Delivering PD Therapy: is it Science or Art?

Dr Lorraine Kwan and Dr Angela Wang

living WELL with kidney failure

Peritoneal dialysis

Case Presentation 1

Mr L – 61/M Retired lab technician in HA hospital

Background Hx:

- 1) Hypertension
- 2) Diabetes mellitus
- 3) Gout
- 4) Hypercholesterolemia
- 5) Ankylosing spondylitis (HLA-B27 positive)
- 6) Severe obstructive sleep apnoea syndrome
- 7) Subclinical hypothyroidism on thyroxine
- First presented with proteinuria in 2012 (24 hr Up 2.4g/d, Scr 112umol/L in 2012, ↑IgA) but strongly refused renal biopsy, on max dose losartan 75mg BD
- Showed gradual deterioration in renal function over the years

- Presented in Nov 2017 with fluid overload, SCr 809umol/L (approaching ESRD)
- Echo – concentric LVH, Normal EF (60%), Moderate LAE and calcification over AV
- **Tenchkoff catheter inserted on 16 Nov 2017**
- **Started CAPD since Jan 2018, regimen: 2.5% 2L x2, 7.5% 2L x1/day**

- **<u>FU at 8 weeks after initiation of CAPD (Mar 2018)</u>** –
- BP 188/102, BMI 30.2kg/m^2, BW 88.3kg, clinically grossly edematous
- Ca/P 2.26/2.50mmol/L, iPTH 84pmol/L (lab ref: 1.3 – 6.8pmol/L)
- Hb 12.2g/dL (on ESA mircera 100mcg every 3 week), serum albumin 34g/L
- Body composition monitor (BCM): overhydration index (OH) = +7.1L
- Estimated dry weight 76.1kg
- Urine output 1.2 - 1.5L per day
- Baseline total weekly KT/V: 1.96 (PD KT/V: 1.23)
- Total weekly CrCl : 93.6 L/wk per 1.73m^2 (PD CrCl: 46.6 L/wk per 1.73m^2)
- Normalized protein catabolic rate (nPCR): 1.02g/kg/day
- Peritoneal equilibration test (PET) D/P creatinine ratio: 0.99 (high transporter)

- **<u>Admitted for quick exchange and had a course of Intermittent PD</u>** with 2.5% 2L x 2 hourly cycle for 12 hours to control his fluid overload, removed 5L fluids

- Patient initially very reluctant to step up to 4 exchanges a day
- Enforced more stringent salt and fluid restriction (ate out a lot)
- Diuretics dose maximized (lasix 160mg BD and metalozone 2.5mg OM added)
- Anti-HTs stepped up: adalat GITS, metoprolol, prazosin, losartan + hydrochlorothiazide, hydralazine (total 6 anti-HTs)

- **<u>Between Mar 2018 – Jan 2020</u>**
- Had 9 times hospitalizations with fluid overload (with 1 hypertensive urgency and pulmonary congestion on CXR) requiring quick exchanges and Intermittent hospital PD for additional ultrafiltration (UF)
- **<u>BCM showed an average OH of +5 - 7L</u>**
- UF volume with icodextrin: 700-1000ml
- Daily UF ~ 1300 – 1600mL, Urine Output ~ 500mL
- PD stepped up to 4 exchanges a day (2.5% 2L x3, 7.5% 2L x1)

- Discussed with pt about several options (he has no live donor):
    1) doing 5 exchanges a day (each exchange took him an hour, difficulty to comply)
    2) automated PD (borderline candidate)
    3) hemodialysis (background ankylosing spondylitis, difficult to sit for too long, refused)

Last Seen in outpatient clinic 6 May 2020 –

Finally agreed to perform 5 PD exchanges a day (but compromised his life participation)

Not happy, clinically still remains edematous

Appetite fair

Serial Dialysis Indices

	5 Mar 2018	16 Mar 2019	30 Sep 2019	28 Apr 2020
Total Kt/V	1.96	1.89	1.61	1.65
PD Kt/V	1.23	1.47	1.42	1.49
Total CrCl (L/wk/1.73m^2)	93.6	78.3	64.2	64.1
PD CrCl (L/wk/1.73m^2)	46.6	49.8	49.8	54
24 hr urine volume (ml)	**1220**	**550**	**170**	**190**
Residual GFR (ml/min/1.73m^2)	**3.72**	**2.22**	**0.87**	**0.80**
nPCR (g/kg/day)	1.02	0.86	0.73	0.69
D/P Creatinine ratio	0.99	0.82	-	Not yet
CAPD regimen	2.5% 2L x2 7.5% 2L x1	2.5% 2L x3 ↑ 7.5% 2L x1	2.5% 2L x3 ↑ 7.5% 2L x1	2.5% 2L x4 ↑ 7.5% 2L x1

Kt/V, urea clearance; PD, peritoneal dialysis; CrCl, creatinine clearance; GFR, glomerular filtration rate, PCR, normalized protein catabolic rate.

Serial Biochemical Parameters

	5 Mar 18	6 Dec 18	16 Mar 19	30 Sep 19	17 Dec 19	28 Apr 20
Hemoglobin (g/dL)	12.2	11.5	10.8	10.0	11.5	9.8
Sodium (mmol/L)	134	138	134	133	133	132
Potassium (mmol/L)	3.9	4.0	3.9	4.2	4.2	4.9
Urea (mmol/L)	27.8	29.9	27.8	21.6	27.9	20.8
Creatinine (umol/L)	806	1182	806	965	931	945
Serum albumin (g/L)	34	33	32	35	36	32
Ca/P (mmol/L)	2.26/2.50	2.43/1.93	2.39/1.66	2.57/1.77	2.61/2.45	2.53/1.92
Intact PTH (pmol/L)	84	69	98	70	-	68
Bicarbonate (mmol/L)	27	30	29	30	-	30

Case Presentation 2

Mr C – 83/M good general condition with family support

Background Hx:

- ESRD due to chronic glomerulonephritis since 2014
- Tenchkoff catheter inserted 28 Aug 2014
- Started on CAPD initially using 1.5% 2L x 3/day
- Uneventful clinical course in the last 6 years without hospitalization
- He maintains a very good residual urine output in the last 6 years (still has over 1L urine by now)
- His PD regimen was stepped down to 2 exchanges a day since 2017
- Blood pressure was 119/59, BW 79kg, no edema
- Good appetite, happy
- Not requiring any anti-HTs or ESA treatment, on Lasix 80mg BD

Serial Dialysis Indices

	Aug 2015	Feb 16	Feb 17	Jan 18	Feb 19	Apr 20
Total Kt/V	1.81	2.12	2.56	1.89	1.90	1.61
PD Kt/V	0.91	1.21	1.06	0.72	0.70	0.72
Total CrCl (L/wk/1.73m^2)	125	146	140	116	123	73
PD CrCl (L/wk/1.73m^2)	27	34	28	21	22	22
24 hr urine volume (ml)	**1780**	**1870**	**2120**	**1690**	**2030**	**1250**
Residual GFR (ml/min/1.73m^2)	6.5	6.4	8.0	6.6	7.1	4.00
nPCR (g/kg/day)	0.79	1.03	1.17	1.01	0.97	0.89
D/P Cr	0.7	0.63	0.68	0.63	0.58	-
CAPD regimen	1.5% 2L x 3	1.5% 2L x 3	**↓1.5% 2L x2**	**1.5% 2L x2**	**1.5% 2L x2**	**1.5% 2L x2**

Kt/V, urea clearance; PD, peritoneal dialysis; CrCl, creatinine clearance; GFR, glomerular filtration rate, PCR, normalized protein catabolic rate.

Latest Biochemical Parameters

- **Last seen 15 April 2020** –
- BP 130/59
- BW 79kg
- Urine output around 1800ml
- Maintained well on 2 PD exchanges
- 1.5% 2L x2/day (incremental PD)
- Not requiring any anti-HTs
- Not on ESA treatment
- Given Lasix 80mg BD

Lab parameters	Apr 2020
Hemoglobin (g/dL)	10.4
Sodium (mmol/L)	138
Potassium (mmol/L)	4.6
Urea (mmol/L)	30.5
Creatinine (umol/L)	667
Serum albumin (g/L)	43
Ca/P (mmol/L)	2.58/1.68
Intact PTH (pmol/L)	4.5
Bicarbonate (mmol/L)	26

Summary of two PD Patients

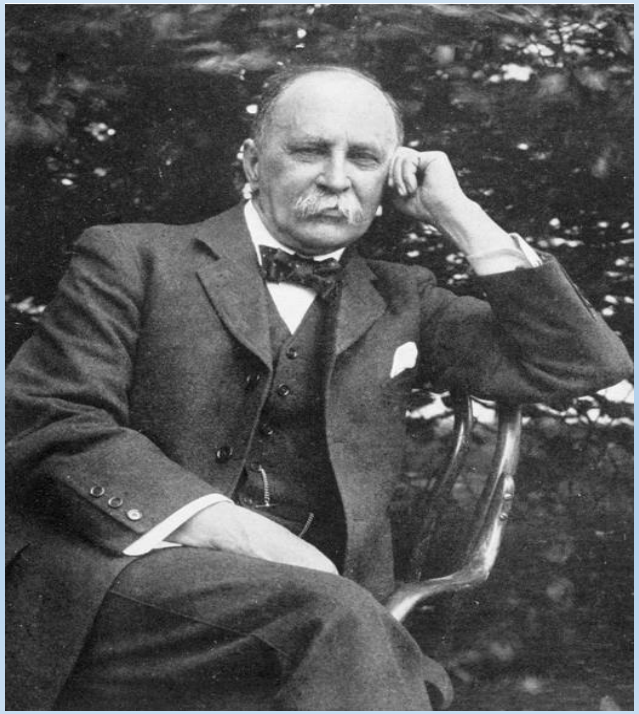
Mr L - 61/M
background DM, ESRD of unknown cause with multiple comorbidities(ankylosing spondylitis)

- Initiated CAPD treatment for 2 years
- Several management problems:
- 1) poor volume and BP control and difficulty in maintaining euvolemia, as a result of
  - i) high peritoneal transporter characteristics,
  - ii) rather rapid decline in residual kidney function within 2 years of CAPD,
  - iii) non compliance to diet and performing PD.
- 2) poor CKD-mineral bone disease (MBD) control (PTH, calcium and phosphate)
- 3) need to perform 5 PD exchanges daily and that significantly impacts his life participation and quality of life
- 4) refused HD and v borderline for automated PD and no family support

Mr C – 83/M
good general condition with family support
Background Hx:

- ESRD due to chronic glomerulonephritis
- Started on CAPD initially using 1.5% 2L x 3/day
- Maintains a very good residual urine output in the last 6 years
- Still has around 1.5L urine 6 years after started on CAPD
- His PD regimen was stepped down to 1.5% 2L x 2 exchanges a day (incremental PD) and remains v stable and well on PD

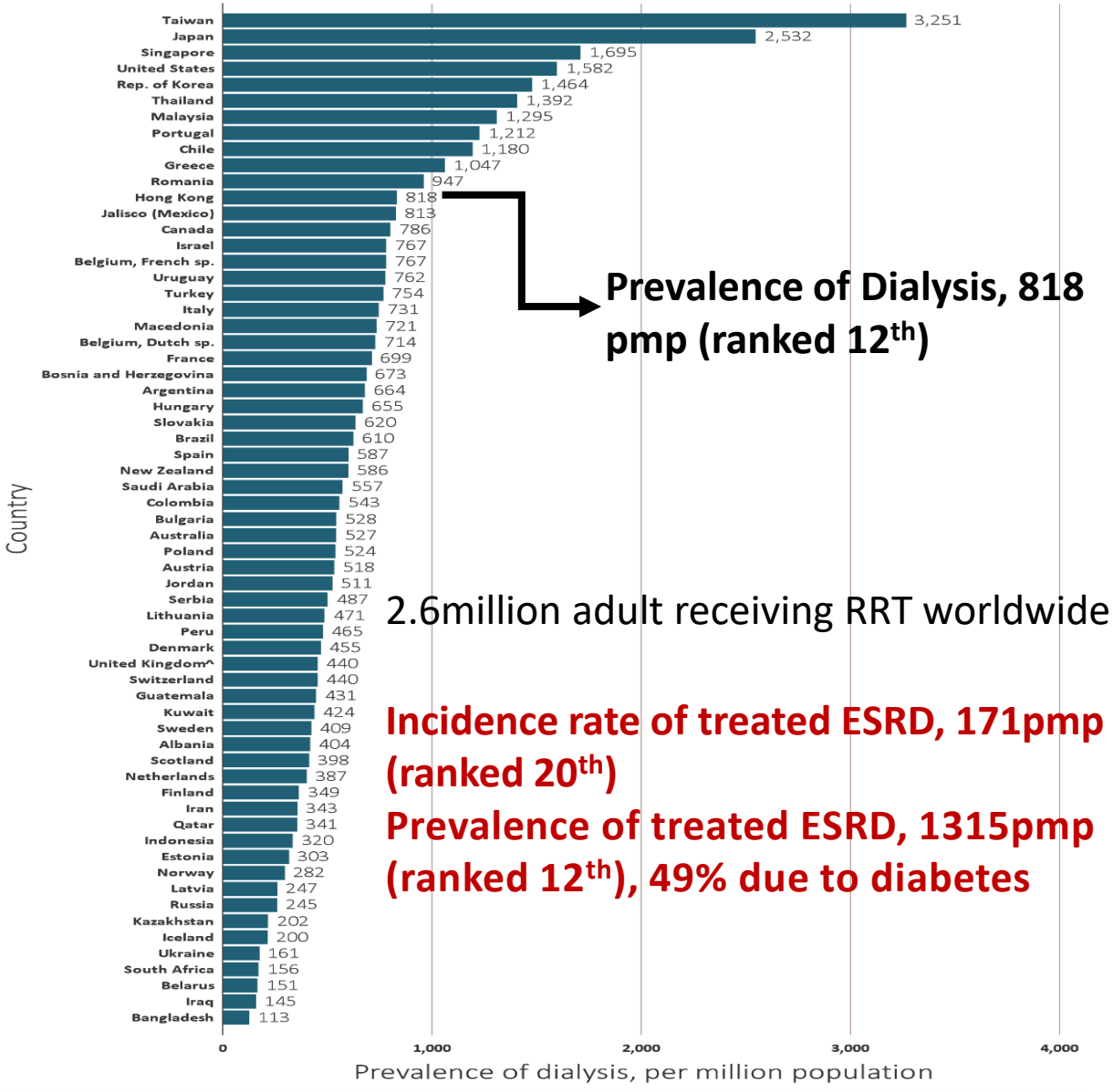
Delivering PD Therapy: is it Science or Art?



The Practice of Medicine is an Art based on Science

- Sir William Osler MD (1849 – 1919)

Global Prevalence of Dialysis and Distribution of Dialysis Modality



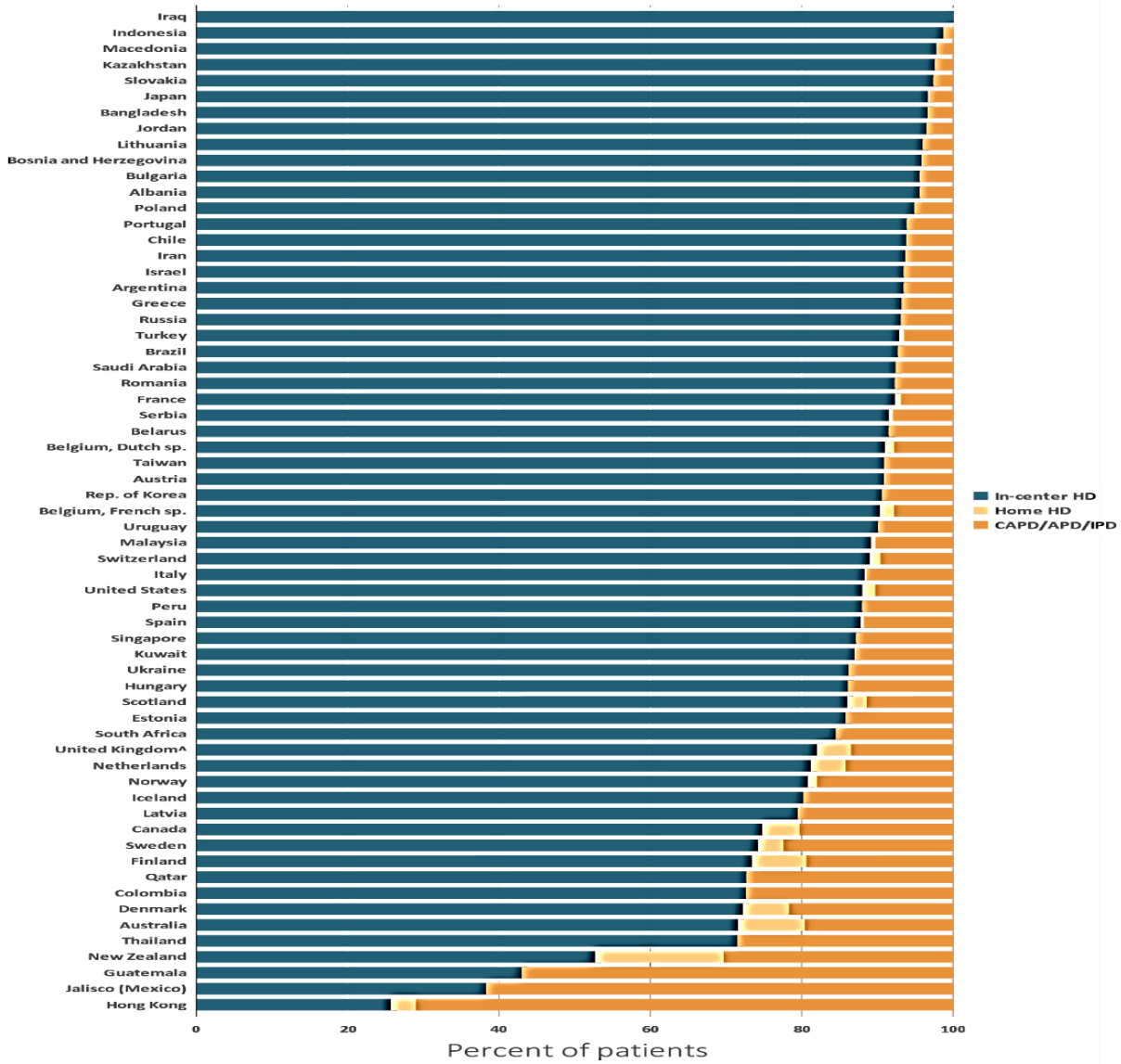
Prevalence of Dialysis, 818 pmp (ranked 12th)

2.6million adult receiving RRT worldwide

Incidence rate of treated ESRD, 171pmp (ranked 20th)

Prevalence of treated ESRD, 1315pmp (ranked 12th), 49% due to diabetes

Global Distribution of % of prevalent dialysis patients



USRDS 2018

Peritoneal Dialysis International, Vol. 26, pp. 520–522
Printed in Canada.

0896-8608/06 $3.00 + .00

ISPD GUIDELINES/RECOMMENDATIONS

GUIDELINE ON TARGETS FOR SOLUTE AND FLUID REMOVAL IN ADULT PATIENTS ON CHRONIC PERITONEAL DIALYSIS

Wai-Kei Lo, Joanne M. Bargman, John Burkart, Raymond T. Krediet, Carol Pollock, Hideki Kawanishi, and Peter G. Blake, for the ISPD Adequacy of Peritoneal Dialysis Working Group

- For small solute removal, the total (renal + peritoneal) urea clearance (Kt/V) should not be less than 1.7 at any time (Evidence level A).
- In anuric patients, peritoneal urea Kt/V has to be above 1.7.
- In the presence of residual kidney function, the contributions of renal and peritoneal clearances may be added for practical purposes, although, as mentioned previously, renal and peritoneal clearances may not be truly additive (Opinion).

PERITONEAL DIALYSIS INTERNATIONAL

Guidelines

Peritoneal Dialysis International
1–10

DOI: 10.1177/0896860819895356
journals.sagepub.com/home/ptd
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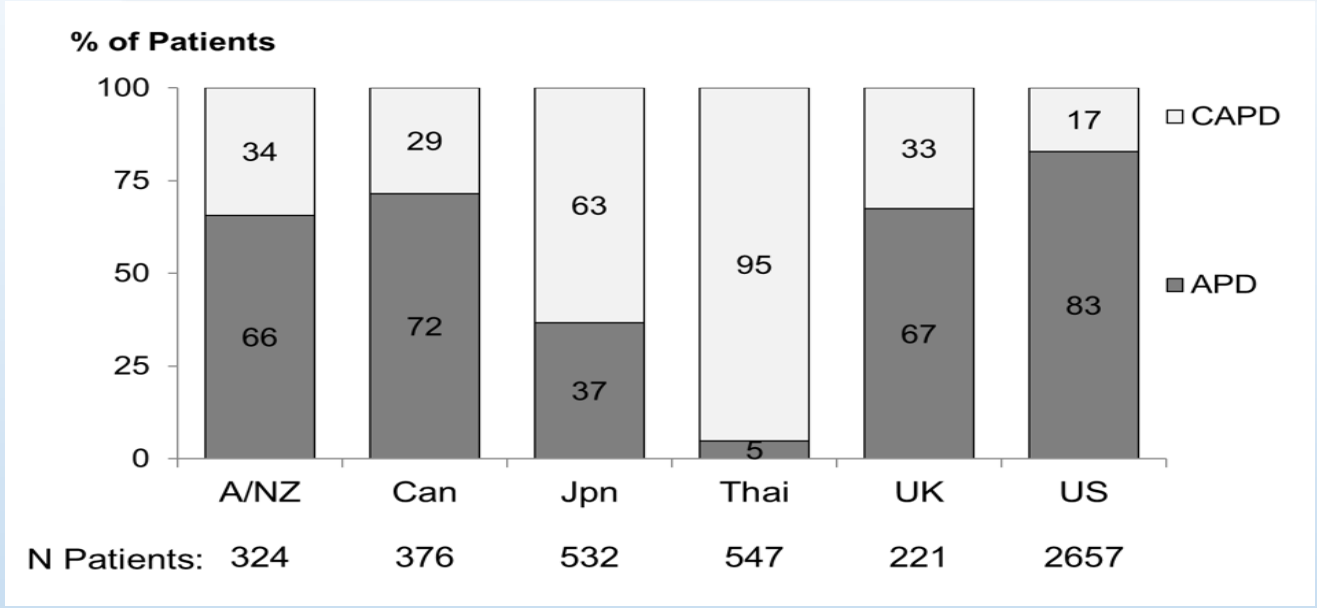
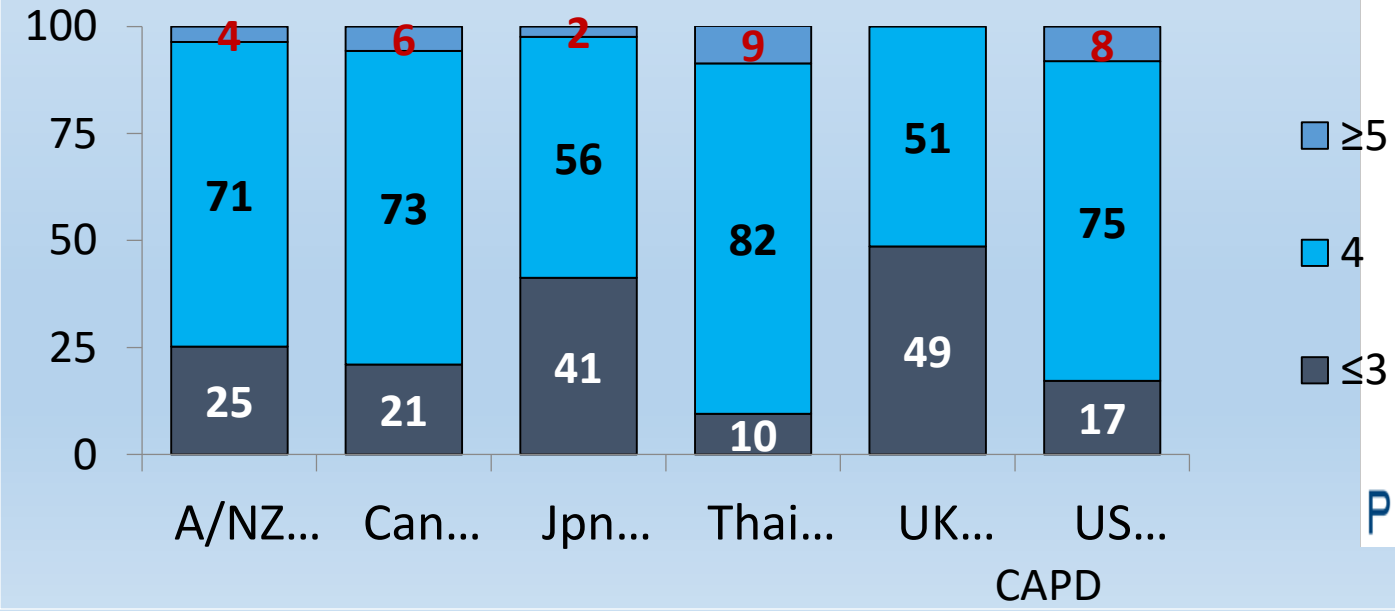
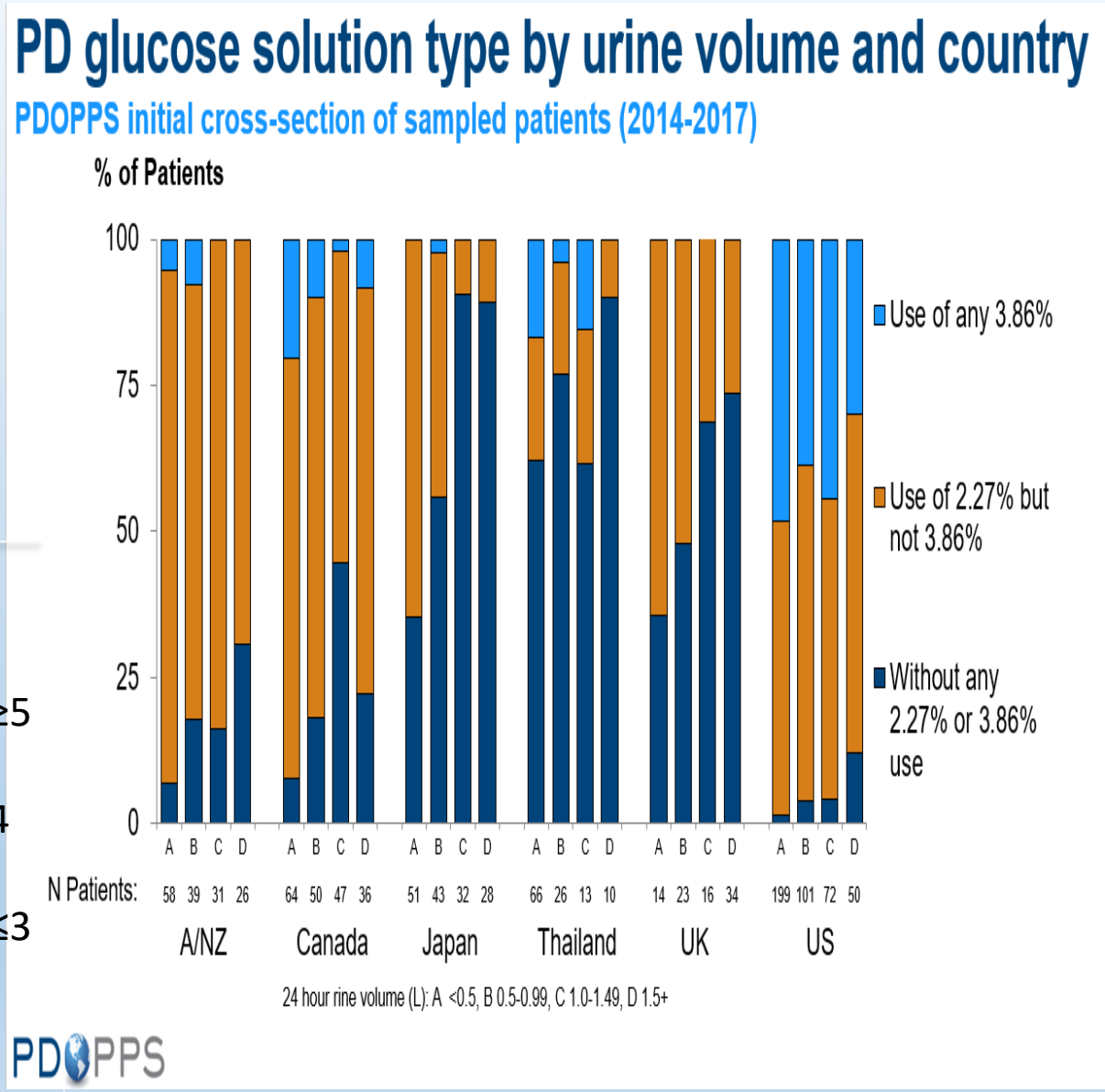
International comparison of peritoneal dialysis prescriptions from the Peritoneal Dialysis Outcomes and Practice Patterns Study (PDOPPS)

Angela Yee-Moon Wang[1], Junhui Zhao[2], Brian Bieber[2], Talerngsak Kanjanabuch[3], Martin Wilkie[4], Mark R Marshall[5], Hideki Kawanishi[6], Jeffrey Perl[7], Simon Davies[8]; and PDOPPS Dialysis Prescription and Fluid Management Working Group

PD Practice Patterns by Country - PDOPPS

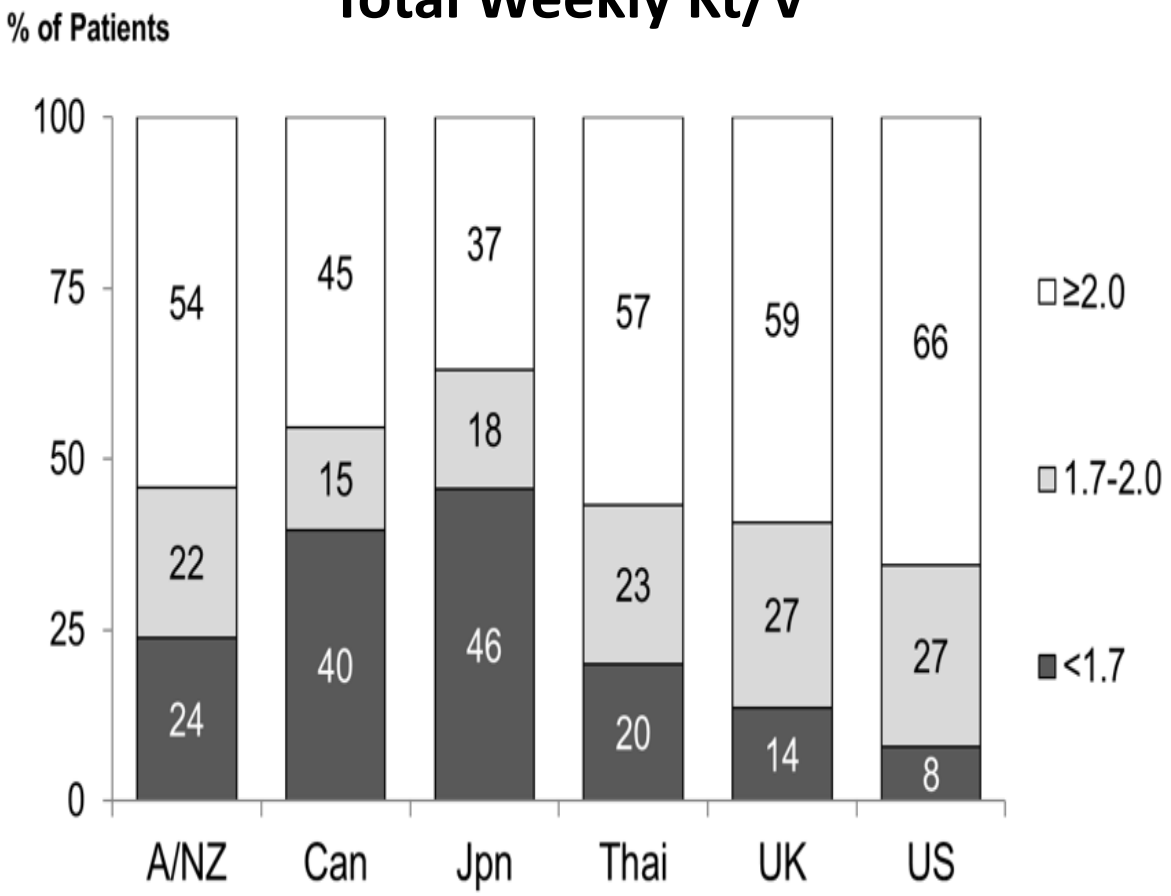






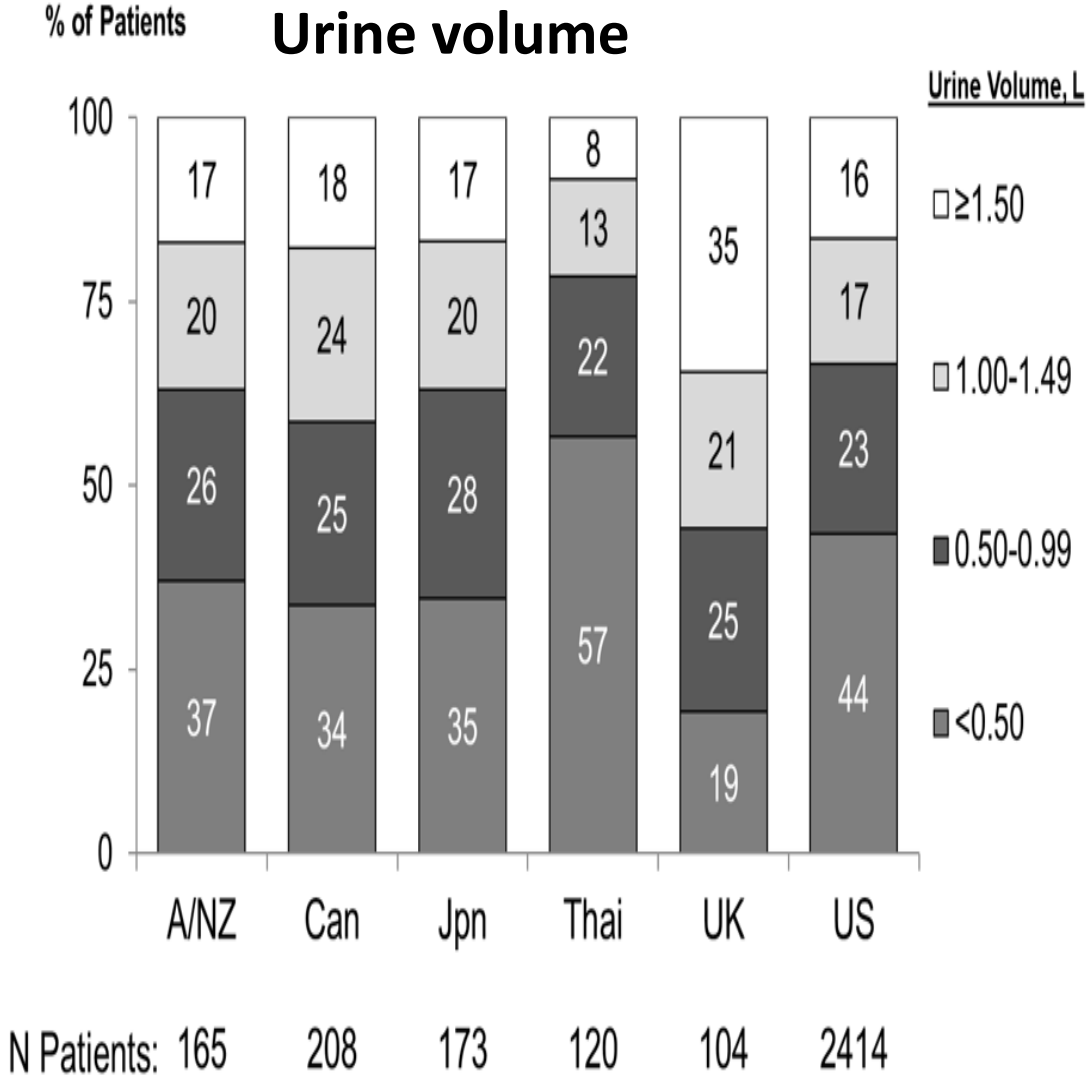
Distribution of total weekly Kt/V by country

Total Weekly Kt/V



	A/NZ	Can	Jpn	Thai	UK	US
Residual KT/V	0.87(0.79)	0.67(0.69)	0.78(0.76)	0.53(0.79)	1.04(0.73)	0.77(0.80)
Peritoneal KT/V	1.25(0.52)	1.21(0.58)	1.14(0.46)	1.74(0.62)	1.22(0.54)	1.54(0.51)

Urine volume

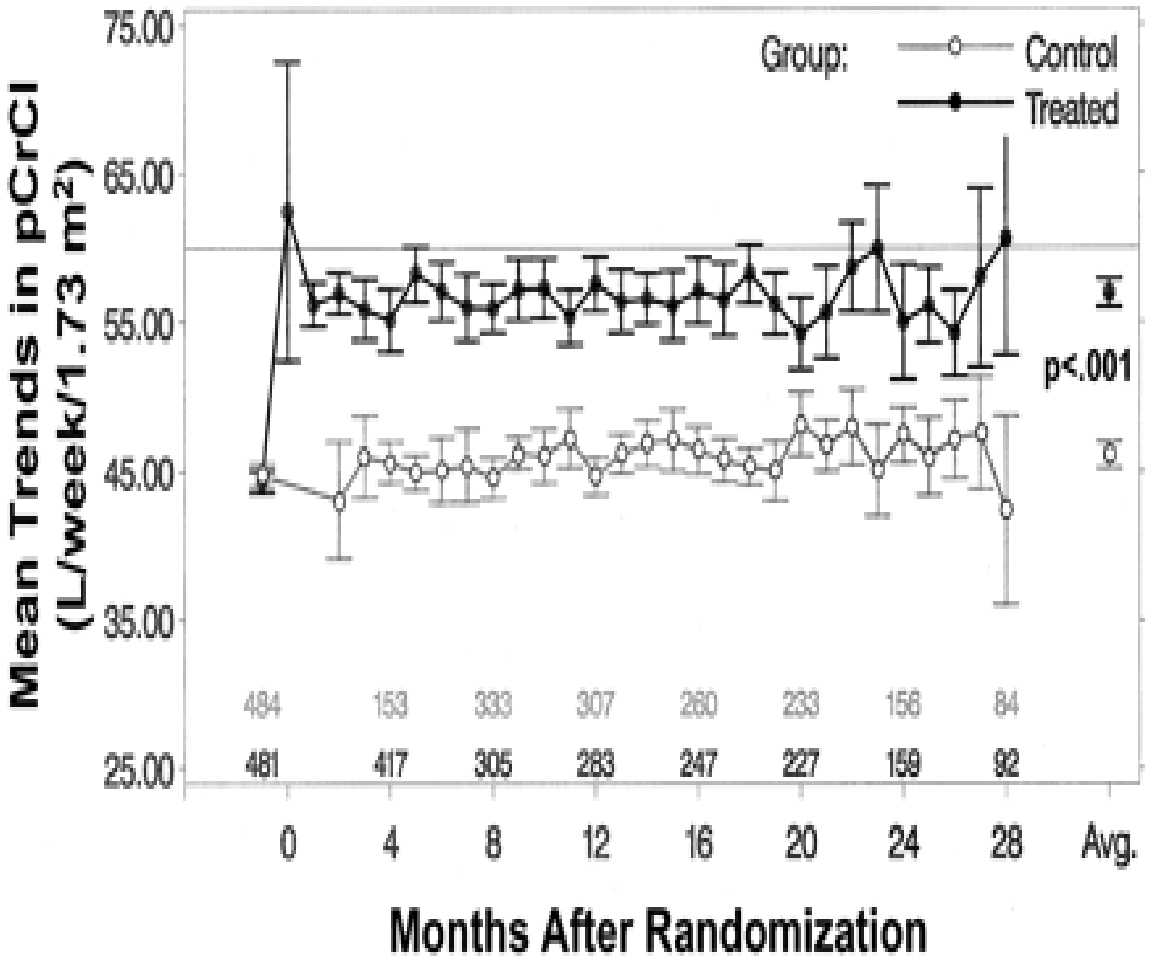


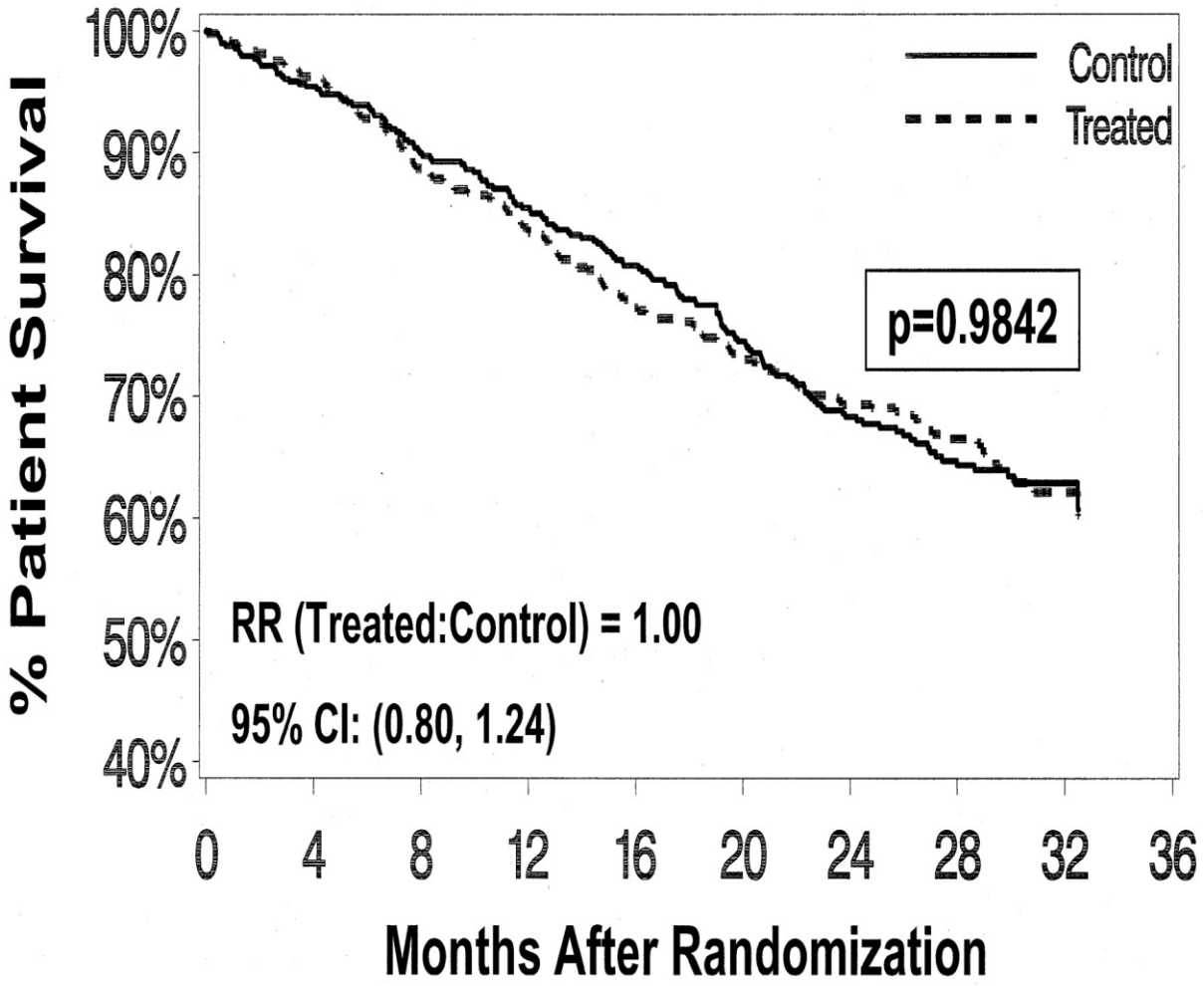
	A/NZ	Can	Jpn	Thai	UK	US
N Patients:	165	208	173	120	104	2414

PDOPPS
Peritoneal Dialysis Outcomes and Practice Patterns Study

Increasing PD Clearance Did not Improve Survival Outcomes: ADEMEX Study

(n=965)

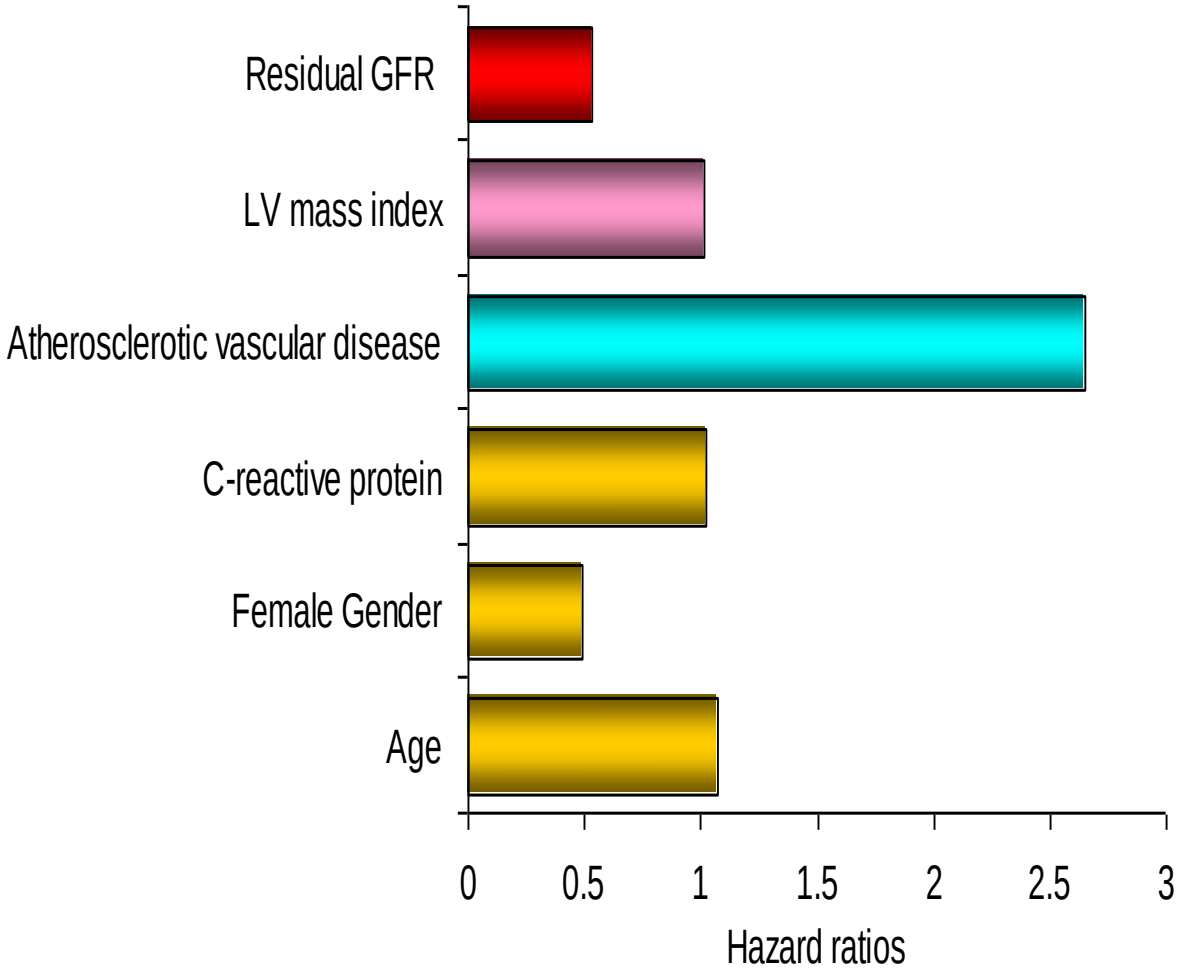




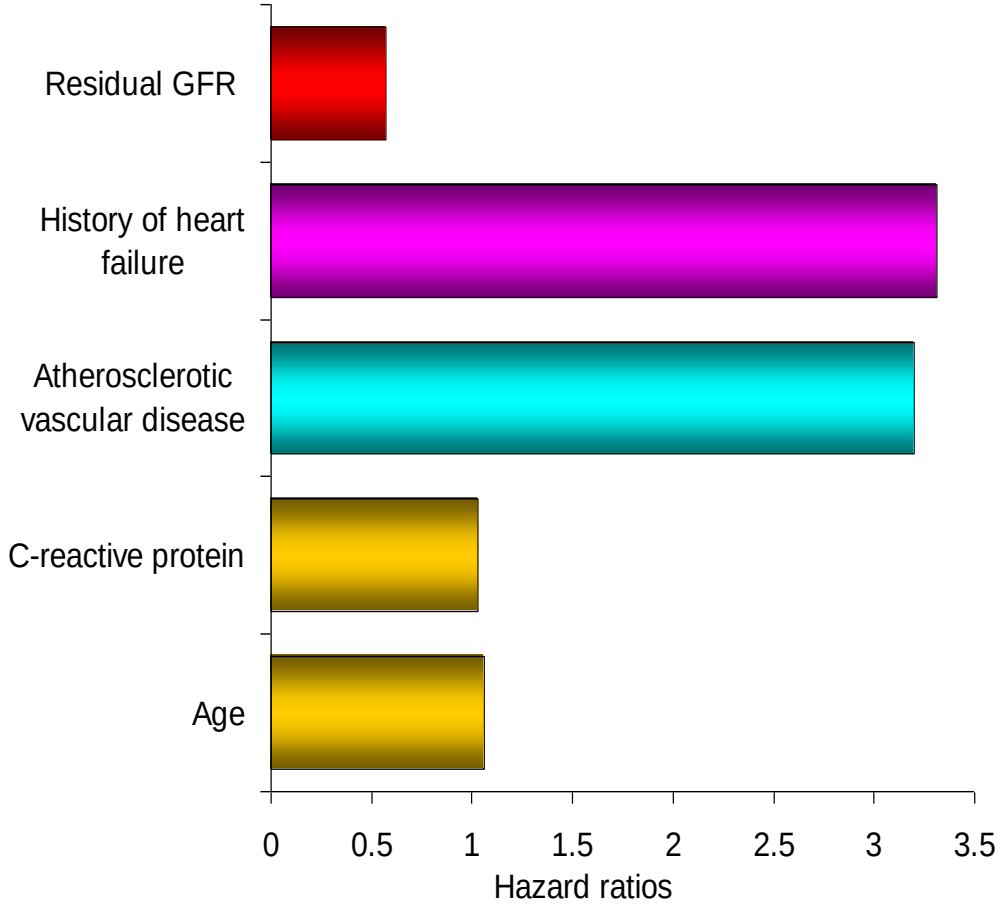
Panagua R. et al. JASN 2002

Factors Associated with All-Cause and Cardiovascular Mortality in PD patients

All-cause mortality



Cardiovascular mortality

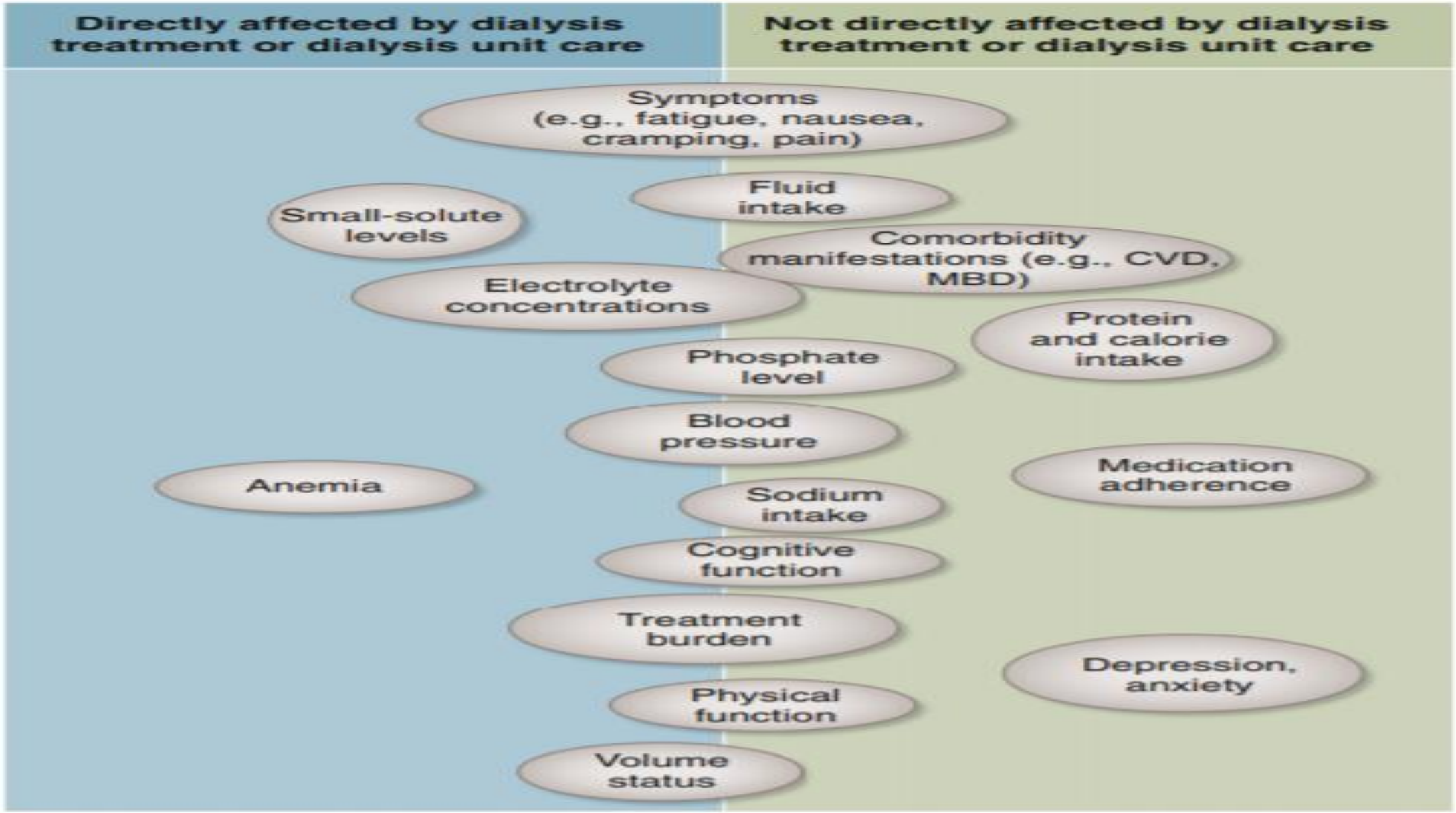


Wang AY, et al. J Am Soc Nephrol 2002

Factors affecting outcomes of patients on peritoneal dialysis

Factor	Impact
Age	Impaired physical function Impaired cognitive function, dementia / delirium Protein energy wasting Falls, frailty
Multi-morbidity	Cardiovascular disease Polypharmacy Impaired physical function Impaired cognitive function Protein energy wasting
Dialysis-related	Symptoms Infections, peritonitis Volume status – volume overload or depletion Protein energy wasting Burden of dialysis
Psycho-social	Depression Anxiety Financial stress Social support

GOAL-DIRECTED DIALYSIS – MULTIFACETED COMPONENTS



KDIGO, Kidney Int 2019

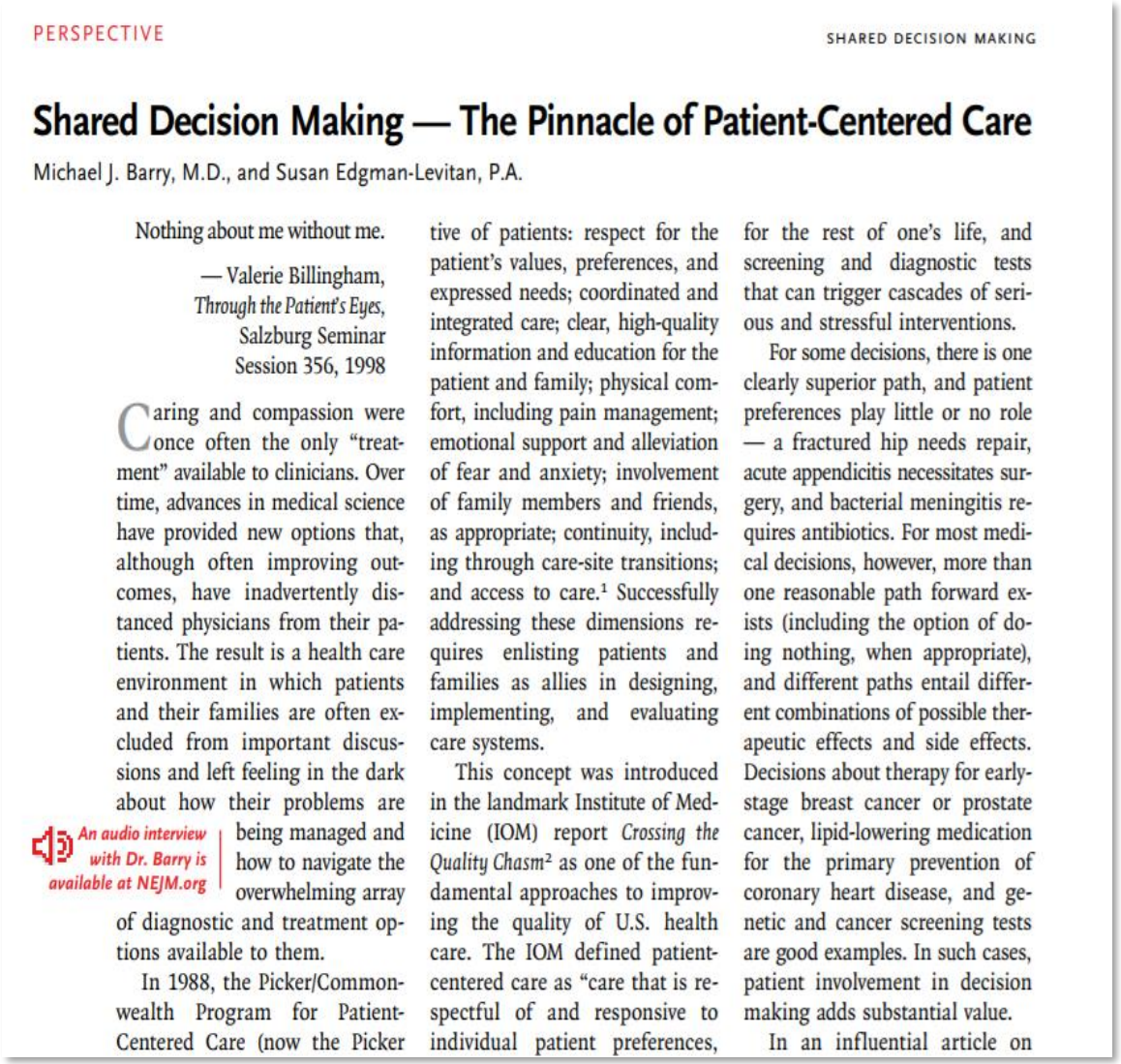
Shared Decision Making-
The Pinnacle of Patient-Centered Care

NEJM 2012

Patient-centered care is defined as **"care that is respectful of and responsive to individual patient preferences, needs, and values"** and that ensures "that **patient values guide all clinical decisions.**"

It highlights the importance of clinicians, patients and their families working together to produce the best outcomes possible and active engagement of patients/families when fateful health care decisions must be made

Nothing about me without me – Through the patients' eyes 1998



PERSPECTIVE

SHARED DECISION MAKING

Shared Decision Making — The Pinnacle of Patient-Centered Care

Michael J. Barry, M.D., and Susan Edgman-Levitan, P.A.

Nothing about me without me.

— Valerie Billingham,
Through the Patient's Eyes,
Salzburg Seminar
Session 356, 1998

Caring and compassion were once often the only "treatment" available to clinicians. Over time, advances in medical science have provided new options that, although often improving outcomes, have inadvertently distanced physicians from their patients. The result is a health care environment in which patients and their families are often excluded from important discussions and left feeling in the dark about how their problems are being managed and how to navigate the overwhelming array of diagnostic and treatment options available to them.

An audio interview with Dr. Barry is available at NEJM.org

In 1988, the Picker/Commonwealth Program for Patient-Centered Care (now the Picker tive of patients: respect for the patient's values, preferences, and expressed needs; coordinated and integrated care; clear, high-quality information and education for the patient and family; physical comfort, including pain management; emotional support and alleviation of fear and anxiety; involvement of family members and friends, as appropriate; continuity, including through care-site transitions; and access to care.[1] Successfully addressing these dimensions requires enlisting patients and families as allies in designing, implementing, and evaluating care systems.

This concept was introduced in the landmark Institute of Medicine (IOM) report *Crossing the Quality Chasm*[2] as one of the fundamental approaches to improving the quality of U.S. health care. The IOM defined patient-centered care as "care that is respectful of and responsive to individual patient preferences, for the rest of one's life, and screening and diagnostic tests that can trigger cascades of serious and stressful interventions.

For some decisions, there is one clearly superior path, and patient preferences play little or no role — a fractured hip needs repair, acute appendicitis necessitates surgery, and bacterial meningitis requires antibiotics. For most medical decisions, however, more than one reasonable path forward exists (including the option of doing nothing, when appropriate), and different paths entail different combinations of possible therapeutic effects and side effects. Decisions about therapy for early-stage breast cancer or prostate cancer, lipid-lowering medication for the primary prevention of coronary heart disease, and genetic and cancer screening tests are good examples. In such cases, patient involvement in decision making adds substantial value.

In an influential article on

Guidelines

PERITONEAL DIALYSIS INTERNATIONAL

Peritoneal Dialysis International
1–10

DOI: 10.1177/0896860819895364
journals.sagepub.com/home/ptd
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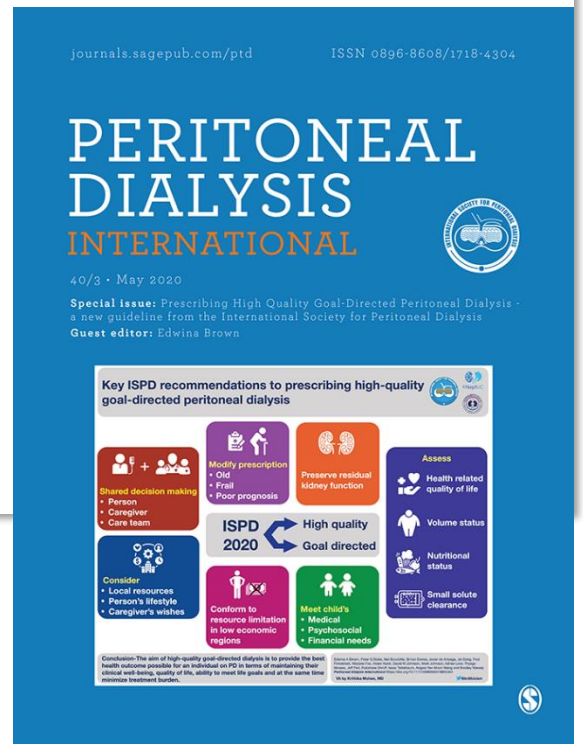
International Society for Peritoneal Dialysis practice recommendations: Prescribing high-quality goal-directed peritoneal dialysis

Edwina A Brown[1], Peter G Blake[2], Neil Boudville[3], Simon Davies[4,5], Javier de Arteaga[6], Jie Dong[7], Fred Finkelstein[8], Marjorie Foo[9], Helen Hurst[10], David W Johnson[11], Mark Johnson[12], Adrian Liew[13], Thyago Moraes[14], Jeff Perl[15], Rukshana Shroff[16], Isaac Teitelbaum[17], Angela Yee-Moon Wang[18] and Bradley Warady[19]

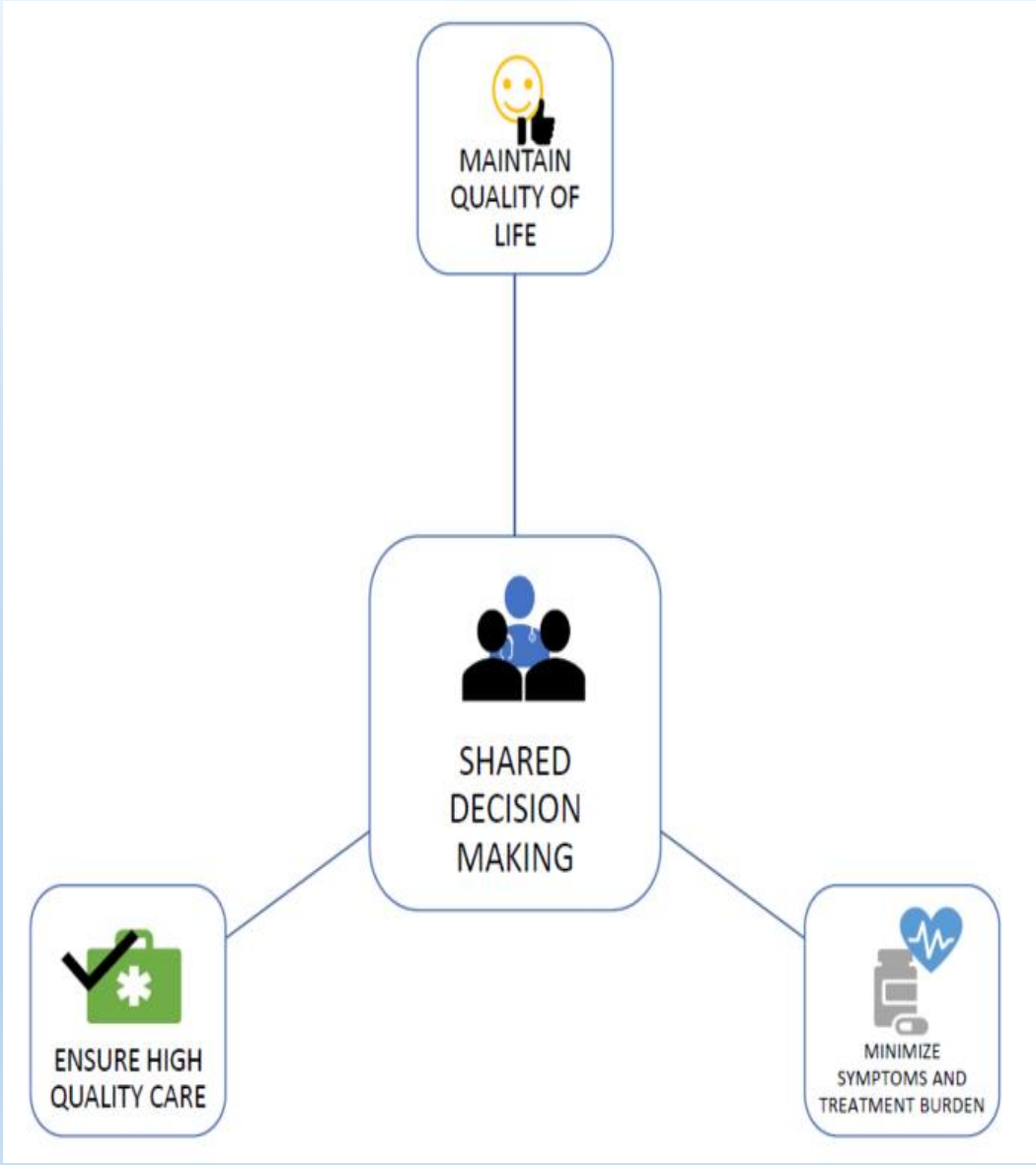


ARBOR RESEARCH COLLABORATIVE FOR HEALTH

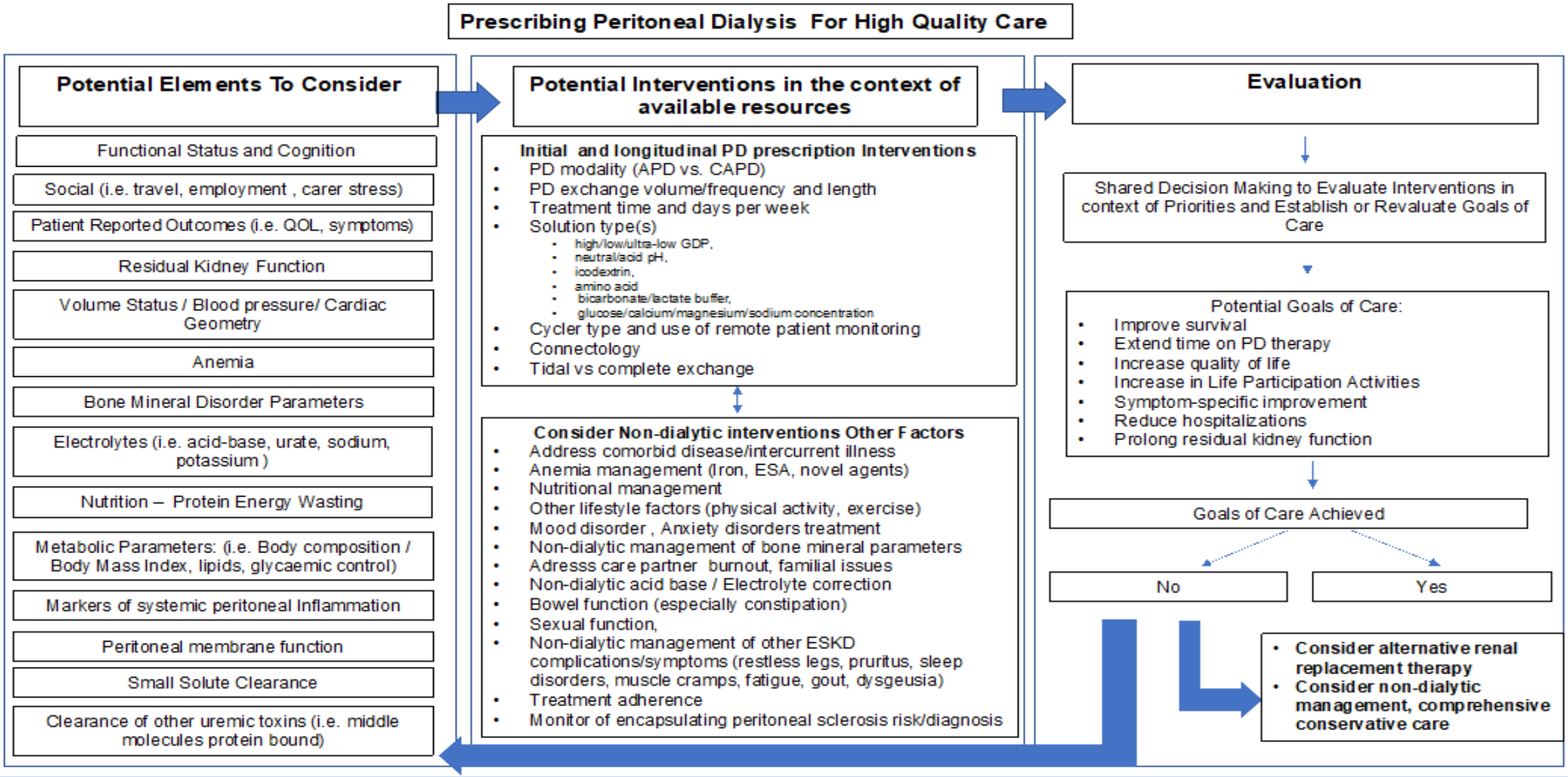
PDI May 2020

ISPD 2020 High Quality Goal-Directed PD Prescription – Overarching Statements

- PD should be prescribed using shared decision-making between the person doing PD/their caregivers and the care team and a patient-centered approach with the aim of
  i) achieving realistic care goals to maximise quality of life and satisfaction for the individual,
  ii) minimise their symptoms and treatment burden
  iii) provide high quality care.
- Patients doing PD should be educated and given choice as far as is possible concerning the PD prescription they receive.
- Patients doing PD should be educated about their condition and be informed about their prognosis and given the opportunity to define their goals of care.
- PD can be prescribed in a variety of ways and should take into account local resources, person's wishes regarding lifestyle and the family's/caregivers' wishes if they are providing assistance.

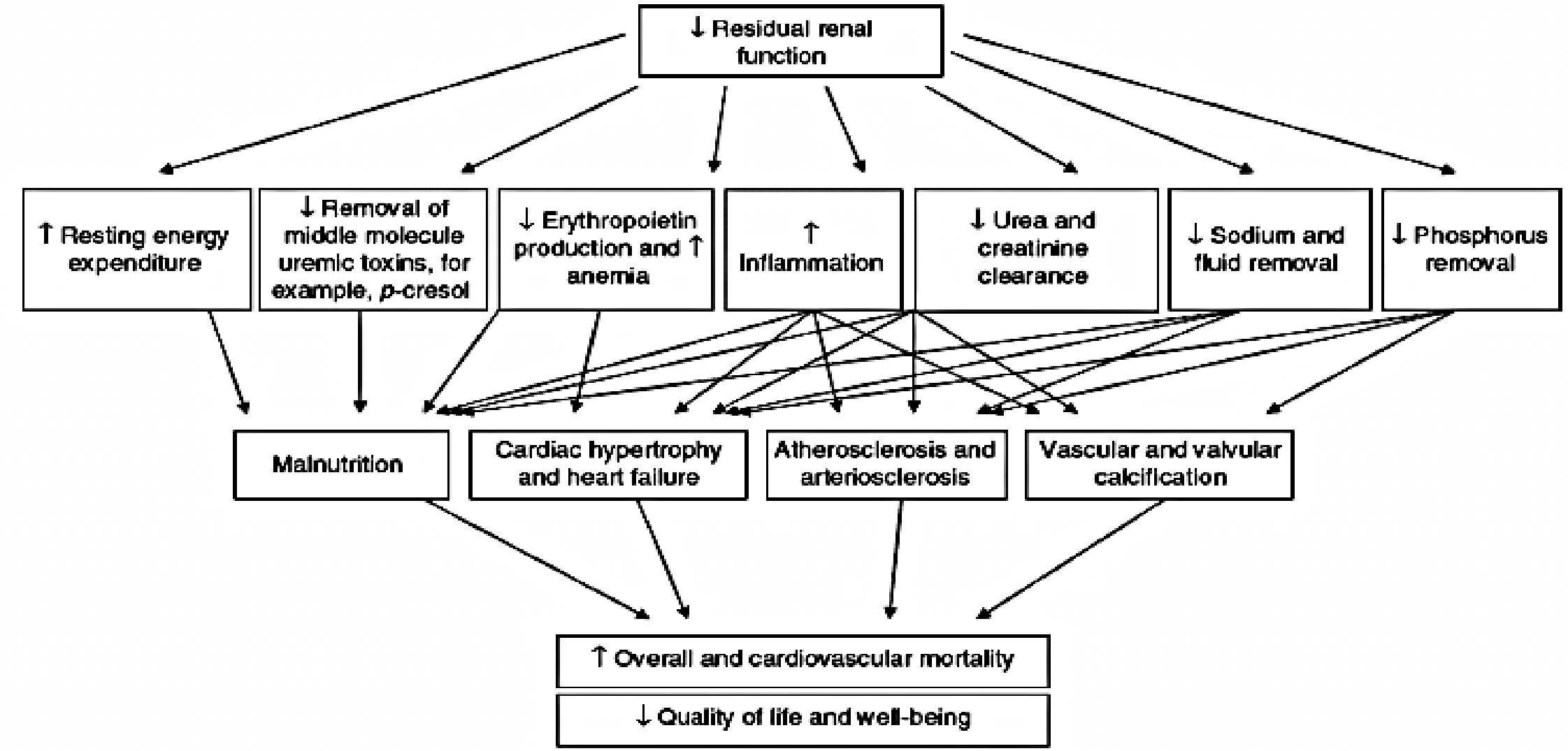


Complexity of Care when Prescribing High-Quality PD



Perit Dial Int 2020

The Heart of Peritoneal Dialysis - Residual Kidney Function

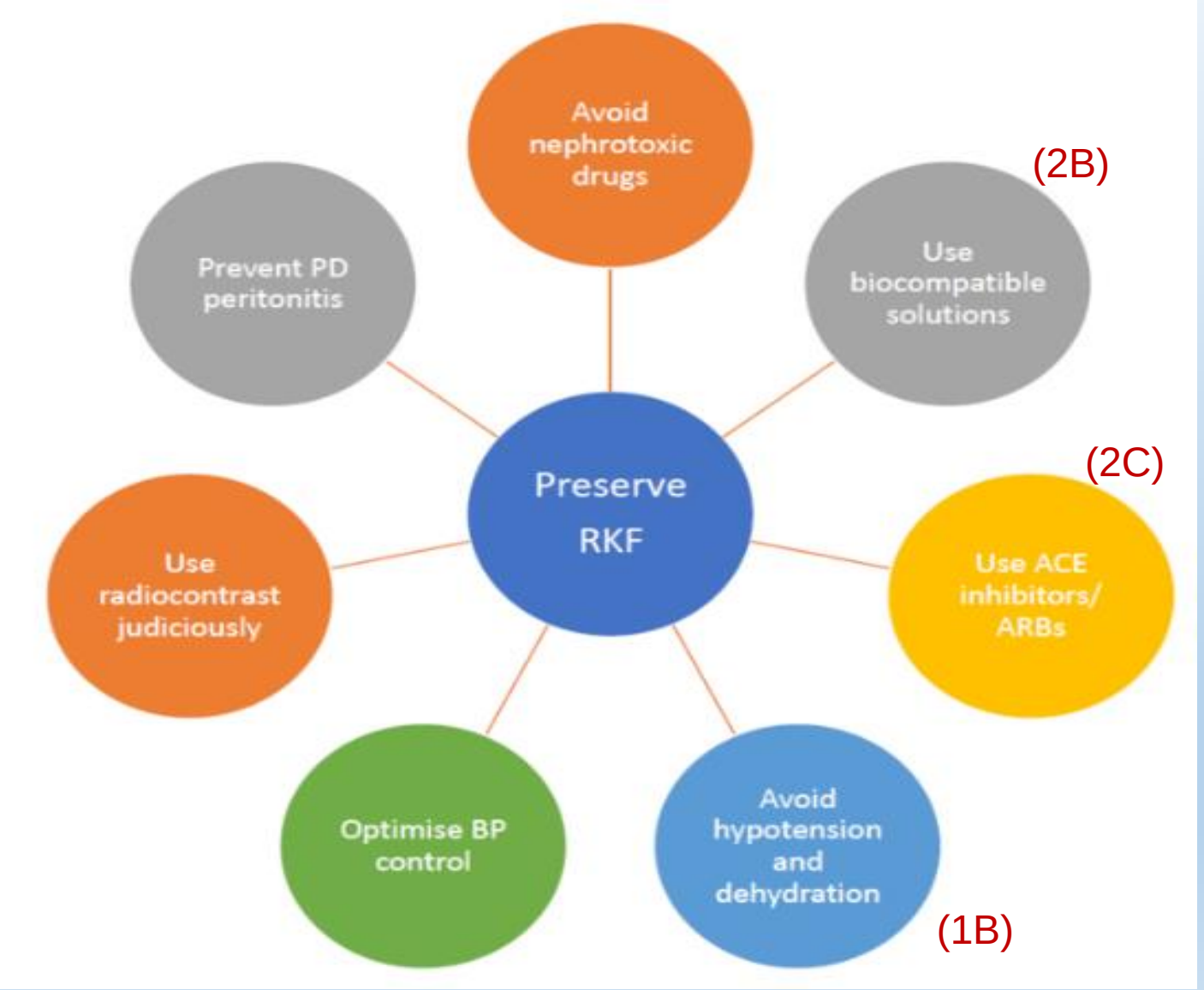


Wang AY, et al. Kidney Int 2006

The Role of Preserving Residual Kidney Function in Prescribing High Quality PD

Chang Huei Chen, Jeff Perl, Isaac Teitelbaum. PDI 2020

- Residual kidney function should be known for all patients on PD and management should focus on preserving this as long as possible.
- RKF should be monitored regularly/quarterly if possible (1C).
- There is no clear evidence demonstrating one PD modality is superior to the other on preservation of RKF; modality choice should be based on patients' preference (1C).



Glucose Degradation Products and Biocompatible PD Solutions

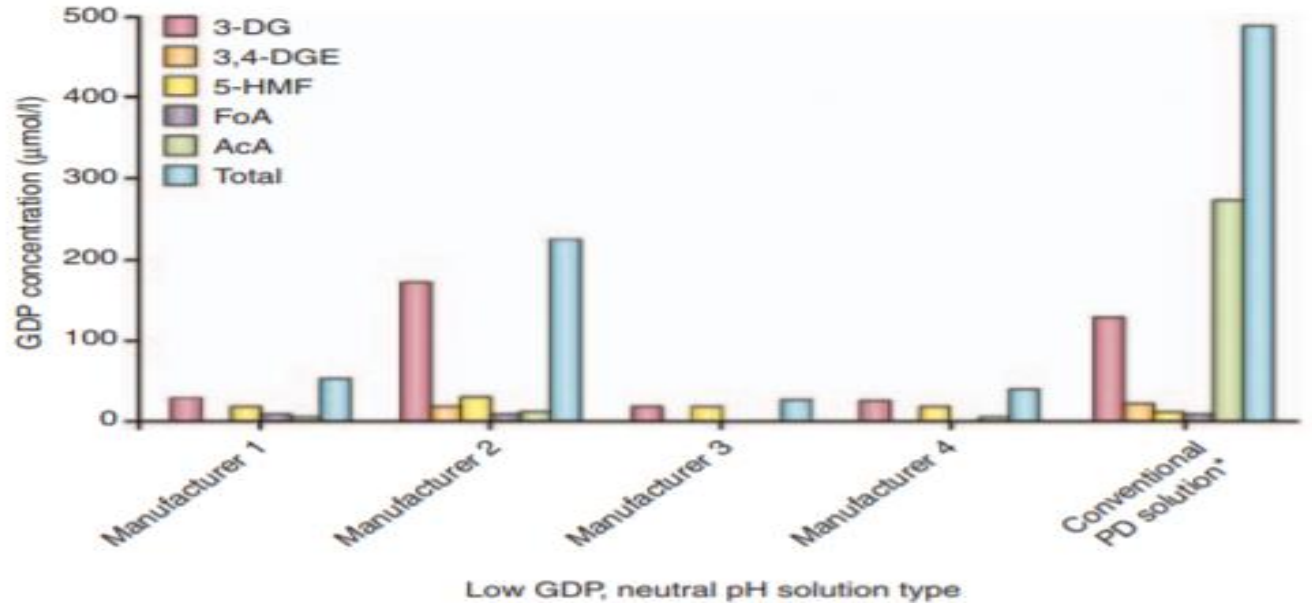
TABLE 1
Glucose Degradation Products (GDPs) Identified in Peritoneal Dialysis Solutions

GDP	Concentration (µmol/L)
Acetaldehyde	120–420
Formaldehyde	6–15
2-Furaldehyde	0.05–2
Glyoxal	3–14
5-Hydroxymethyl furaldehyde	6–30
Methylglyoxal	2–23
Valeraldehyde	ND
3-Deoxyglucosone	118–154
3,4-Dideoxyglucosone-3-ene	9–22

ND = no data.
Adapted from Ref. (50).

	Chambers	Buffer (mmol/l) Lactate	Buffer (mmol/l) Bicarbonate	Final pH
Balance	2	35	—	7.0
Bicavera	2	—	34/39	7.1
Gambrosol Trio	3[a]	39–41	—	6.5
Physioneal	2	10/15	25	7.3
Conventional	1	35/40	—	5.0–5.4

Abbreviation: GDP, glucose degradation product.
[a]Chambers to allow for final glucose concentration of three different concentrations.



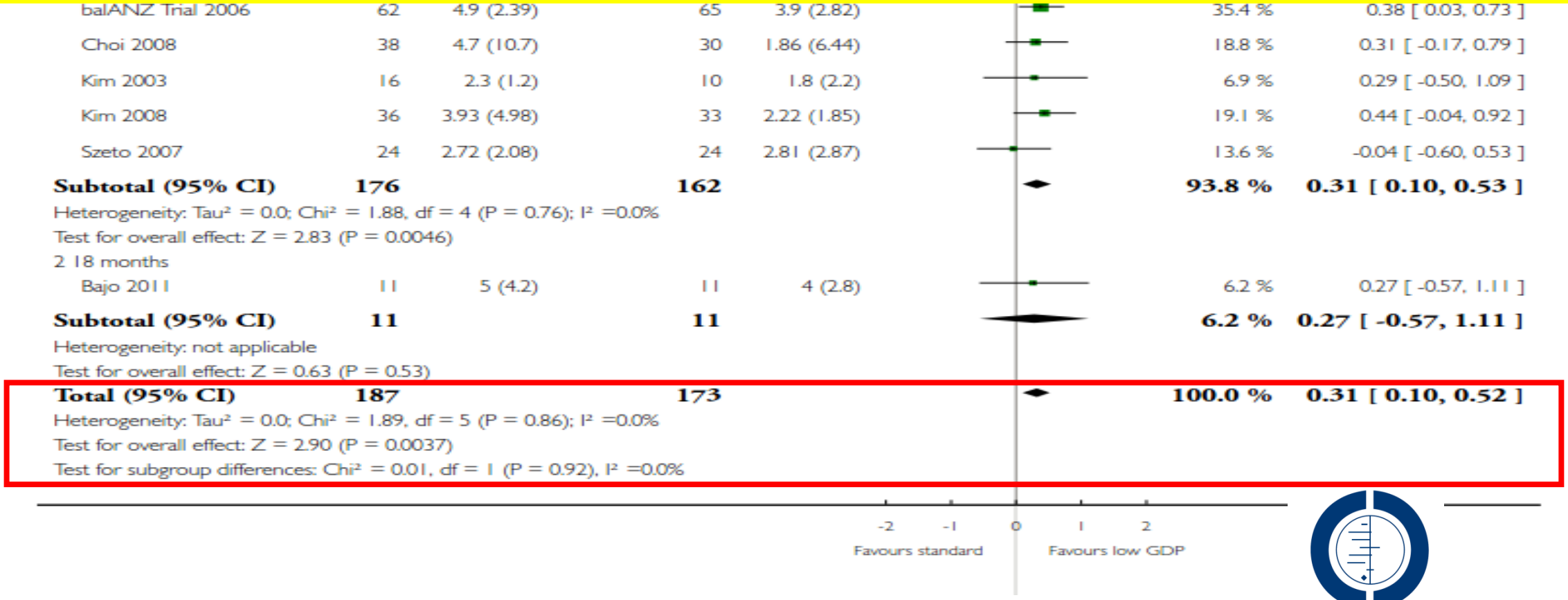
Conventional PD solutions - presence of glucose degradation products (GDPs) coupled with the hyperosmolarity, reduced pH, and use of lactate as the buffer may incur local and systemic toxicity.

Comparison: Low GDP (all buffer types) vs standard glucose dialysate

Outcome: Residual Renal Function 12 months to 23 months

ISPD Adult Cardiovascular and Metabolic Guideline 2015 (Wang AY, et al. PDI 2015)

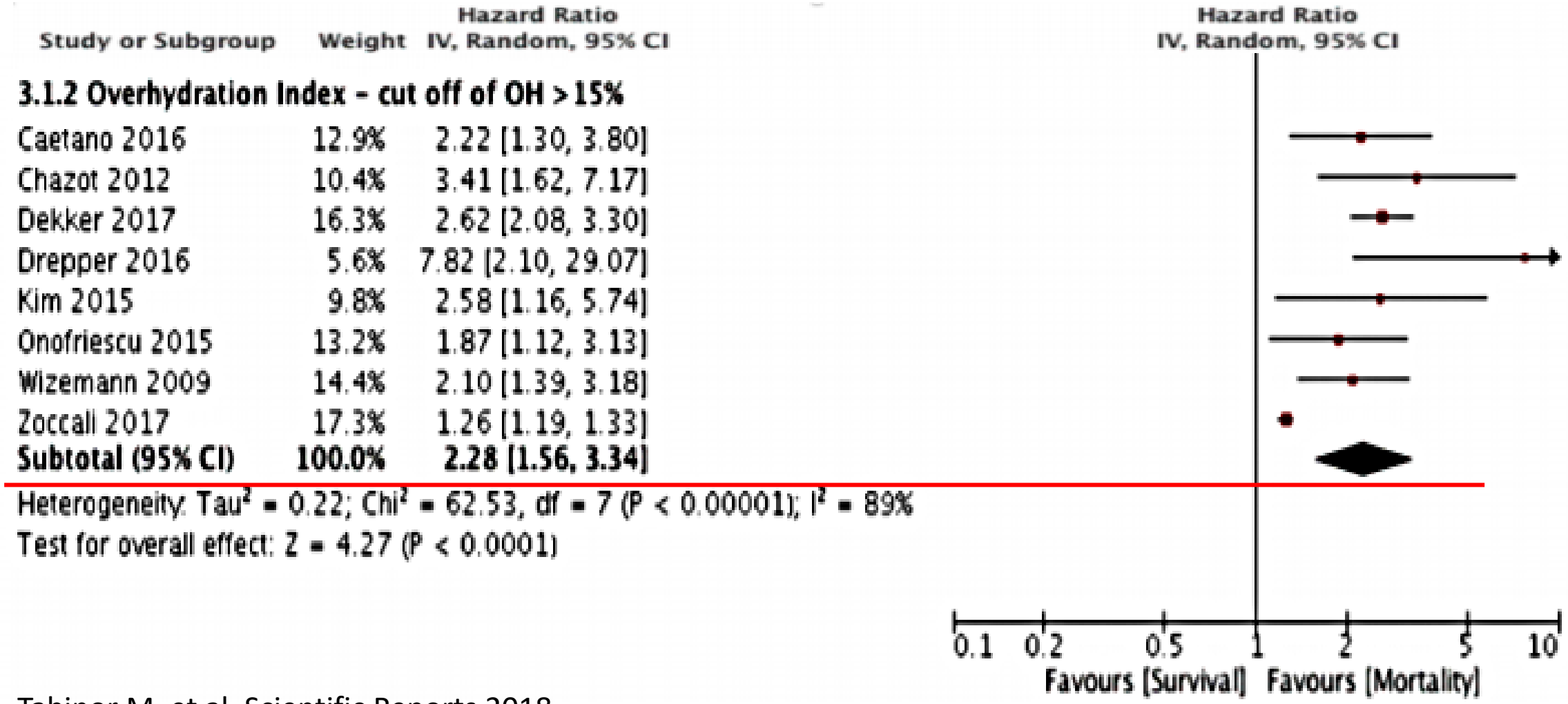
Guideline 2.1.4: We suggest neutral pH, low glucose degradation product peritoneal dialysis solutions may be considered for better preservation of residual renal function if used for periods of 12 months or more. (2B)



Cho Y; Cochrane database Syst Rev 2014

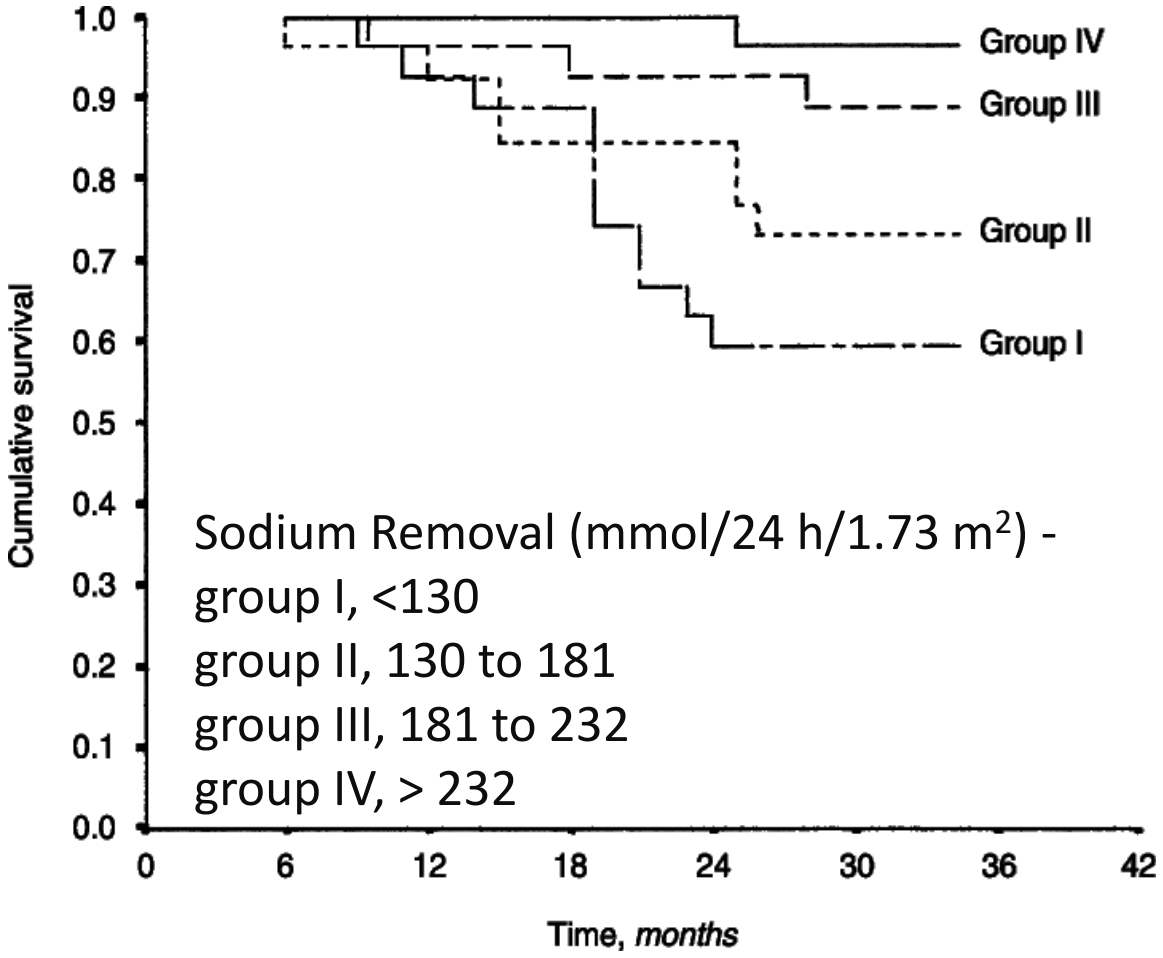
THE COCHRANE COLLABORATION®

Bioimpedance-Defined Overhydration > 15% Predicts An Increased Mortality in Dialysis Population

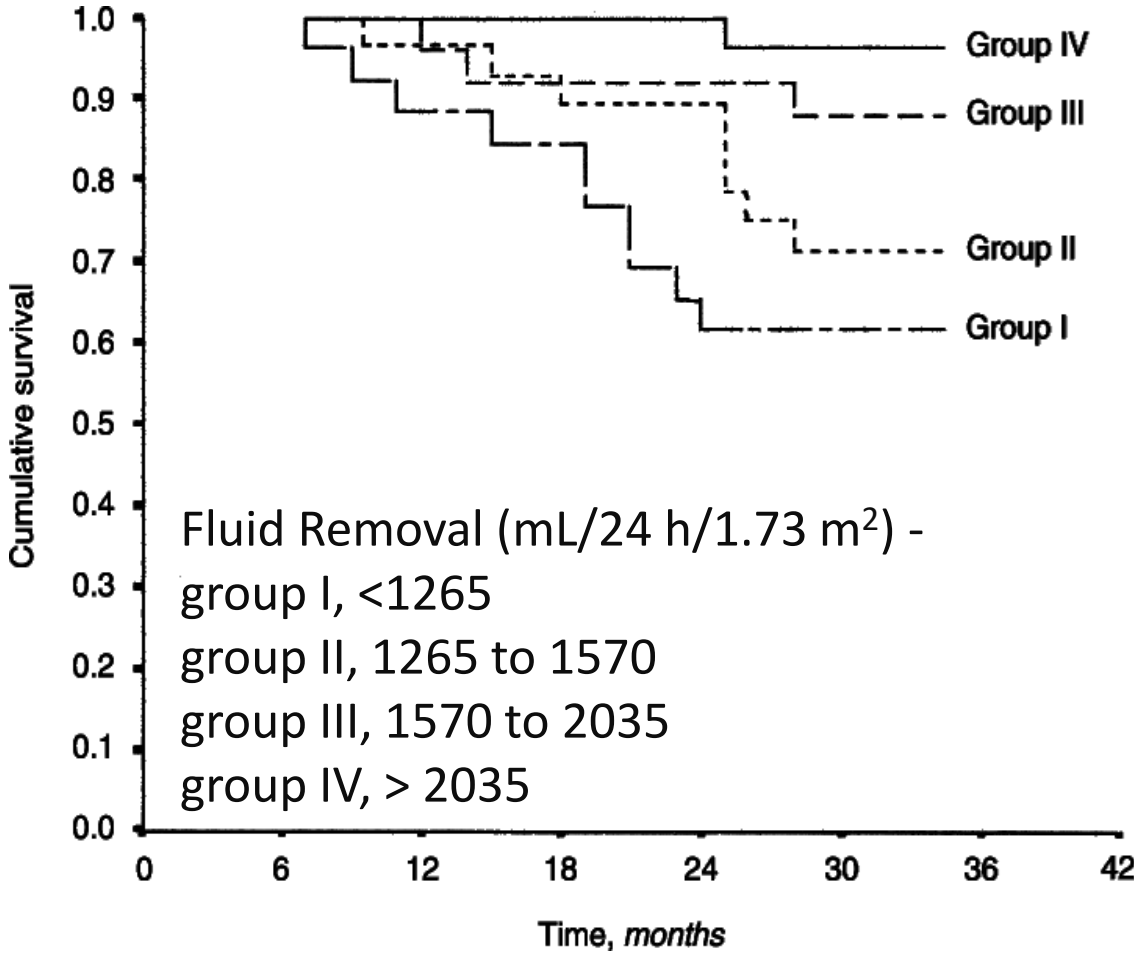


Tabinor M, et al. Scientific Reports 2018

Effect of Sodium and Fluid Removal on Survival of Peritoneal Dialysis Patients



Sodium Removal (mmol/24 h/1.73 m^2) -
group I, <130
group II, 130 to 181
group III, 181 to 232
group IV, > 232



Fluid Removal (mL/24 h/1.73 m^2) -
group I, <1265
group II, 1265 to 1570
group III, 1570 to 2035
group IV, > 2035

Ates K, et al. Kidney Int 2001

Volume Management as a Key Dimension of a High Quality PD Prescription

Angela Yee-Moon Wang, Jie Dong, Xiao Xu, Simon Davies. PDI 2020

- High Quality PD prescription should **aim to achieve and maintain clinical euvolemia while taking residual kidney function and its preservation into account**, so that both **fluid removal from peritoneal ultrafiltration and urine output are considered and residual kidney function is not compromised (PRACTICE POINT).**

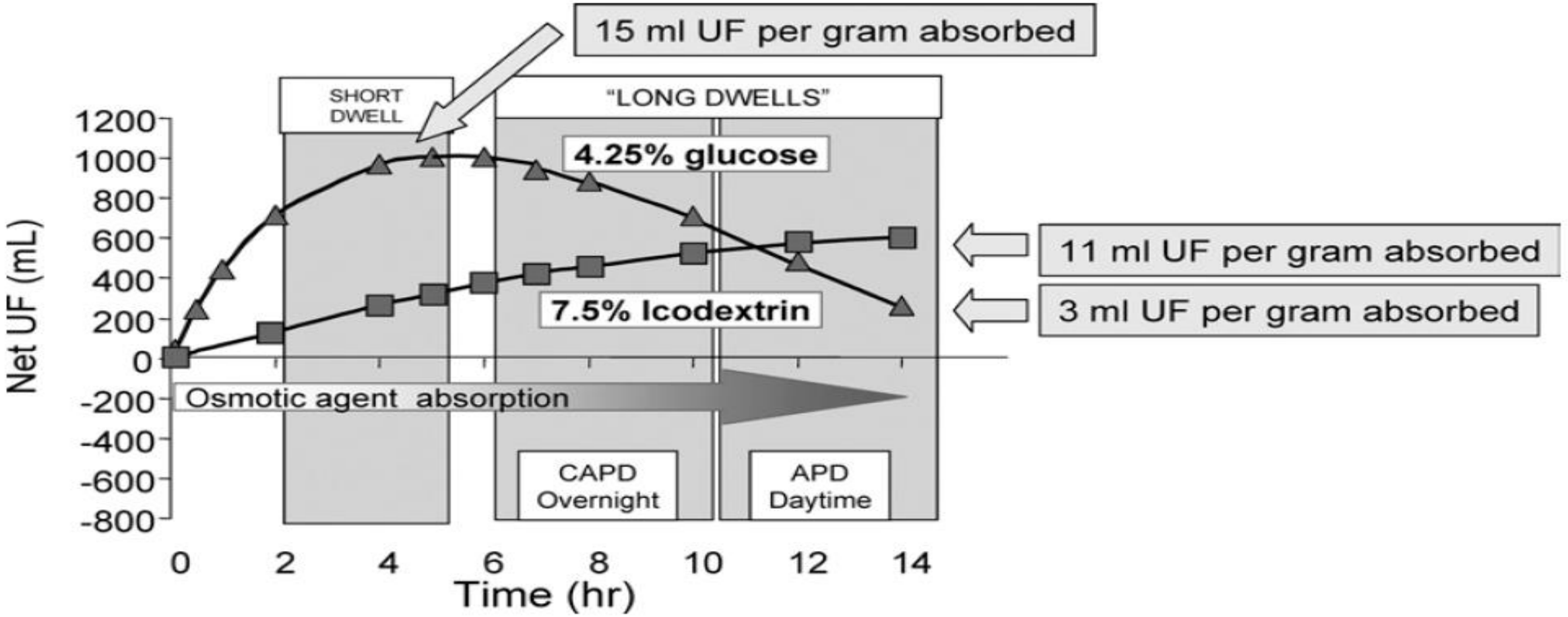
- Regular assessment of volume status including blood pressure and clinical examination should be part of the routine clinical care **(PRACTICE POINT).**

- **Blood pressure** should be included as **one of the key objective parameters in assessing quality of PD prescription (PRACTICE POINT).**

- 2.6.3: *We recommend peritoneal dialysis patients with hypertension have volume status optimized before starting anti-hypertensive medications. (1C)*

ISPD Adult Cardiovascular and Metabolic Guidelines 2015. PDI 2015

Ultrafiltration Profile of Icodextrin



- A starch-derived water soluble glucose polymer, colloid osmotic agent, 16kDa in size.
- Icodextrin is not significantly metabolised inside peritoneum but absorbed slowly (40% after 12 hours) into bloodstream via lymph vessels and broken down into oligosaccharides, ie. maltose (2 glucose molecules), maltotriose (3 glucose molecules), & maltotetraose (4 glucose molecules), with little glucose released in the systemic circulation due to absence of circulating maltase.

Comparison: Glucose polymer (Icodextrin) vs standard glucose dialysate

Outcome: Daily Ultrafiltration

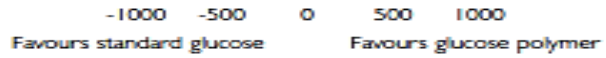
Analysis 2.1. Comparison 2 Glucose polymer (icodextrin) versus standard glucose dialysate, Outcome 1 Daily ultrafiltration.

Review: Biocompatible dialysis fluids for peritoneal dialysis

Comparison: 2 Glucose polymer (icodextrin) versus standard glucose dialysate

Outcome: 1 Daily ultrafiltration

Study or subgroup	Glucose polymer N	Mean(SD)[mL/d]	Standard glucose N	Mean(SD)[mL/d]	Mean Difference IV,Random,95% CI	Weight	Mean Difference IV,Random,95% CI
1 3 months							
Plum 2002	17	278 (177.3)	16	-138 (324)		78.5 %	416.00 [236.26, 595.74]
Subtotal (95% CI)	**17**		**16**			**78.5 %**	**416.00 [236.26, 595.74]**
Heterogeneity: not applicable							
Test for overall effect: Z = 4.54 (P < 0.00001)							
2 4 months							
Konings 2003	19	1670 (4524.5)	13	1063 (3461.3)		0.3 %	607.00 [-2164.12, 3378.12]
Subtotal (95% CI)	**19**		**13**			**0.3 %**	**607.00 [-2164.12, 3378.12]**
Heterogeneity: not applicable							
Test for overall effect: Z = 0.43 (P = 0.67)							
3 24 months							
Posthuma 1997	7	1271 (552.9)	6	1109 (710.4)		5.2 %	162.00 [-538.62, 862.62]
Takatori 2011	14	947.6 (304.6)	10	250 (588.7)		16.0 %	697.60 [299.37, 1095.83]
Subtotal (95% CI)	**21**		**16**			**21.2 %**	**510.55 [10.10, 1011.00]**
Heterogeneity: Tau^2 = 58900.40; Chi^2 = 1.70, df = 1 (P = 0.19); I^2 =41%							
Test for overall effect: Z = 2.00 (P = 0.046)							
Total (95% CI)	**57**		**45**			**100.0 %**	**448.54 [289.28, 607.80]**
Heterogeneity: Tau^2 = 0.0; Chi^2 = 2.28, df = 3 (P = 0.52); I^2 =0.0%							
Test for overall effect: Z = 5.52 (P < 0.00001)							
Test for subgroup differences: Chi^2 = 0.14, df = 2 (P = 0.93), I^2 =0.0%							



Htay Htay, et al. Cochrane Database 2018

Comparison: Glucose polymer (Icodextrin) vs standard glucose dialysate

Outcome: Uncontrolled Fluid overload

Analysis 2.2. Comparison 2 Glucose polymer (icodextrin) versus standard glucose dialysate, Outcome 2 Uncontrolled fluid overload.

Review: Biocompatible dialysis fluids for peritoneal dialysis

Comparison: 2 Glucose polymer (icodextrin) versus standard glucose dialysate

Outcome: 2 Uncontrolled fluid overload

Study or subgroup	Glucose polymer n/N	Standard glucose n/N	Risk Ratio M-H,Random,95% CI	Weight	Risk Ratio M-H,Random,95% CI
1 24 months					
Takatori 2011	3/21	9/20		35.5 %	0.32 [0.10, 1.01]
Subtotal (95% CI)	**21**	**20**		**35.5 %**	**0.32 [0.10, 1.01]**
Total events: 3 (Glucose polymer), 9 (Standard glucose)					
Heterogeneity: not applicable					
Test for overall effect: Z = 1.95 (P = 0.051)					
2 12 months					
Paniagua 2008	5/30	17/29		64.5 %	0.28 [0.12, 0.67]
Subtotal (95% CI)	**30**	**29**		**64.5 %**	**0.28 [0.12, 0.67]**
Total events: 5 (Glucose polymer), 17 (Standard glucose)					
Heterogeneity: not applicable					
Test for overall effect: Z = 2.88 (P = 0.0040)					
Total (95% CI)	**51**	**49**		**100.0 %**	**0.30 [0.15, 0.59]**
Total events: 8 (Glucose polymer), 26 (Standard glucose)					
Heterogeneity: Tau^2 = 0.0; Chi^2 = 0.02, df = 1 (P = 0.88); I^2 =0.0%					
Test for overall effect: Z = 3.47 (P = 0.00052)					
Test for subgroup differences: Chi^2 = 0.02, df = 1 (P = 0.88), I^2 =0.0%					

0.1 0.2 0.5 1 2 5 10

Favours glucose polymer Favours standard glucose

Htay Htay, et al. Cochrane Database 2018

Recommendations on Icodextrin Use for Volume Control

- 2.2.3: We recommend once-daily icodextrin be considered as an alternative for hypertonic glucose peritoneal dialysis solutions for long dwells in PD **patients experiencing difficulties to maintain euvolemia due to insufficient peritoneal ultrafiltration**, taking into account the peritoneal transport state. (1B)

ISPD Adult Cardiovascular and Metabolic Guidelines 2015. PDI 2015

- Icodextrin is recommended **to improve ultrafiltration independent of Dialysate/Plasma (D/P) creatinine**. There is no apparent risk or adverse side effects or impact on RRF. (practice point)

ISPD High quality goal-directed PD prescription 2020. PDI 2020

2020 Update on Recommendations of Small Solute Clearance

Neil Boudville, Thyago Moraes. PDI 2020

- In setting a Kt/V target for an individual patient, **define an acceptable range** that recognises the uncertainty of the measurement, rather than apply a single cut-off value is more appropriate. (Practice point)

- Given the uncertainty of the estimate of V (volume of distribution), clinicians should be **encouraged to alter the prescribed dialysis dose in response to symptoms and treatment goals, rather than solely equating a single value cut-off value with adequate treatment.** (Practice point)

Prescribing High Quality PD: Moving beyond Kt/V

Glavinovic T, Hurst H, Hutchison A, Johansson L, Ruddock N. PDI 2020

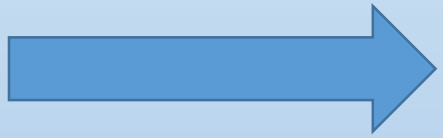
- Patients who remain symptomatic despite a Kt/V_{urea} > 1.7 should have other dialysis and non-dialysis related factors considered as possible contributing factors **(PRACTICE POINT).**

Hypokalaemia

Protein energy wasting

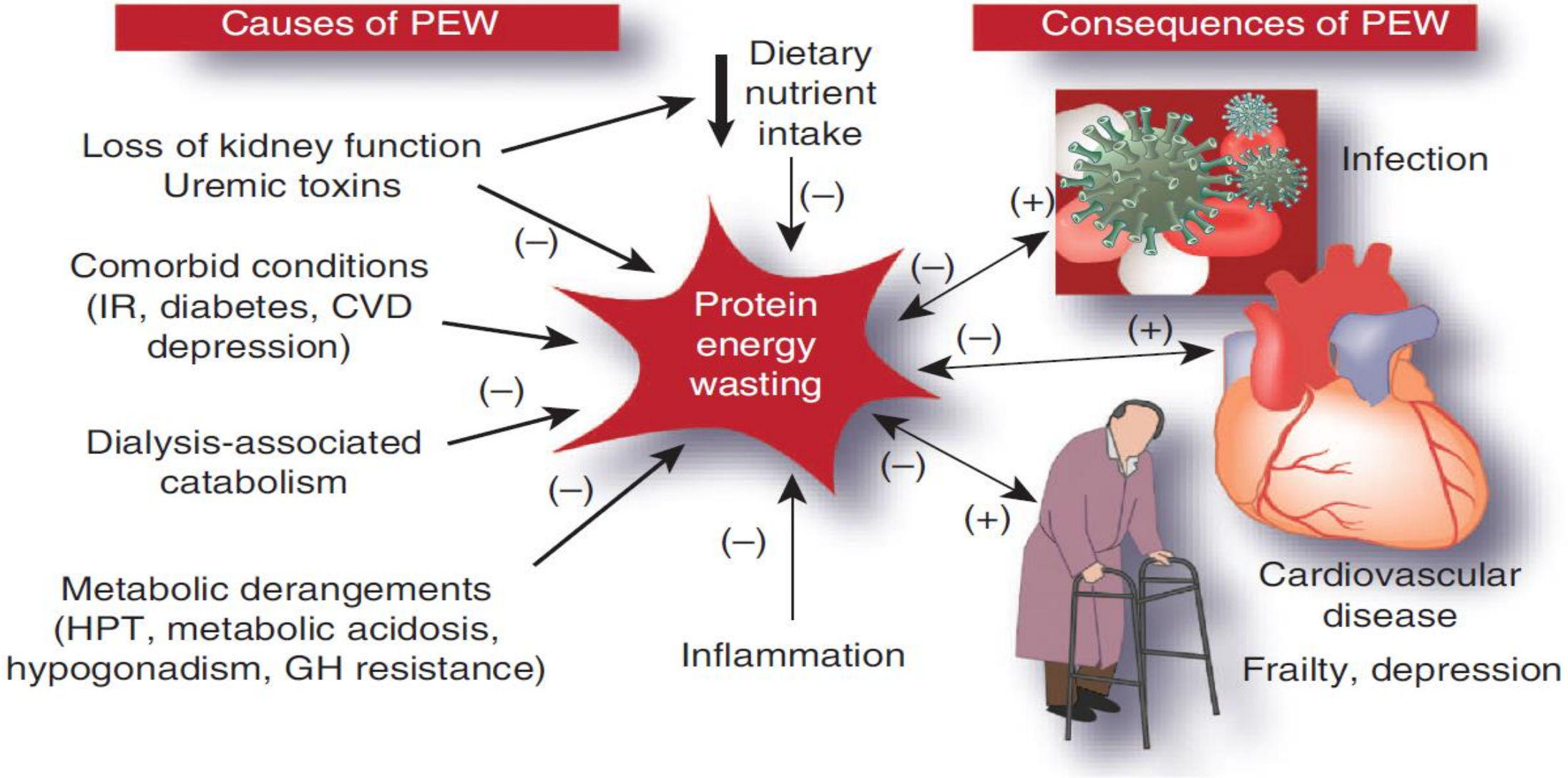
Hypoalbuminemia

Hyperphosphatemia



Review PD prescription and other non-dialysis related factors

Etiology and Consequences of Protein Energy Wasting



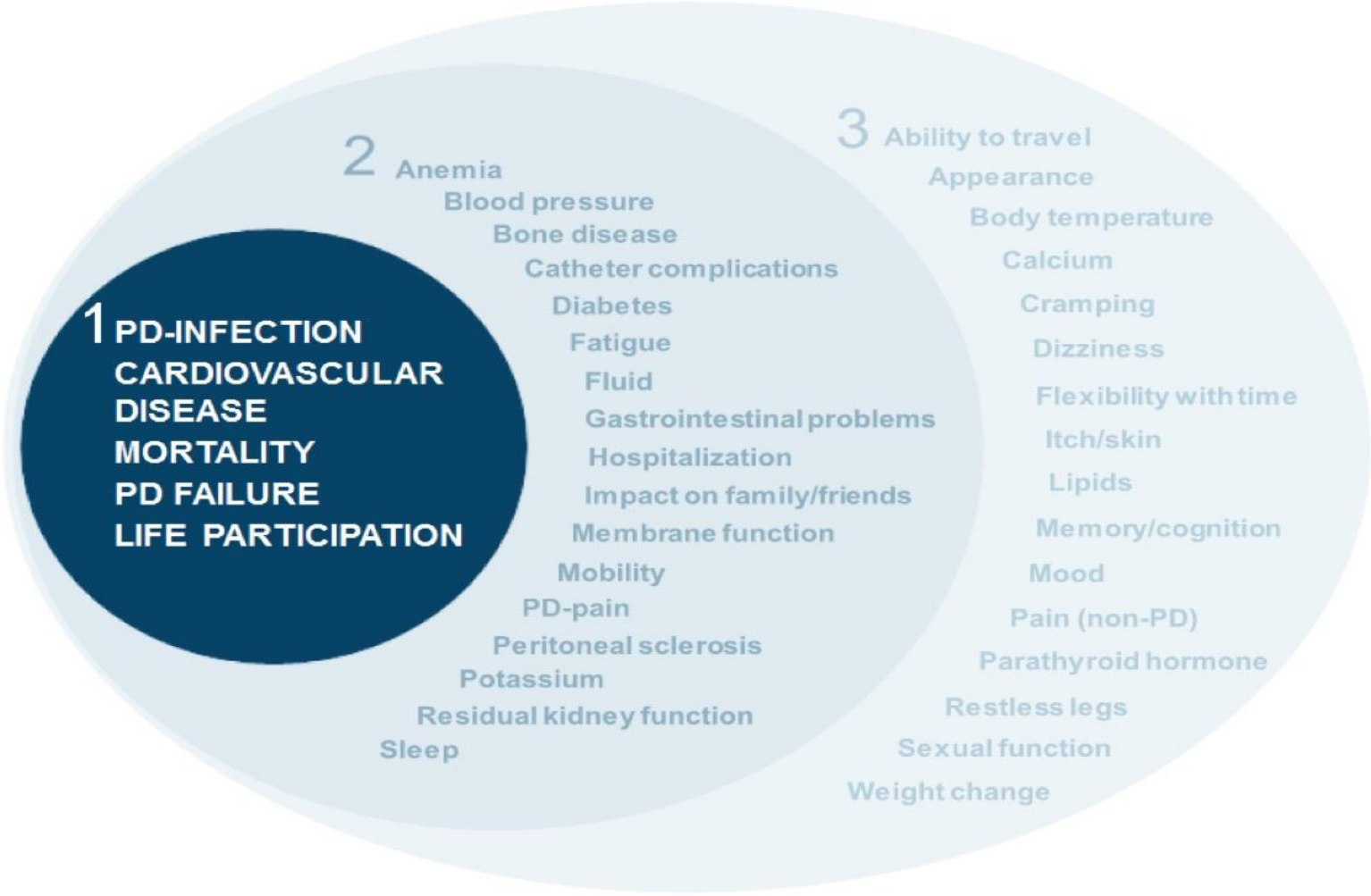
International Society of Renal Nutrition and Metabolism. Kidney Int 2013; May: 1-12

Factors Suggesting A Need to Increase Dialysis Delivery

Factor	Suggests increase in dialysis
Clinical features	Uremic symptoms (recognising there could be other causes of individual symptoms) Symptomatic volume overload Poor nutritional status Hospitalisation related to uremia or volume overload
Small solute removal	Low Kt/V (1.7 ± 0.2) and/or creatinine clearance ($<50 \pm 5$) L/week/1.73m^2
Residual Kidney Function	Decline in urine output and/or renal small solute removal
Biochemical features	Hyperkalaemia Hyperphosphataemia Low plasma bicarbonate

What Matters Most to our PD Patients?

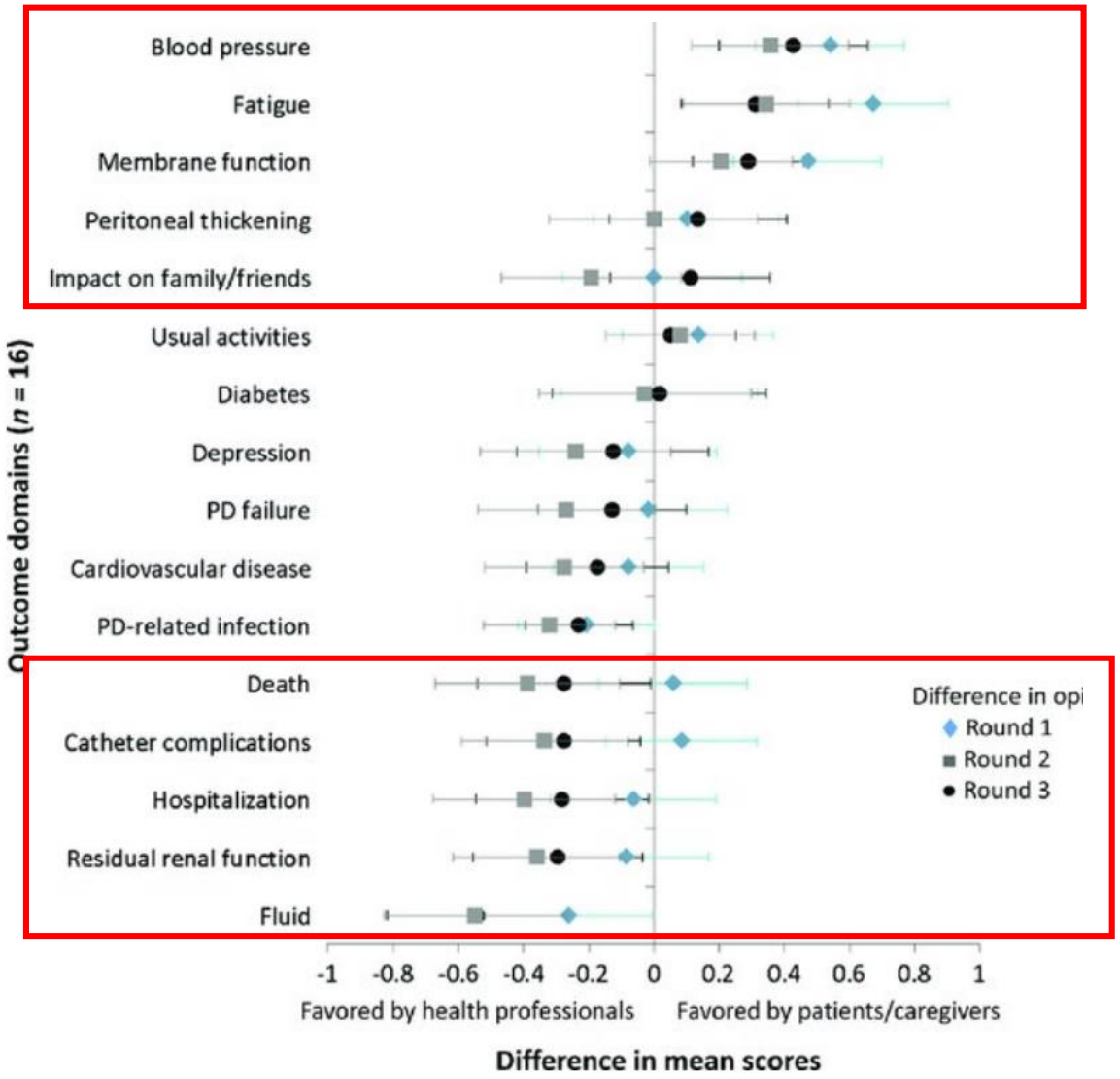
SONG-PD Core Outcome Domains



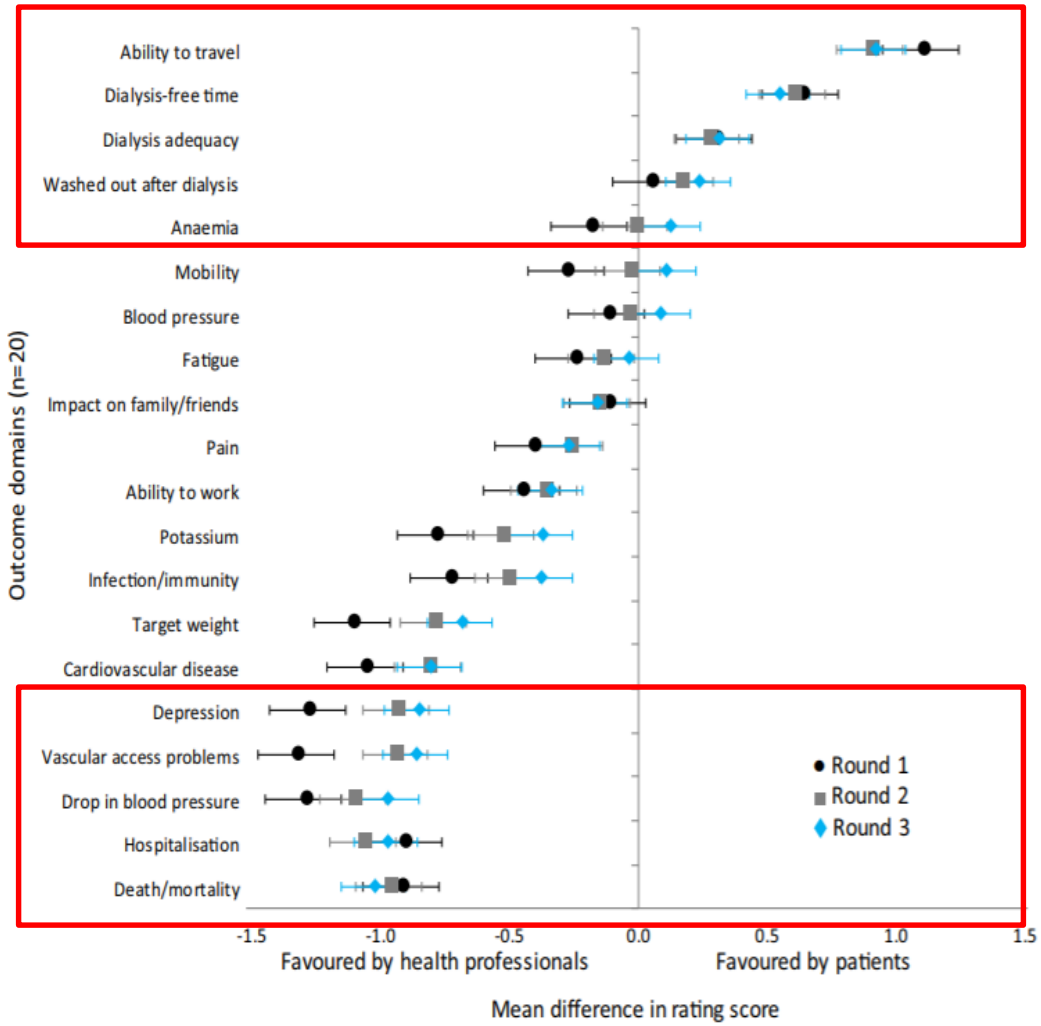
Standardized Outcomes in Nephrology (SONG)-Peritoneal Dialysis (PD) Group. Kidney Int 2019

Developing a Set of Core Outcomes for Trials in PD and HD - SONG Initiative

Standardized Outcomes in Nephrology



Manera K, et al. Am J Kidney Dis 2020



Evangelidis N, et al. SONG-HD. AJKD 2016

Domains to be Addressed in PD Patients

- Cognitive dysfunction
- family and marital discord
- Depression
- Anxiety
- Fatigue
- Lethargy
- Physical functioning
- Sexual dysfunction
- Symptoms of neuropathy
- Sleep disturbances
- Uremic pruritus
- Anorexia, nausea

- Restless legs
- Satisfaction with dialysis treatment regimen
- Impact of the treatment regimen on their life
- Satisfaction with care provided
- Caregiver burden
- Abdominal discomfort, anorexia appetite, nausea, vomiting
- Additional physical symptoms

Health-Related Quality of Life (HRQOL)

Fredric O. Finkelstein and Marjorie WY Foo. PDI 2020

- Patient reported experience of care and perception of their HRQOL are crucial measures of how effective person centered care is in PD and should be surveyed and integrated into routine care assessments and used to adjust dialysis regimen and improve delivery of care. **(PRACTICE POINT)**

Patient Reported Outcome Measures (PROMS)

General Questionnaires

- KDQOL-36
- KDQOL-SF
- EQ5D
- Choice Health Experience Questionnaire (CHEQ)
- Dialysis Symptom Index

Depression and Anxiety Screening:

- Beck Depression Inventory
- Patient health questionnaire 9
- Center for Epidemiologic Studies Depression Scale
- Hospital anxiety and depression score

Caregiver Burden:

- Zarit Burden Interview

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

Edwina A Brown[1], Peter G Blake[2], Neil Boudville[3], Simon Davies[4,5], Javier de Arteaga[6], Jie Dong[7], Fred Finkelstein[8], Marjorie Foo[9], Helen Hurst[10], David W Johnson[11], Mark Johnson[12], Adrian Liew[13], Thyago Moraes[14], Jeff Perl[15], Rukshana Shroff[16], Isaac Teitelbaum[17], Angela Yee-Moon Wang[18] and Bradley Warady[19]

Conclusion-The aim of high-quality goal-directed dialysis is to provide the best health outcome possible for an individual on PD in terms of maintaining their clinical well-being, quality of life, ability to meet life goals and at the same time minimize treatment burden.

Edwina A Brown, Peter G Blake, Neil Boudville, Simon Davies, Javier de Arteaga, Jie Dong, Fred Finkelstein, Marjorie Foo, Helen Hurst, David W Johnson, Mark Johnson, Adrian Liew, Thyago Moraes, Jeff Perl, Rukshana Shroff, Isaac Teitelbaum, Angela Yee-Moon Wang and Bradley Warady *Peritoneal Dialysis International* https://doi.org/10.1177/0896860819895364
VA by Krithika Mohan @krithicism