pediatr Nephrol 2008

AUTOMATED PERITONEAL DIALYSIS IN CHILDREN AND ADOLESCENTS—BENEFITS: A SURVEY OF PATIENTS AND PARENTS ON HEALTH-RELATED QUALITY OF LIFE

- 42 pts
- HD (6), APD (17) or Tx (19)
- No significant differences between the total scores for the APD and Tx groups among patients and parents alike

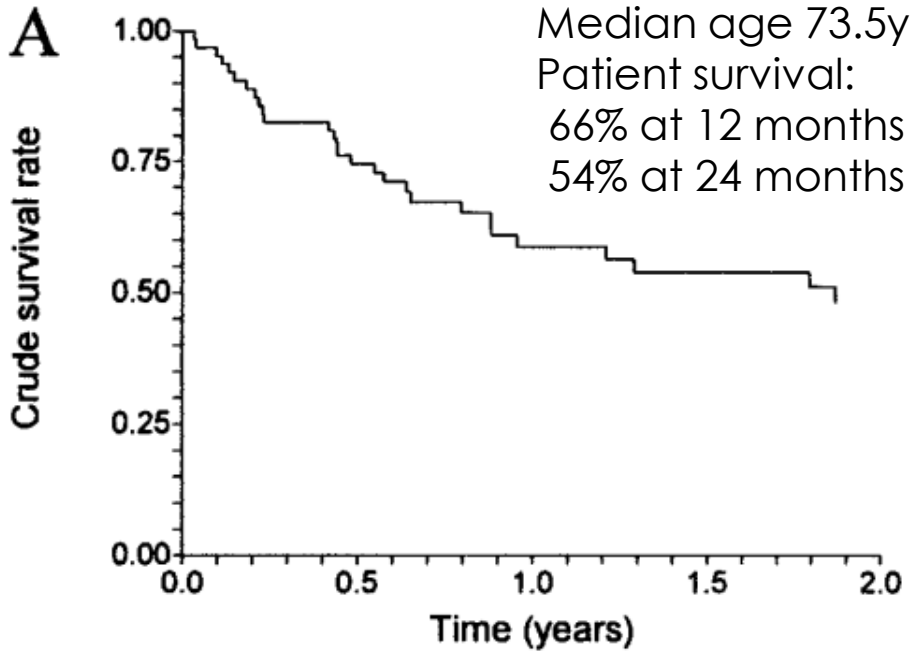
TABLE 4
Comparing Perspectives of Patients on Automated Peritoneal Dialysis (APD) and on Transplantation (Tx) and Those of Their Parents

	Scores					
	Patients			Parents		
	APD	Tx	*p* Value	APD	Tx	*p* Value
General wellbeing	2.12	2.35	0.34	2.55	2.80	0.53
Physical ability	2.62	2.28	0.39	3.40	2.46	0.08
School/work	1.99	1.90	0.77	2.67	2.32	0.35
Peer relationships	1.33	1.41	0.58	1.93	1.60	0.28
Family relationships	1.35	1.39	0.83	1.73	1.40	0.26
Sleep problems	1.87	1.39	0.54	2.15	1.40	0.07
Worries and concerns	1.79	1.79	0.98	2.36	1.80	0.12
Overall score	13.0[a]	12.5[a]	0.67	16.0[b]	13.8[b]	0.22

Chiu MC et al, Perit Dial Int 2007

Elderly patients: assisted PD (aPD)

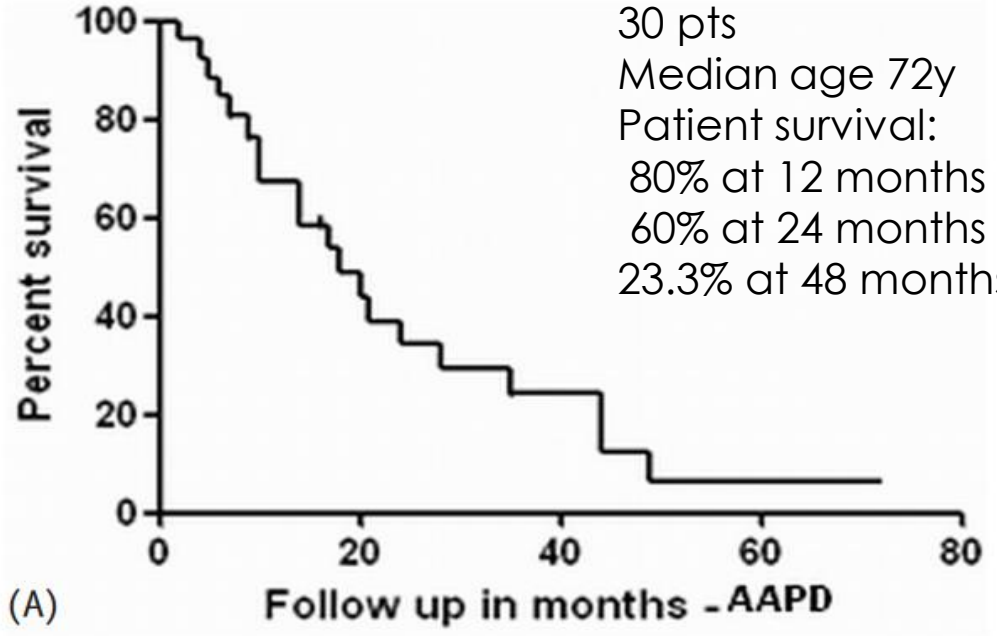
ASSISTED AUTOMATED PERITONEAL DIALYSIS (AAPD) FOR THE FUNCTIONALLY DEPENDENT AND ELDERLY PATIENT



64 pts
Median age 73.5y
Patient survival:
66% at 12 months
54% at 24 months

Povlsen JV and Ivarsen P, Perit Dial Int 2005

A BRAZILIAN EXPERIENCE IN ASSISTED AUTOMATED PERITONEAL DIALYSIS: A RELIABLE AND EFFECTIVE HOME CARE APPROACH



30 pts
Median age 72y
Patient survival:
80% at 12 months
60% at 24 months
23.3% at 48 months

Gainnoti Franco MRG et al, Perit Dial Int 2012

10. Cost

Monthly Direct Medical Costs (in €) for the Entire Sample of PD and HD Patients Paid by Insurance (2013–2014)

Insurance (prices in €)	APD	CAPD	HD[a]	HDF[a]
Dialysis process	0	0	1,677	1,677
Consumables	4,010	2,800	287.40	287.40
Drugs	420	420	517.40	517.40
Laboratory tests	151.10	151.10	177.70	177.70
Transportation	0	0	250	250
Subsistence (food)	362	362	362	362
Total treatment cost	4,943.10	3,733.10	3,271.50	3,271.50

Monthly Indirect Costs (in €) for the Entire Sample of PD and HD Units Paid by the State (2013–2014)

State (prices in €)	PD (both APD and CAPD)	HD (both HD and HDF)
Salary	11,560	28,460
General healthcare consumables	100.80	6,247.10
Dialysis consumables	0	14,980.50
Operational expenses of the unit (excluding salaries)	0	1,911
Equipment (maintenance and depreciation of machinery)	0	3,002
Sterilization of the machines	0	1,669.90
Total maintenance cost	11,660.80	56,270.50

Koukou M et al, Perit Dial Int 2017

RRTs and indirect costs

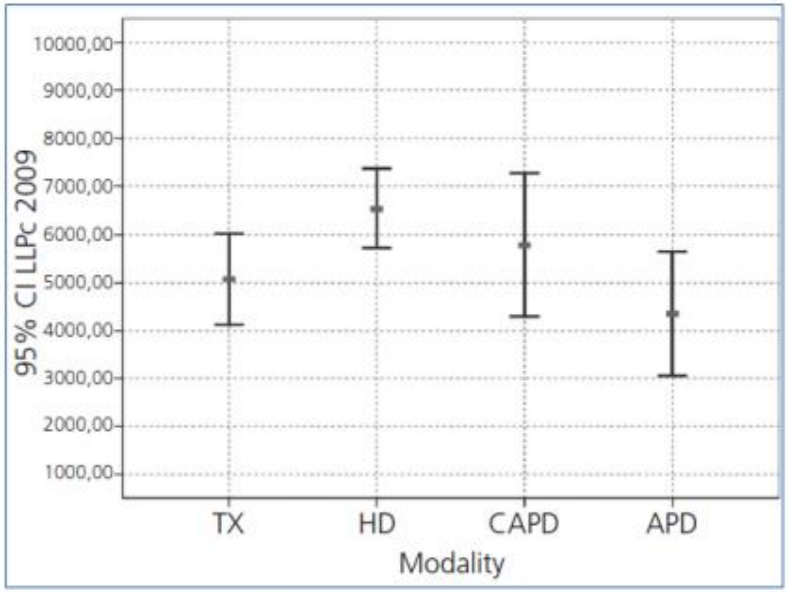


Figure 1. Cost of lost labour productivity in 2009
For each modality of renal replacement therapy, we present the mean LLPc (grey rectangle) and the 95% confidence interval (black bar).

Table 2. Description of the sample based on modality of renal replacement therapy administered

		TX (n=82)	HD (n=83)	CAPD (n=32)	APD (n=46)	P[a]
Sex. female. n (%)		34 (41.5)	34 (41.0)	13 (40.6)	15 (32.6)	0.768
Age	Mean (SD)	46.40 (10.63)	47.85 (9.50)	48.72 (11.77)	48.41 (11.13)	
	Median (25PC-75PC)	46.00 (38.75-55.25)	49.00 (43.00-54.00)	52.50 (42.25-56.75)	50.50 (40.50-58.25)	0.512
Years	Mean (SD)	9.02 (7.99)	8.26 (8.89)	3.37 (5.28)	4.21 (9.57)	
treatment	Median (25PC-75PC)	6.00 (3.00-14.25)[b]	4.00 (1.00-15.00)[c]	2.00 (0.62-2.00)[b,c]	[illegible]	[illegible]
Employed. n (%)		32 (39.0)	18 (21.7)	9 (28.1)	22 (47.8)	0.012
PWD. n (%)		32 (39.0)	38 (45.8)	13 (40.6)	20 (43.5)	0.841
Disability. n (%)		13 (15.9)	24 (28.9)	7 (21.9)	6 (13.0)	0.124
Handicap >33 %. n (%)		51 (62.2)	51 (61.4)	17 (53.1)	24 (52.2)	0.531
PPYL. mean (95 % CI)		10.05 (7.45-12.65)	12.58 (10.42-14.73)[b]	10.69 (6.14-15.2[illegible]	6.09 (3.43-8.74)[b]	0.002
LLPc 2009. mean		5078.69	6546.63	5785.31	[illegible]	[illegible]
(95 CI %)		(4126.9-6030.5)	(5727.1-7366.1)[b]	(4301.6-7269.0)	(3064.0-5654.9)[b]	

PPYL: potentially productive years of life lost; LLPc: cost of lost labour productivity; APD: automated peritoneal dialysis;

Conclusions: APD and, to a lesser degree, TX are the modalities of RRT with the lowest impact on indirect costs due to morbidity, resulting in higher rates of employment than HD and requiring less disability benefits.

Mauro JC et al, Nefrologia 2013

Συμπερασματικά
APD: Πλεονεκτήματα και προβληματισμοί

Πλεονεκτήματα

- Ευκολότερη επίτευξη των στόχων επάρκειας ή υπερδιήθησης
- Αποφυγή αυξημένης IP πίεσης
- Λιγότερες συνδέσεις (περιτονίτιδες?)
- Περισσότερος ελεύθερος χρόνος- κατάλληλη μέθοδος για ασθενείς που εργάζονται και παιδιά
- Ευκολότερη η παροχή ΠΚ σε άτομα που χρειάζονται βοηθό (υποβοηθούμενη ΠΚ)

Προβληματισμοί

- Δυσκολότερη επίτευξη στόχων επάρκειας και υπερδιήθησης σε LT
- Απομάκρυνση Na – P (σε NIPD)
- Πολύπλοκη εφαρμογή της μεθόδου
- Δυσκολία μετακινήσεων
- Μειονέκτημα σε περιόδους ειδικών συνθηκών (π.χ. φυσικές καταστροφές)

Guidelines

International Society for Peritoneal Dialysis practice recommendations: Prescribing high-quality goal-directed peritoneal dialysis

1. PD should be prescribed using shared decision-making between the person doing PD and the care team. The aim is to establish realistic care goals that
(1) maintain quality of life for the person doing PD as much as possible by enabling them to meet their life goals,
(2) minimize symptoms and treatment burden while
(3) ensuring high-quality care is provided.

2. The PD prescription should take into account the **local country resources**, the **wishes and lifestyle considerations of people needing treatment, including those of their families/caregivers**', especially if providing assistance in their care.

Brown EA, Perit Dial Int. 2020

PATIENT SELECTION FOR AUTOMATED PERITONEAL DIALYSIS: FOR WHOM, WHEN?

- Fast transporters
- It can be more easily performed by employed patients
- It offers more time for personal and family activities
- Suitable for children, elderly patients, and patients needing assisted PD

Because individual choice cannot be overlooked, APD should be offered according to patient preference

Liakopoulos V and Dombros NV Perit Dial Int 2009

Σας ευχαριστώ για την προσοχή σας !