PD First Policy:

Is this still the right decision?

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Scope of contents

❑ **Aspects of health economics**

❑ **Aspects of clinical outcomes**

❑ **Gaps to improve outcomes of PD First (Thailand)**

More Use of Peritoneal Dialysis Gives Significant Savings: A Systematic Review and Health Economic Decision Model

Eva Pike[a], Vida Hamidi[a], Tove Ringerike[a], Torbjorn Wisloff[a, b]
Marianne Klemp[a, b, c]

❑ **Examine efficacy, safety and cost-effectiveness of HD performed at different locations (hospital, satellite, and home) and PD at home**

❑ **Conduct a systematic review for patients > 18 years with ESRD requiring dialysis in several databases and perform meta-analyses**

❑ **Analysis composed of**

- clinical end points: mortality and major complications that required hospitalization (infection and cardiovascular events) (PD - peritonitis and sepsis; HD - access related infection, sepsis)

- calculate annual cost per patients and economic evaluation

Process of study selection

109 SRs/ HTAs identified

4348 original studies identified from the literature search and

2 from hand search

85 SR/HTA excluded

4199 studies excluded based on title and abstract

24 SRs/ HTAs evaluated in full text

149 studies evaluated in full text

24 SR/HTA excluded

136 studies excluded

(The reasons for exclusions are given in Additional file 10)

13 publications

(1 RCT and 12 publications

reporting 13 observational data sets).

Study details in Additional File 10

SRs= systematic reviews
HTA = health technology assessments
RCTs= randomized controlled trials

☐ **Eligible criteria:**
Include SRs, HTAs, RCTs and observation studies with control group that assessed mortality and complications in patients above 18 years with ESRD requiring dialysis

☐ **6 studies from Europe**
4 studies from USA
2 studies from Asia
1 study from Canada

Efficacy estimates for log-normal distribution

	PD vs. HD hospital			HD home vs. HD satellite		
	RR	ln(RR)	SE	RR	ln(RR)	SE
All cause mortality	1.11 (0.59-2.10)	0.10	0.33	0.60 (0.33-1.10)	-0.51	0.31

HD: haemodialysis; PD: peritoneal dialysis; RR: relative risks; SE: standard error

➢ **No significant difference in mortality between PD vs HD hospital**

➢ **No significant difference in mortality between HD home vs HD satellite**

Eva Pike[a], Vida Hamidi[a], Tove Ringerike[a], Torbjorn Wisloff[a, b]
Marianne Klemp[a, b, c]

Relative risk of cardiac or vascular hospitalization

	HD satellite vs. HD hospital			PD vs. HD hospital			HD home vs.PD		
	RR	ln(RR)	SE	RR	ln(RR)	SE	RR	ln(RR)	SE
Cardiac or vascular hospitalization	0.53[a] (0.28-1.01)	-0.63	0.33	0.03[b] (0-0.54)	-3.51	1.43	1.45[c] (0.49-4.36)	0.37	0.56

HD: haemodialysis; PD: peritoneal dialysis; RR: relative risks; SE: standard error

[a] Cardiac or vascular hospitalization

[b] All acute coronary syndrome

[c] Patients admitted diagnosed with cardiac disease (angina, myocardial infarction, atrial fibrillation

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Table 2. Results of the Base-Case Cost-Effectiveness Analyses Over a 5-Year Time Horizon From a Societal Perspective (Discounted) (EUR1.00 ≈ NOK7.47)

	Total costs (EUR)	Effects (QALYs)	Versus PD			Sequential ICER (EUR/QALY)
			Incremental cost (EUR)	Incremental effect (QALYs)	ICER (EUR/QALY)	
PD	164,741	1.6825				
HD home	228,362	1.8613	63,621	0.1788	355,822	355,822
Dominated strategies						
HD hospital	317,501	1.7169	152,760	0.0344	4,440,698	Dominated by HD home
HD self-care	261,260	1.7170	96,519	0.0344	2,805785	Dominated by HD home
HD satellite	352,048	1.7181	187,308	0.0356	5,261,461	Dominated by HD home

All HD strategies were compared to PD, because none of the more effective strategies were cost-effective compared to PD. QALY: quality-adjusted life year; ICER: incremental cost-effectiveness ratio; INHB: incremental net health benefit; HD: hemodialysis; PD: peritoneal dialysis.

❑ **PD: most cost effective dialysis compared to all HD types**

❑ **HD home: slightly more effective than other HD modalities but more costly relative to PD**
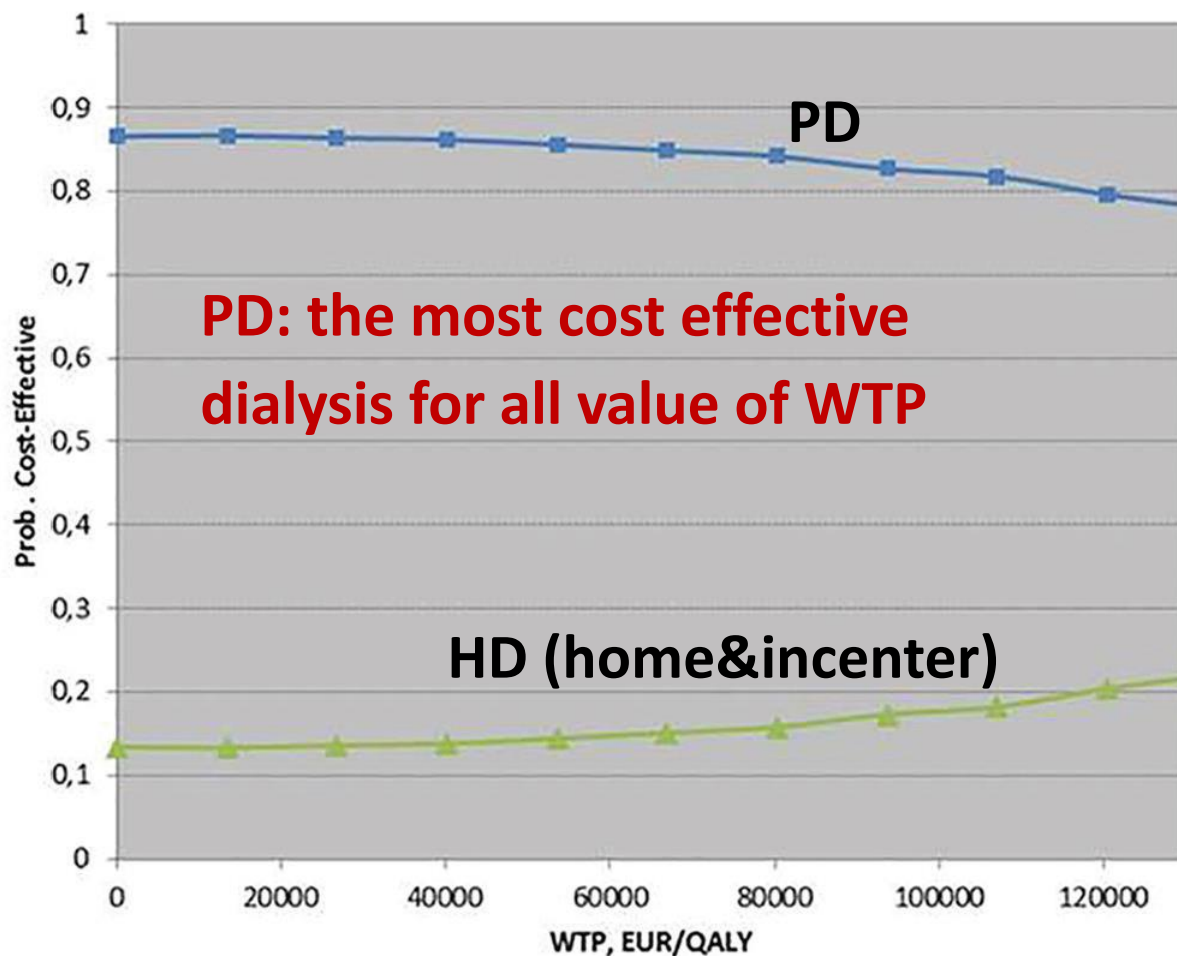
Cost effectiveness acceptability curve of willingness to pay

PD: the most cost effective
dialysis for all value of WTP

Conclusion:

☐ **PD was the most cost-effective dialysis and was comparable to HD regarding efficacy outcomes.**

☐ **There were significant saving potentials if more ESRD patients started on PD instead of HD.**

Systems of Health Care Coverage in Thailand

Table 1. Thailand Health Care Coverage Schemes and Renal Replacement Therapy Reimbursement

Scheme	Civil Servant Medical Benefit Scheme **(CSMBS)**	Social Security Scheme **(SSS)**	Universal Coverage Scheme **(UHC) –NHSO**
Date introduced	1960	1990	2002
Beneficiaries	Government employees and dependents, retirees	Private sector employees	Rest of population
Population coverage	6 million (9%)	10 million (16%)	48 million (75%)
Funding	Government budget	Payroll contribution Tri-parties	Government budget
Payment to health facilities	Fee-for-service, reimbursement	Capitation	Capitation and DRG[**]
Renal replacement therapy[*] reimbursement	Fully reimbursed[*] before 2008	Fully reimbursed[*] before 2008	No reimbursement before 2008

[*]Kidney transplantation, hemodialysis, and peritoneal dialysis.
[**]Diagnosis Related Groups.

PD First in 2008

Economic Evaluation of Palliative Management versus Peritoneal Dialysis and Hemodialysis for End-Stage Renal Disease: Evidence for Coverage Decisions in Thailand

- ❑ **Objective: To assess the value for money of providing PD and HD for UC patients vs palliative care**

- ❑ **Analytic model: - evaluate incremental cost-effectiveness ratio (ICER) of moving from palliative cares before 2008 versus**

  1) providing PD as initial care followed by HD if complications/ switching occur

  2) providing HD as initial care followed by PD if complications/ switching occur

  - **develop decision-analytic model applied to ESRD patients aged 20 to 70 years**

Yot Teerawattananon, MD,[1,2] Miranda Mugford, DPhil,[2] Viroj Tangcharoensathien, PhD[1]

Economic Evaluation of Palliative Management versus Peritoneal Dialysis and Hemodialysis for End-Stage Renal Disease: Evidence for Coverage Decisions in Thailand

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VALUE IN HEALTH

Table 4 Results of economic evaluation of providing peritoneal and hemodialysis as an initial treatment compared to palliative care, using the societal perspective

| | Unadjusted survival | | | | Adjusted survival | | | |
| | Baht per life-year saved | | Baht per QALY gained | | Baht per life-year saved | | Baht per QALY gained | |
Age (year)	Peritoneal dialysis	Hemodialysis	Peritoneal dialysis	Hemodialysis	Peritoneal dialysis	Hemodialysis	Peritoneal dialysis	Hemodialysis
20	466,000	525,000	667,000	777,000	466,000	525,000	667,000	777,000
30	470,000	533,000	671,000	795,000	470,000	533,000	671,000	795,000
40	470,000	539,000	672,000	803,000	470,000	539,000	672,000	803,000
50	473,000	543,000	672,000	806,000	473,000	543,000	672,000	806,000
60	480,000	555,000	677,000	821,000	480,000	555,000	677,000	821,000
70	497,000	575,000	700,000	850,000	497,000	575,000	700,000	850,000

Costs are rounded up to nearest 1000 Baht, 2004 price levels.
QALY, quality-adjusted life-year.

NHSO accounted 95% for offering PD and 85% for offering HD

Table 5 Results of economic evaluation of providing peritoneal and hemodialysis as an initial treatment compared to palliative care, using NHSO's perspective

| | Unadjusted survival | | | | Adjusted survival | | | |
| | Baht per life-year saved | | Baht per QALY gained | | Baht per life-year saved | | Baht per QALY gained | |
Age (year)	Peritoneal dialysis	Hemodialysis	Peritoneal dialysis	Hemodialysis	Peritoneal dialysis	Hemodialysis	Peritoneal dialysis	Hemodialysis
20	447,000	456,000	641,000	675,000	447,000	456,000	641,000	675,000
30	451,000	463,000	645,000	691,000	451,000	463,000	645,000	691,000
40	449,000	455,000	643,000	678,000	449,000	455,000	643,000	678,000
50	463,000	483,000	657,000	714,000	463,000	483,000	657,000	714,000
60	472,000	486,000	670,000	716,000	472,000	486,000	670,000	716,000
70	495,000	512,000	696,000	759,000	495,000	512,000	696,000	759,000

Costs are rounded up to nearest 1000 Baht, 2004 price levels
NHSO, National Health Security Office; QALY, quality-adjusted life-year.
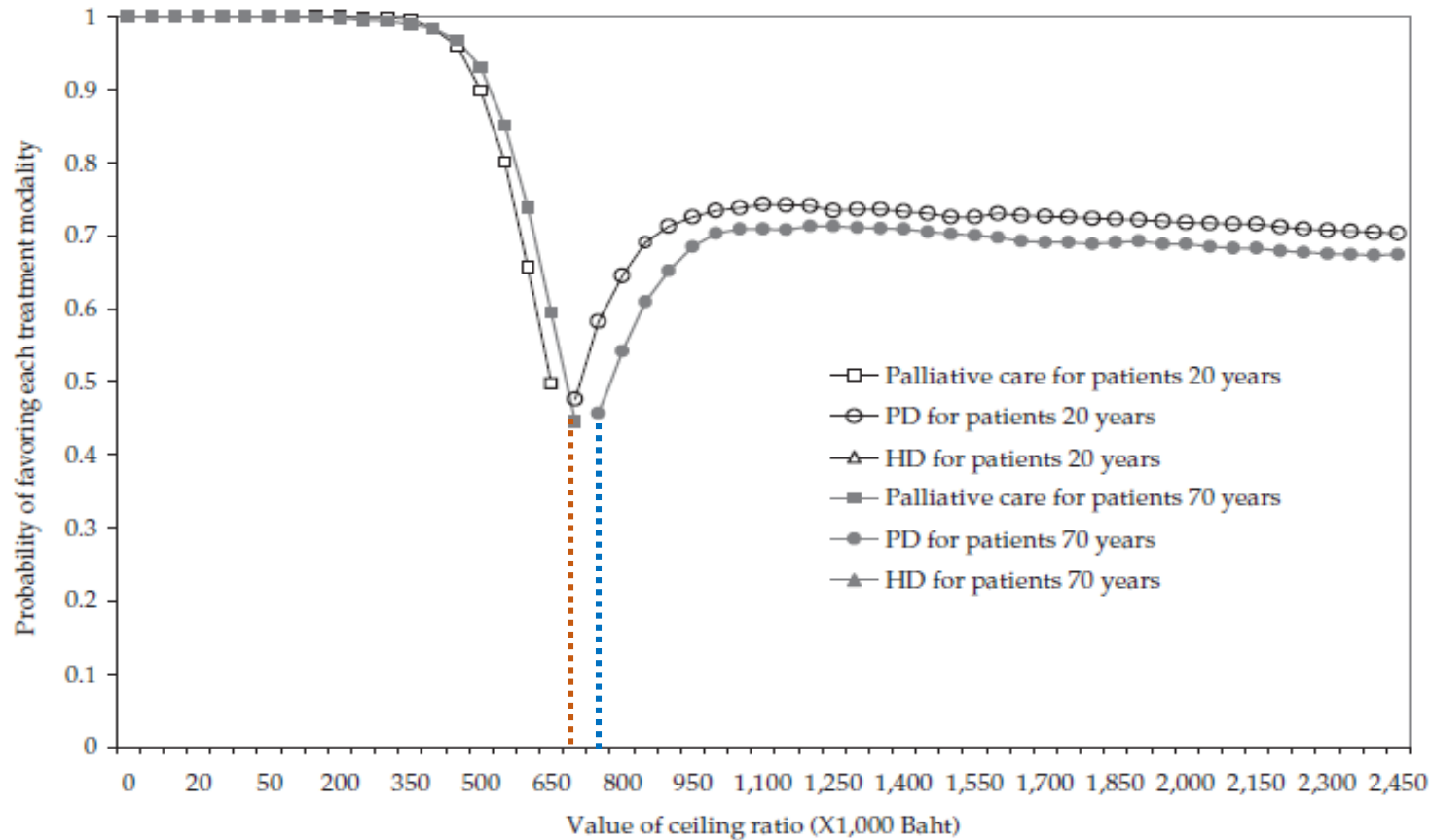
Cost-effectiveness acceptability frontier

- [ ] **For ceiling ratios <650,000 and 700,000 Baht per QALY for age groups 20 and 70 years, providing care without dialysis for ESRD patients was the most appropriate**

- [ ] **If policy makers are willing to pay >700,000 Baht per QALY for age group 20 years and 750,000 Baht per QALY for age group 70 years, providing "PD first" was the optimal choice**

How much the actual amount paid by NHSO?

Payment system for RRT in UHC scheme

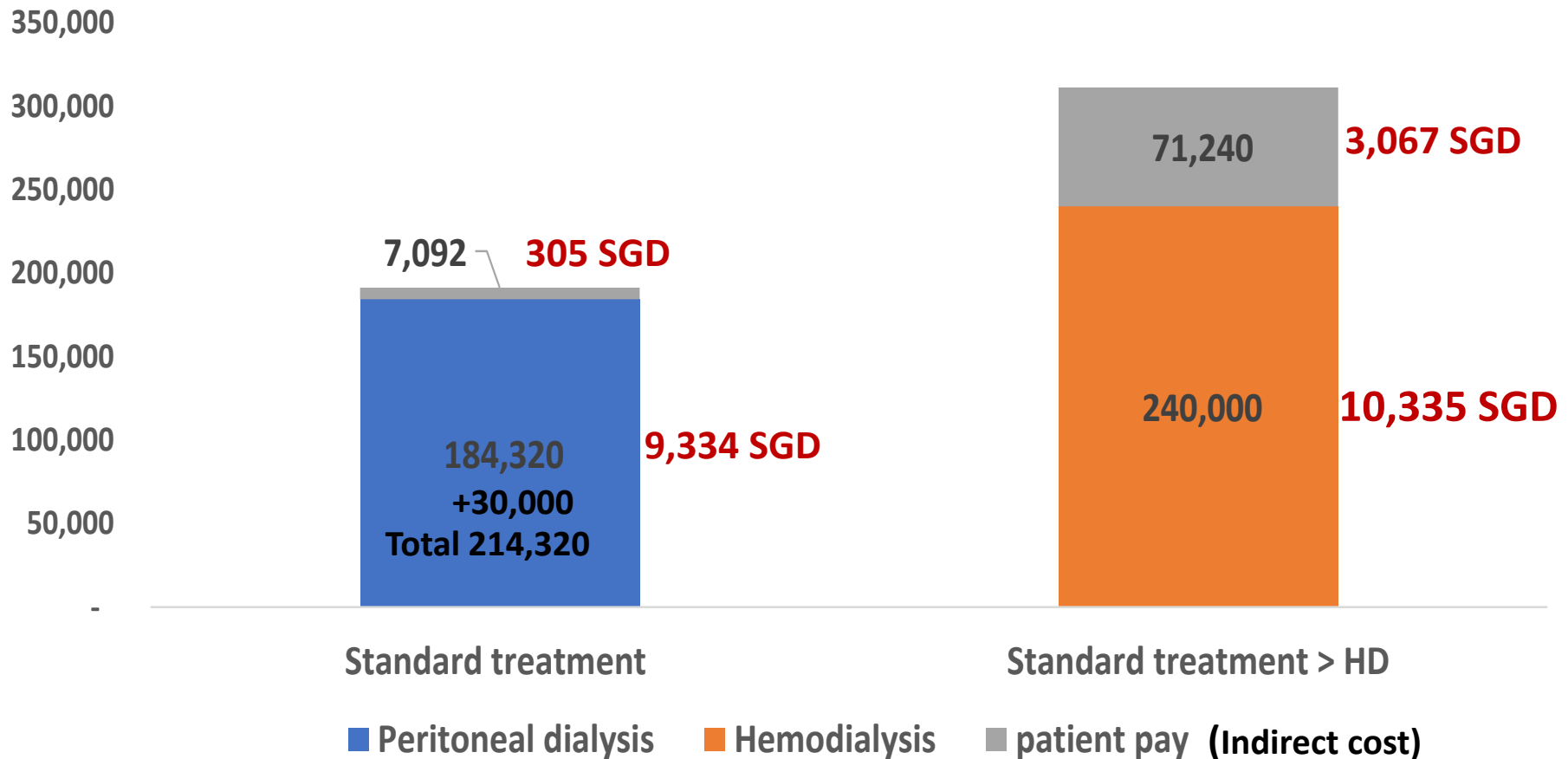Epo provided to all dialysis (CAPD, HD self pay, HD-UC)

Financial expense of RRT in UC scheme and outcomes of Thai PD First policy
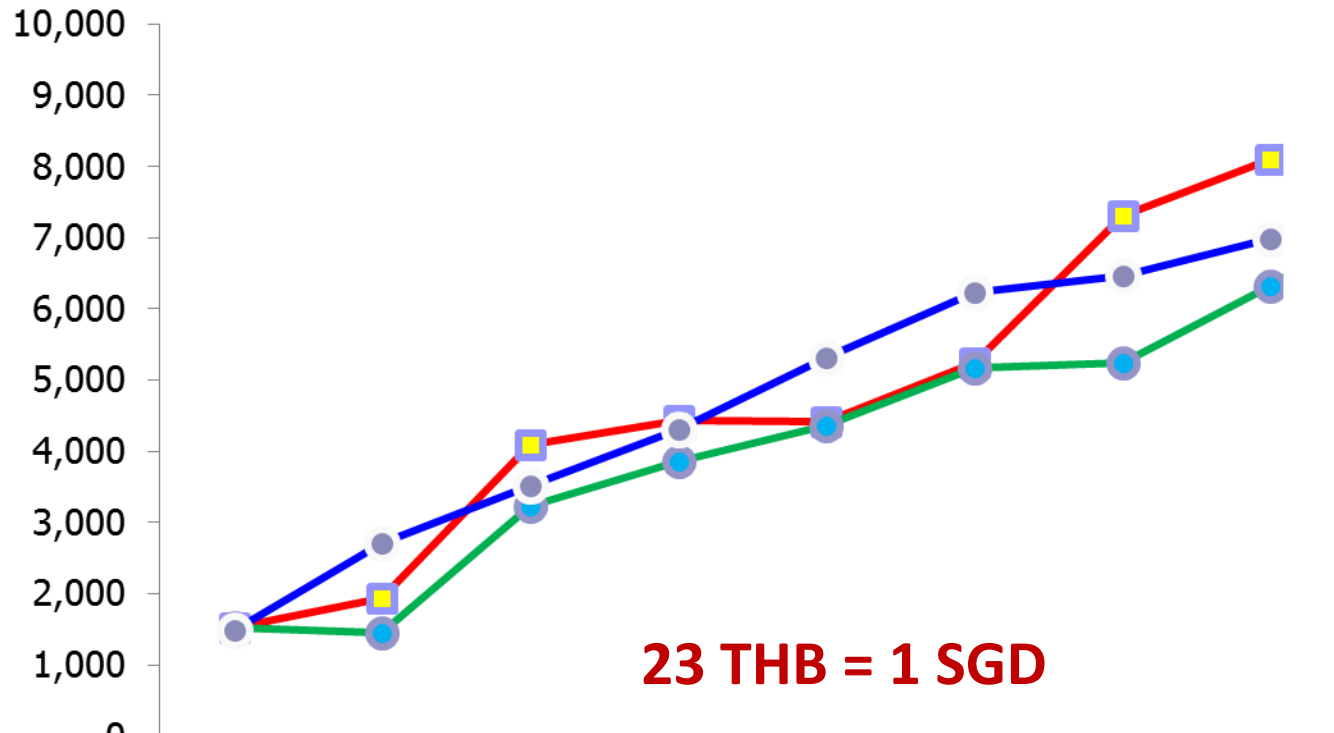
Direct and indirect cost between PD and HD

HD in UC 1,500 baht (64.6 SGD)/session ~ 240,000 baht (10,334.8 SGD)/year

PDF 1 bag for UC 128 baht (5.5 SGD) include logistic cost (120 bag/month)

Total Budget for RRT-UC during fiscal year 2009 - 2016

Million baht ■ Estimated budget ● Received budget ● Actual budget

23 THB = 1 SGD

	2552	2553	2554	2555	2556	2557	2558	2559
Estimated budget	1,530	1,928	4,098	4,437	4,417	5,234	7,315	8,098
Received budget	1,530	1,455	3,227	3,858	4,358	5,179	5,247	6,318
Actual budget	1,488	2,704	3,512	4,316	5,306	6,233	6,470	6,991

Siribha Changsirikulchai,[1] Suwannee Sriprach,[2] Nintita Sripaiboonkij Thokanit,[3] Jirayut Janma,[1] Piyatida Chuengsaman,[4] and Dhavee Sirivongs[5]

❑ **Objective: To analyze patient survival, technique survival, and associated factors of these outcomes under Thailand's PD-First policy**

❑ **Method: - Enrolled ESRD patients who had started PD (Jan 2008-Nov 2016) and who were at least 18 years of age and covered by UHC, CSMBS, or SSS**

- They were incident PD patients who were voluntarily registered in the Database of Peritoneal Dialysis in the EXcel (DPEX) program by 58 of 160 PD centers (36.3%) nationwide
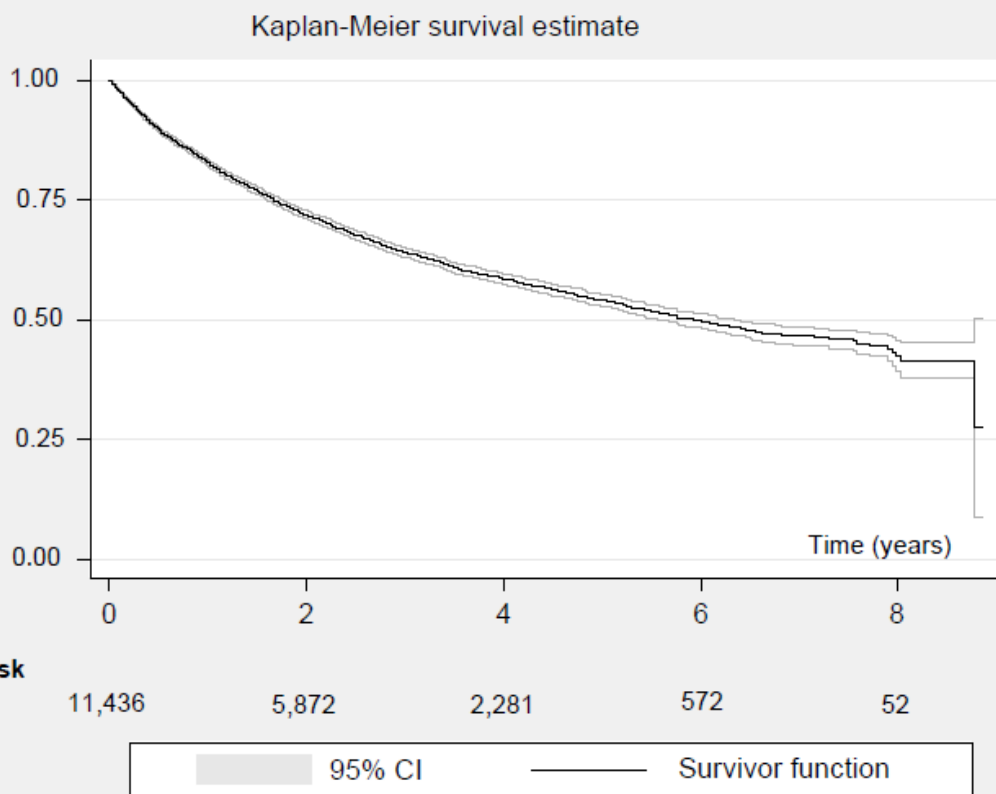
SURVIVAL ANALYSIS AND ASSOCIATED FACTORS IN THAI PATIENTS ON PERITONEAL DIALYSIS UNDER THE PD-FIRST POLICY

Siribha Changsirikulchai,[1] Suwannee Sriprach,[2] Nintita Sripaiboonkij Thokanit,[3] Jirayut Janma,[1] Piyatida Chuengsaman,[4] and Dhavee Sirivong

Kaplan-Meier survival estimate

Number at risk: 11,436 — 5,872 — 2,281 — 572 — 52

Legend: 95% CI — Survivor function

Patient survival rates

1 yr = 82.6%

2 yr = 71.8%,

3 yr = 64.0%

4 yr = 58.5%

5 yr = 54.0%

Median time of patient survival 70.1 months

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TABLE 2

Cox Proportional Hazard Ratio of Factors Associated with Patient Survival

Factors	HR	95% CI	P value	Adjusted HR[a]	95% CI	P value
Gender: male as reference						
Female	1.15	1.08–1.22	<0.001	1.07	1.01–1.14	0.03
Age at start of PD						
Increased age every 5 years	1.14	1.13–1.15	<0.001	1.11	1.10–1.12	<0.001
Educational level: Illiterate or primary school as reference			<0.001			<0.001
Secondary school	0.67	0.60–0.74		0.91	0.81–1.02	
College or higher	0.51	0.39–0.66		0.59	0.45–0.76	
Payment system: Universal health coverage scheme as reference			<0.001			<0.001
Civil servant medical benefit scheme	1.75	1.57–1.95		1.59	1.43–1.78	
Social security scheme	0.37	0.26–0.52		0.50	0.36–0.70	
Diabetic status: Without diabetes as reference						
With diabetes	1.73	1.62–1.86	<0.001	1.51	1.41–1.62	<0.001

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TABLE 4
Characteristics of PD Patients Classified by Healthcare Scheme

| Characteristic	UHC, n (%)	CSMBS, n (%)	SSS, n (%)
Age at start of PD			
≤45 years	2,258 (24.4)	117 (16.0)	125 (54.3)
46–55 years	2,640 (25.2)	147 (20.1)	74 (32.2)
56–65 years	2,881 (27.5)	203 (27.7)	23 (10.0)
>65 years	2,414 (23.0)	266 (36.3)	8 (3.5)
Median (25th–75th IQR)	56.1 (46.4–64.3)	60.8 (51.5–69.6)	43.6 (35.4–51.9)
Educational level			
Illiterate or primary school	9,063 (86.4)	573 (78.2)	128 (55.7)
Secondary school	1,192 (11.4)	101 (13.8)	83 (36.1)
College or higher	238 (2.3)	59 (8.0)	19 (8.3)
Diabetic status			
With diabetes	6,366 (60.7)	496 (67.7)	113 (49.1)
Without diabetes	4,124 (39.3)	237 (32.3)	117 (50.9)

UHC = universal health coverage scheme; CSMBS = civil servant medical benefit scheme; SSS = social security scheme; IQR = interquartile range.

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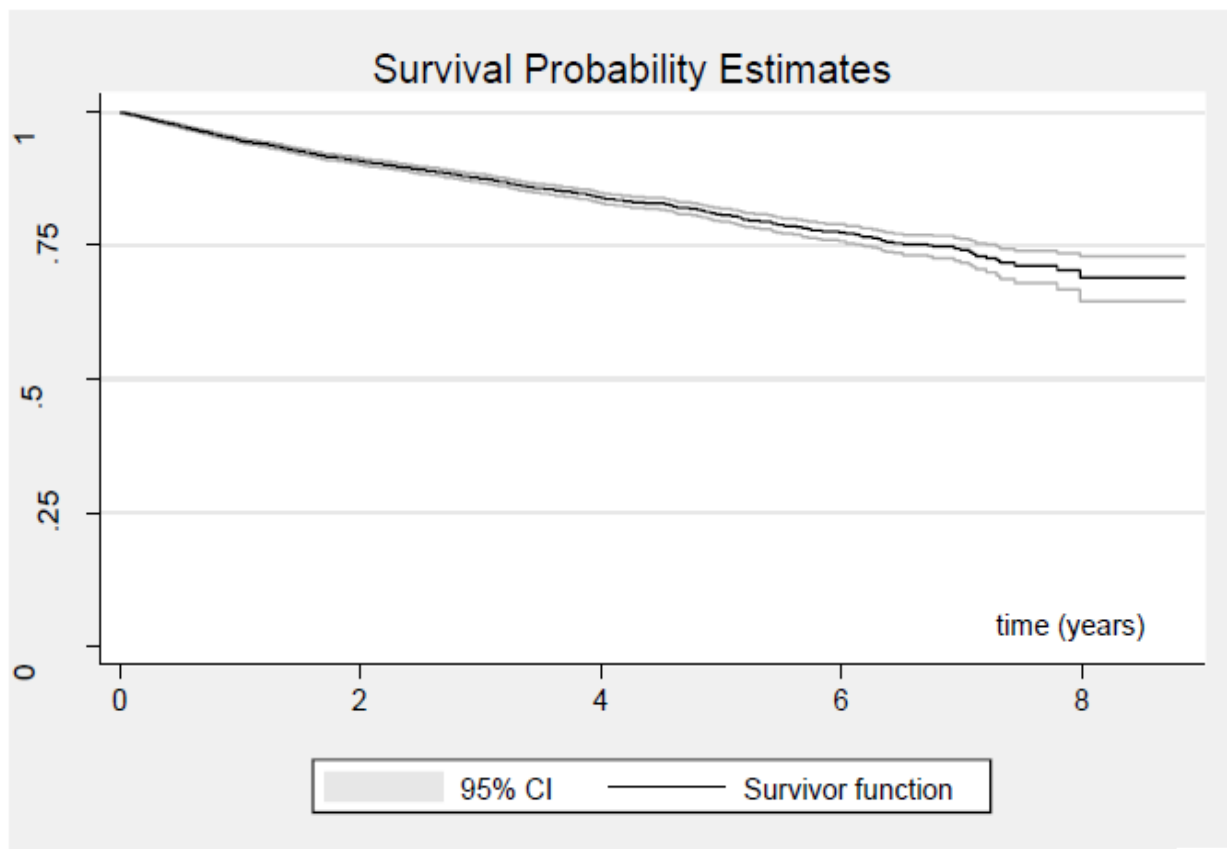
Technique survival rates (censor death and KT)

1 yr = 94.8 %

2 yr = 90.8%,

3 yr = 87.7%

4 yr = 84.1%

5 yr = 80.8%

Figure was not shown in article

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TABLE 3
Cox Proportional Hazard Ratio of Factors Associated with Technique Survival (Censored for Death and Kidney Transplantation)

Factors	HR	95% CI	P value	Adjusted HR[a]	95% CI	P value
Gender: male as reference						
Female	0.94	0.84–1.05	0.32	0.97	0.86–1.08	0.56
Age at start of PD:						
Increased age every 5 years	0.95	0.93–0.96	<0.001	0.94	0.92–0.96	<0.001
Educational level: Illiterate or primary school as reference			0.01			0.37
Secondary school	1.29	1.10–1.50		1.15	0.98–1.36	
College or higher	1.15	0.83–1.59		0.95	0.69–1.33	
Payment system: Universal health coverage scheme as reference			<0.001			<0.001
Civil servant medical benefit scheme	1.68	1.38–2.04		1.79	1.47–2.12	
Social security scheme	0.42	0.24–0.73		0.36	0.20–0.63	
Diabetic status: Without diabetes as reference						
With diabetes	0.96	0.85–1.07	0.45	1.03	0.91–1.16	0.74

HR = hazard ratio; CI = confidence interval; PD = peritoneal dialysis.
[a] Adjusted for gender, age at start of PD, educational level, payment system and diabetic status.

Comparison of PD survival among countries in Asia

Country	Number of cases	Mean age, years	DM rate	Time of review	Patient survival
Hong Kong	3,573	59.2	46%	1995–2009	1 year:91.1% 3 years 69.6% 5 years:50.7% 10 years:26.7%
Australia	1,660	n.a.	33%	2006–2008	1 year:94% 3 years:73% 5 years:54%
New Zealand	412	n.a.	43%	2006–2008	1 year:94% 3 years:77% 5 years:50%
Korea	7,423	58	45.20%	2001–2010	1 year:93.9% 3 years:75.2% 5 years:56.9% 10 years:32.3%
Singapore	1,015	58	58%	2000–2008	1 year:88.7% 5 years:39.8% 10 years:15.4%
Taiwan	8,430	55.7	31.40%	2000–2009	1 year:95% 5 years:60%
Thailand	**11,813**	**56.2 (median)**	**60.9%**	**2008-2016**	**1 year:82.6% 3 year:64.0% 5 year:54.0%**

Modified from Peritoneal dialysis in Asia. Kidney Dis 2015;1: 147-156

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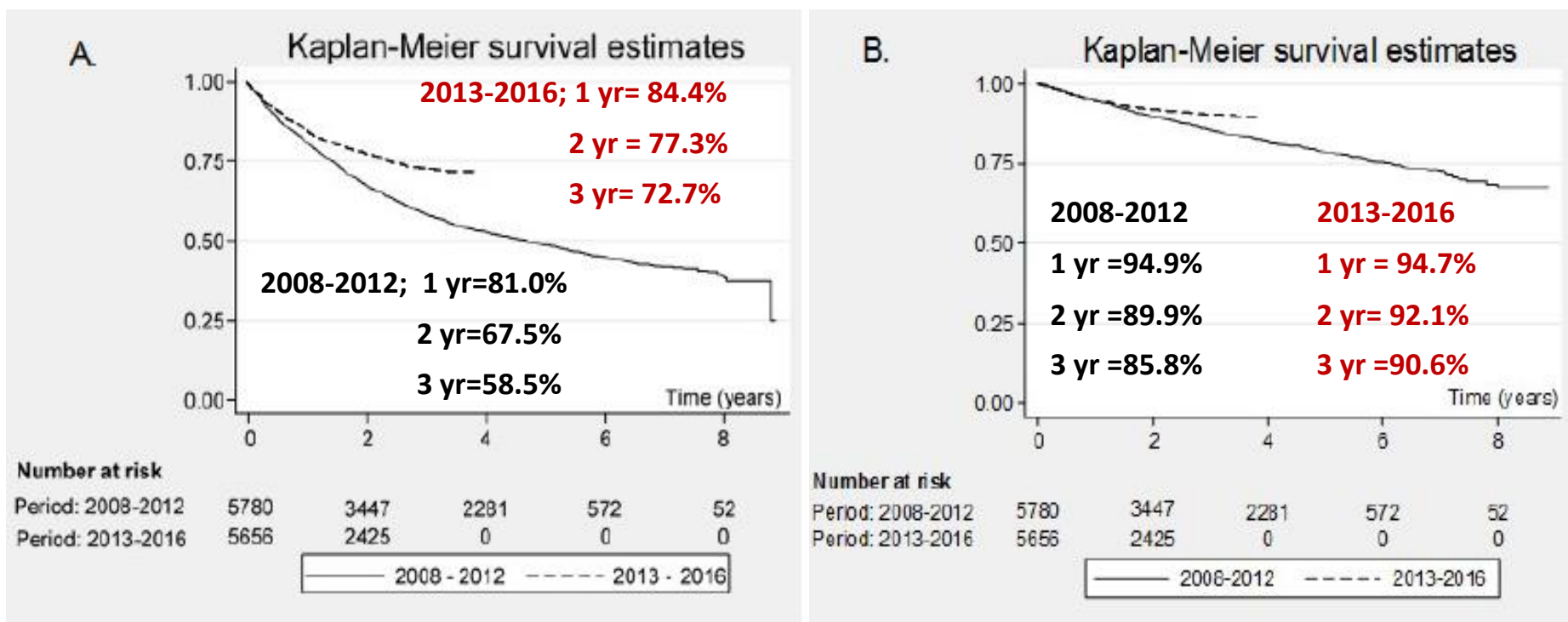
Figure 2 — Comparison of PD patient and technique survival rates between 2008 – 2012 and 2013 – 2016. A) patient survival; B) technique survival. PD = peritoneal dialysis.

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Characteristics	Overall (%)	2008 – 2012 N (%)	2013 – 2016 N (%)	P value
Gender				0.062
Male	5,879 (51.2)	2,922 (50.4)	2,957 (52.1)	
Female	5,598 (48.8)	2,880 (49.6)	2,718 (47.9)	
Age at start of PD				<0.001
≤45 years	2,806 (24.5)	1,397 (24.1)	1,409 (24.8)	
46–55 years	2,864 (25.0)	1,541 (26.6)	1,323 (23.3)	
56–65 years	3,111 (27.1)	1,591 (27.4)	1,520 (26.8)	
>65 years	2,696 (23.4)	1,273 (21.9)	1,423 (25.1)	
Median (25th–75th IQR)	56.2 (46.4–64.4)	55.7 (46.5–63.8)	56.7 (46.2–65.0)	
Educational level				<0.001
Illiterate or primary school	9,783 (85.2)	5,019 (86.5)	4,764 (83.9)	
Secondary school	1,377 (12.0)	655 (11.3)	722 (12.8)	
College or higher	317 (2.8)	128 (2.2)	189 (3.3)	
Payment system				<0.001
UHC	10,493 (91.6)	5,446 (94.0)	5,047 (89.2)	
CSMBS	733 (6.4)	269 (4.6)	464 (8.2)	
Social security scheme	230 (2.0)	82 (1.4)	148 (2.6)	
Diabetic status				<0.001
With diabetes	6,986 (60.9)	3,444 (59.4)	3,542 (62.4)	
Without diabetes	4,488 (39.1)	2,355 (40.6)	2,133 (37.6)	

Reasons of low 1 year- patient survival rate in PD First Policy Thailand (during past 10 years)

- ❑ **High rate of PD patients with diabetes**

- ❑ **High number of patients with several comorbidities accessed to PD during early phase of policy**

- ❑ **Competency and workload of medical personnel during early phase of policy**

Better outcomes in patient survival in 2013-2016 compared to outcomes in 2008-2012
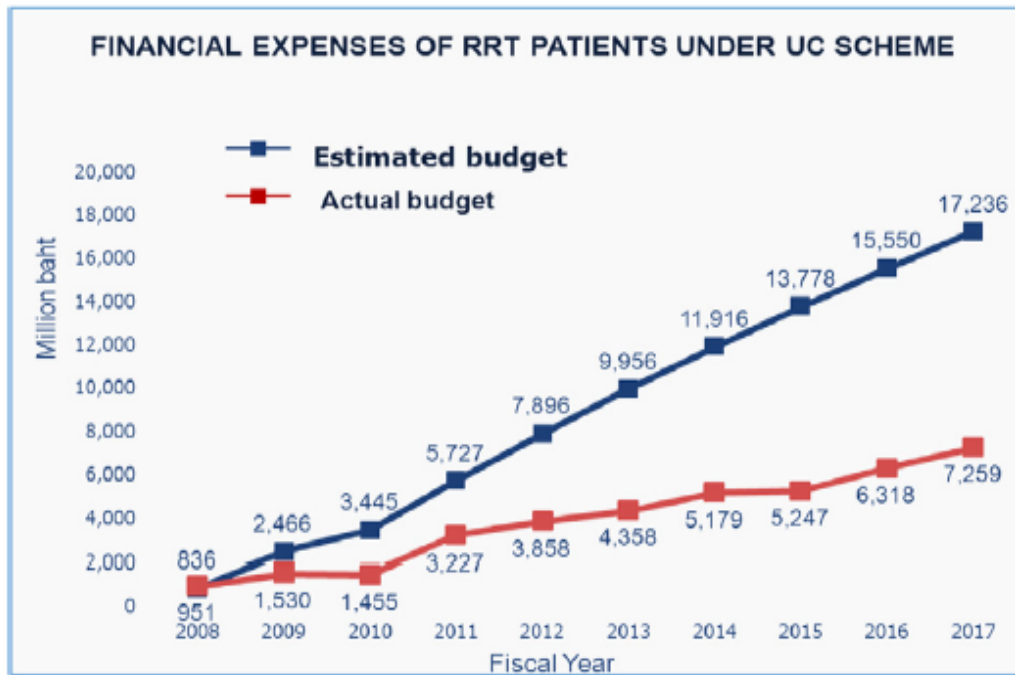
PD First Policy:
Is this still the right direction or change to PD prefer?

PD First Policy: Thailand's Response to the Challenge of Meeting the Needs of Patients With End-Stage Renal Disease

Piyatida Chuengsaman, MD,* and Vijj Kasemsup, MD, PhD[†]

Figure 3. Estimated and actual budgets for renal replacement therapy since the launch of the PD First policy. UC, universal coverage.

❑ **Budget of RRT in PD First policy increase gradually but less than expected expenditure**

❑ **Actual number of ESRD patients accessed to RRT half of expected ESRD number probably from**
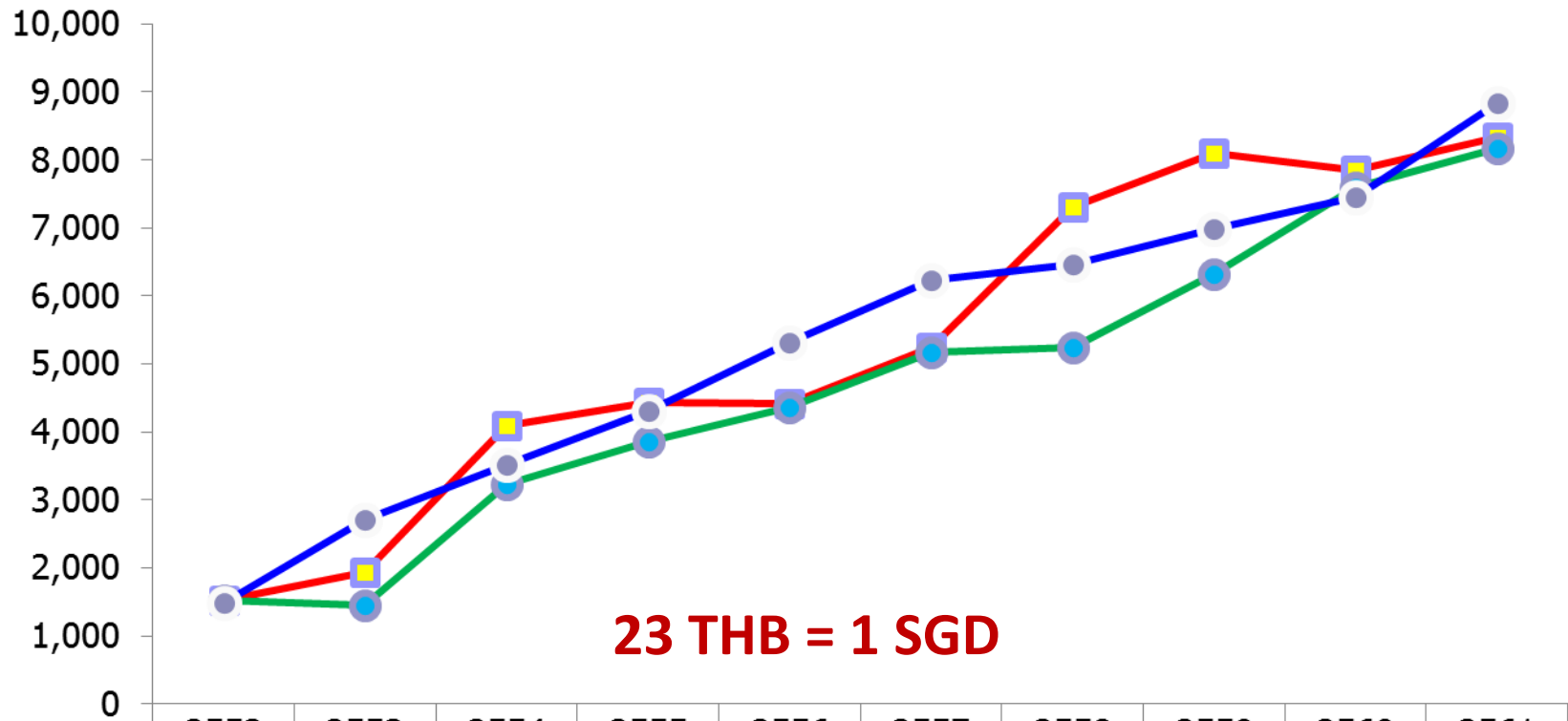-slow uptake of PD by patients
Or
-positive impact of CKD preventive program

Total Budget for RRT-UC during fiscal year 2009 - 2018

Million baht 🟨 **Estimated budget** 🔵 **Received budget** 🔵 **Actual budget**

23 THB = 1 SGD

	2552	2553	2554	2555	2556	2557	2558	2559	2560	2561
🟨	1,530	1,928	4,098	4,437	4,417	5,234	7,315	8,098	7,842	8,332
🔵	1,530	1,455	3,227	3,858	4,358	5,179	5,247	6,318	7,592	8,165
🔵	1,488	2,704	3,512	4,316	5,306	6,233	6,470	6,991	7,462	8,830
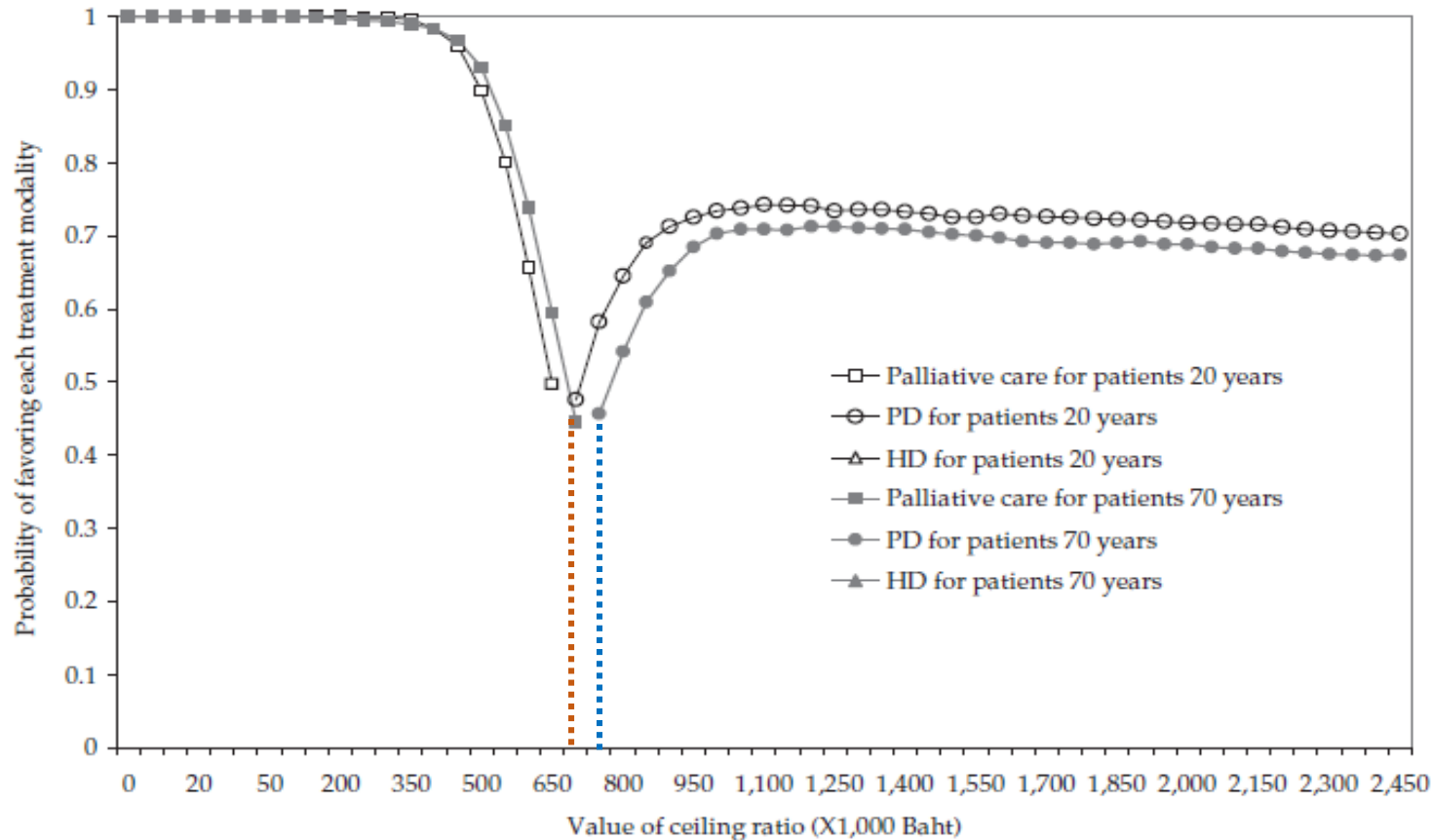
Cost-effectiveness acceptability frontier

❑ **For ceiling ratios <650,000 and 700,000 Baht per QALY for age groups 20 and 70 years, providing care without dialysis for ESRD patients was the most appropriate**

❑ **If policy makers are willing to pay >700,000 Baht per QALY for age group 20 years and 750,000 Baht per QALY for age group 70 years, providing "PD first" was the optimal choice**

How much the actual amount paid by NHSO?

Received RRT for UC budget in fiscal year 2018

Type of RRT	Target number of patients	Budget (Baht)
1. RRT - CAPD	**26,570** = **159,714 bath/case**	**4,243,614,500** **185,347,693 SGD**
2. RRT- HD	**19,110** = **178, 850 bath/case**	**3,417,828,700** **149,279,975 SGD**
3. Reimbursed Epo (HD self pay)	**5,320**	**73,472,000** **3,209,025 SGD**
4. KT		
- All process of KT	**172** = **338,759 bath/case**	**58,266,700** **2,544,906 SGD**
- Only KT- medication (KTI)	**1,804**	**372,425,100** **16,266,354 SGD**
Total	**52,976**	**8,165,607,000** **356,647,953 SGD**

1 SGD = 23 THB

Number of CAPD patients and PD units registered with NHSO (End of September, 2018)

Number

- ☐ **Number of PD unit**   **253 units**

- ☐ **Number of HD unit registerd with NHSO   661 units**

- ☐ **Number of active RRT patients   44,366 cases**

- ☐ **Number of cumulative CAPD patients   52,809 cases**

- ☐ **Number of active CAPD patients   28,798 (54%) cases**

- ☐ **Number of cumulative HD patients   39,065 cases**

- ☐ **Number of active HD patients   15,568 (39%) cases**

- ☐ **Number of cumulative KTI patients   2,690 cases**

Gaps in Thai PD First Policy that need to solve

Sustainability of PD First policy

❑ **Workload in manpower esp. PD nurses and incentives**

   - new PD nurses <50 persons/year

   - new HD nurses >300 persons/year

❑ **Expand reimbursement for PD, not restrict to conventional CAPD to improve outcomes**

❑ **Experience of CAPD during fellowship training program**
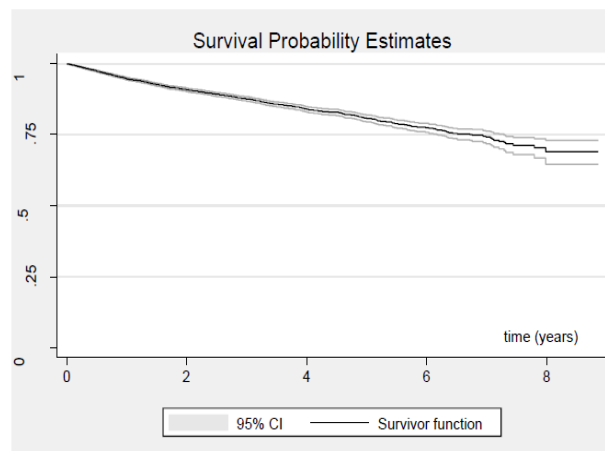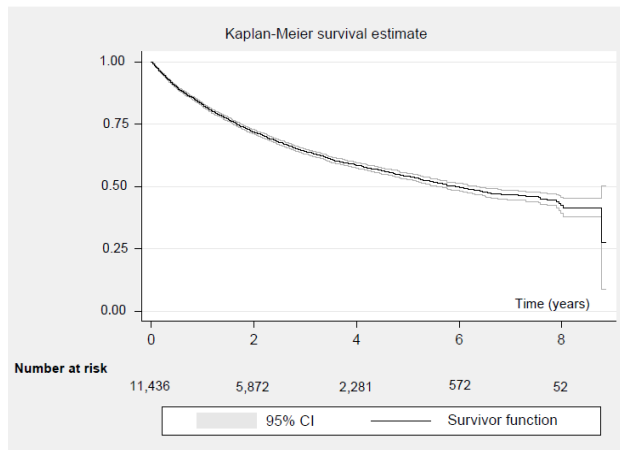
Contrast outcomes between technique survival rates and patient survival rates

Causes of Drop Out of Patients on CAPD

Cause of drop out	Cumulative Number (case)	Percent
Death	9,909	64.7
Permanent to HD	3,742	24.4
Renal transplantation	213	1.4
Loss to follow up	177	1.2
Economic reason	15	0.1
Recovery of renal function	160	1.1
Others	1,107	7.1
Total	15,323	100

Unpublished data from DPEX: tool for quality improvement in CAPD

Causes of Hospitalization

Number of hospitalization recorded 18,250 episodes

- ❑ **Peritonitis   4,325 (23.7%) episodes**

- ❑ **Fluid overload 1,796 (9.8%) episodes**

- ❑ **Anemia 701 (3.8%) episodes**

- ❑ **Congestive heart failure 370 (2.0%) episodes**

- ❑ **Diarrhea 236 (1.3%) episodes**

- ❑ **Depression 116 (0.6%) episodes**

- ❑ **Malnutrition 109 (0.6%) episodes**

Unpublished data from DPEX: tool for quality improvement in CAPD

PD First Policy: Is this still the right direction?

My opinion is YES. Based on reasons

- ❑ PD and HD have similarity in clinical outcomes

- ❑ PD is more cost effectiveness than HD

- ❑ PD requires fewer health care workers than HD

- ❑ PD can be performed by patients at home

  with minimal infrastructure compared to HD

- ❑ PD has lower indirect cost than HD

Future direction of Thai PD First Policy
for better outcomes, quality and sustainability

- ❑ Provide APD and icodextrin PD solution for patients who need them (UHC and SSS)
- ❑ Incentives to health care workers working in PD and HD should be equal (including nephrologists)
- ❑ Education and stimulating in CQI process should be done regularly to improve experience of health care workers in PD
- ❑ Improve QOL of ESRD patients and health care workers
- ❑ Promote high quality of CKD preventive program

THANK YOU FOR YOUR ATTENTION