Long-Term Survival Outcomes of Hemodialysis Versus Peritoneal Dialysis in Taiwan: A National Cohort Study

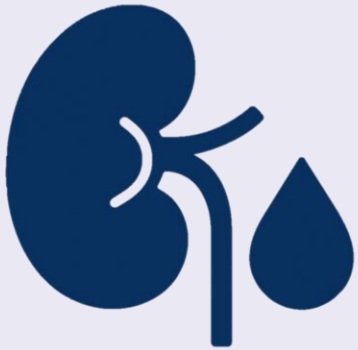
Jen-Hao Teng[1], Jia-Sin Liu[2], Ming-Yen Lin[1], Yi-Wen Chiu[1,3]

[1]Division of Nephrology, Department of Internal Medicine, Kaohsiung Medical University Hospital, Kaohsiung Medical University, Kaohsiung, Taiwan
[2]Institute of Population Health Sciences, National Health Research Institutes, Miaoli, Taiwan
[3]Faculty of Medicine, College of Medicine, Kaohsiung Medical University, Kaohsiung, Taiwan

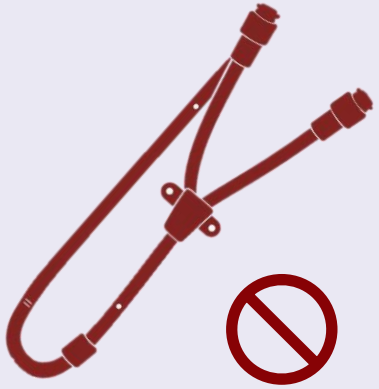
Background

Peritoneal dialysis (PD) is widely regarded as offering better quality of life than **hemodialysis (HD)**, with comparable survival reported in many studies, leading to **PD-favoring policies** in several countries including Taiwan.

Superior autonomy



Residual renal function



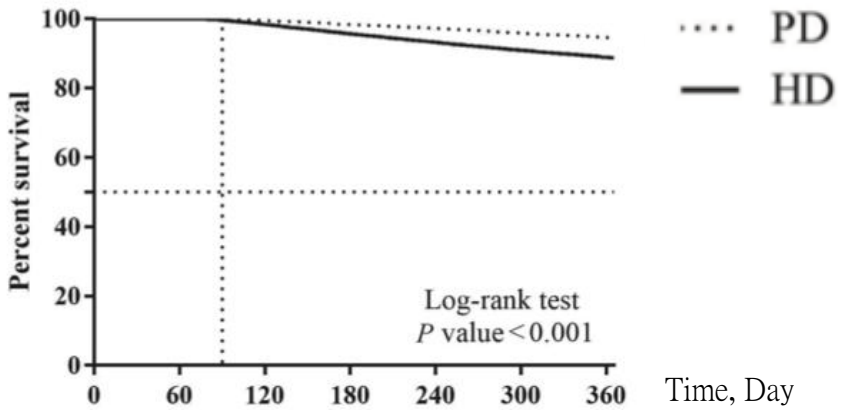
Avoidance of vascular access

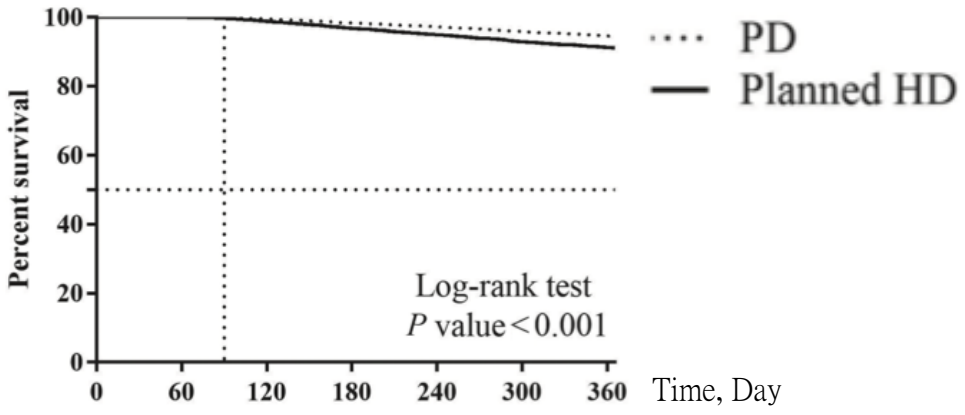
PD vs. HD: Survival and SDM

The choice of dialysis modality is recommended to be made through shared decision-making (SDM) → **partly due to inconsistent survival results between PD and HD.**

- PD offer an **early survival advantage**
- **Planned initiation of HD** reduces catheter-related complications, **potentially narrowing early survival differences.**

Planned Initiation of Hemodialysis Alleviates the Survival Disadvantage of Hemodialysis Over Peritoneal Dialysis

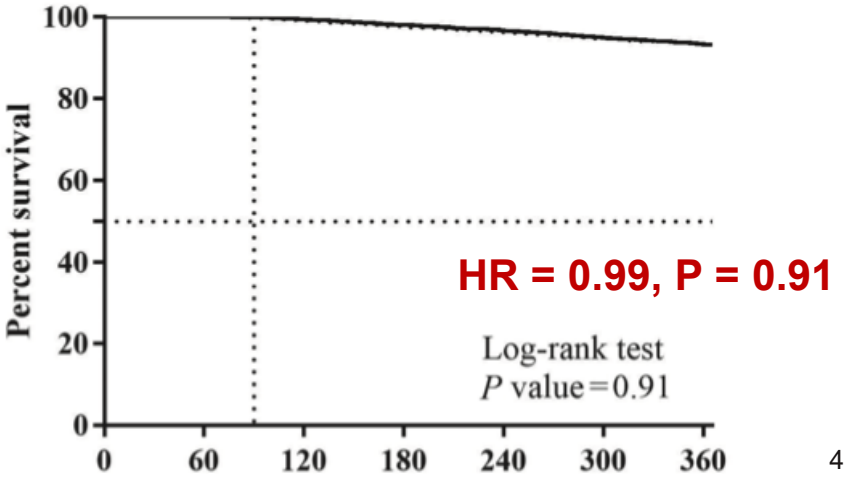




Design: Retrospective nationwide cohort
Period: 2007-2011
Outcome: 1-year overall survival
45,825 dialysis patients (HD: 39,635, Planned-HD: 9,184, PD: 6,190)

Planned initiation of HD alleviates the 1-year survival disadvantage observed in conventional HD comparisons.

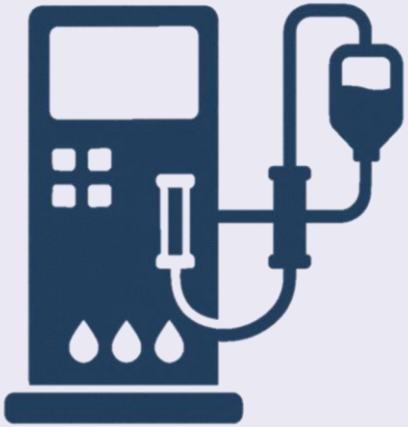
After 1:1 propensity score matching:



Acta Nephrologica 32.2 (2018): 57-64.

Long-term survival?

- Providing information on long-term survival is essential when engaging patients in SDM.
- With the expansion of **pre-ESRD care programs**, **shifting patient demographics**, and **advancements in modern dialysis care**, survival outcomes should be re-evaluated.



Aim of this study

Using a contemporary nationwide cohort, we conducted a study to assess **whether dialysis modality (HD, planned HD, PD)** independently affects **long-term mortality** in Taiwan ESRD patients.

Methods

- **Design:** Retrospective, population-based study (2013–2021)
- **Data source:** National Health Insurance Research Database (NHIRD)
- **IRB:** KMUHIRB-E(II)-20250378

Methods

- **Index date:** Initiation of dialysis therapy
- **Period:** 2013-2021
- **Censor:** until death or the end of the observation period on December 31, 2021
- **Inclusion Criteria:**
  - Age≥18 y/o
  - Catastrophic Illness Database(CID) certificate for maintenance dialysis
  - Dialysis ≥90 days post-CID certificate
  - PD patients: no HD >90 days before first PD
- **Exclusion Criteria:** transplantation before the index date

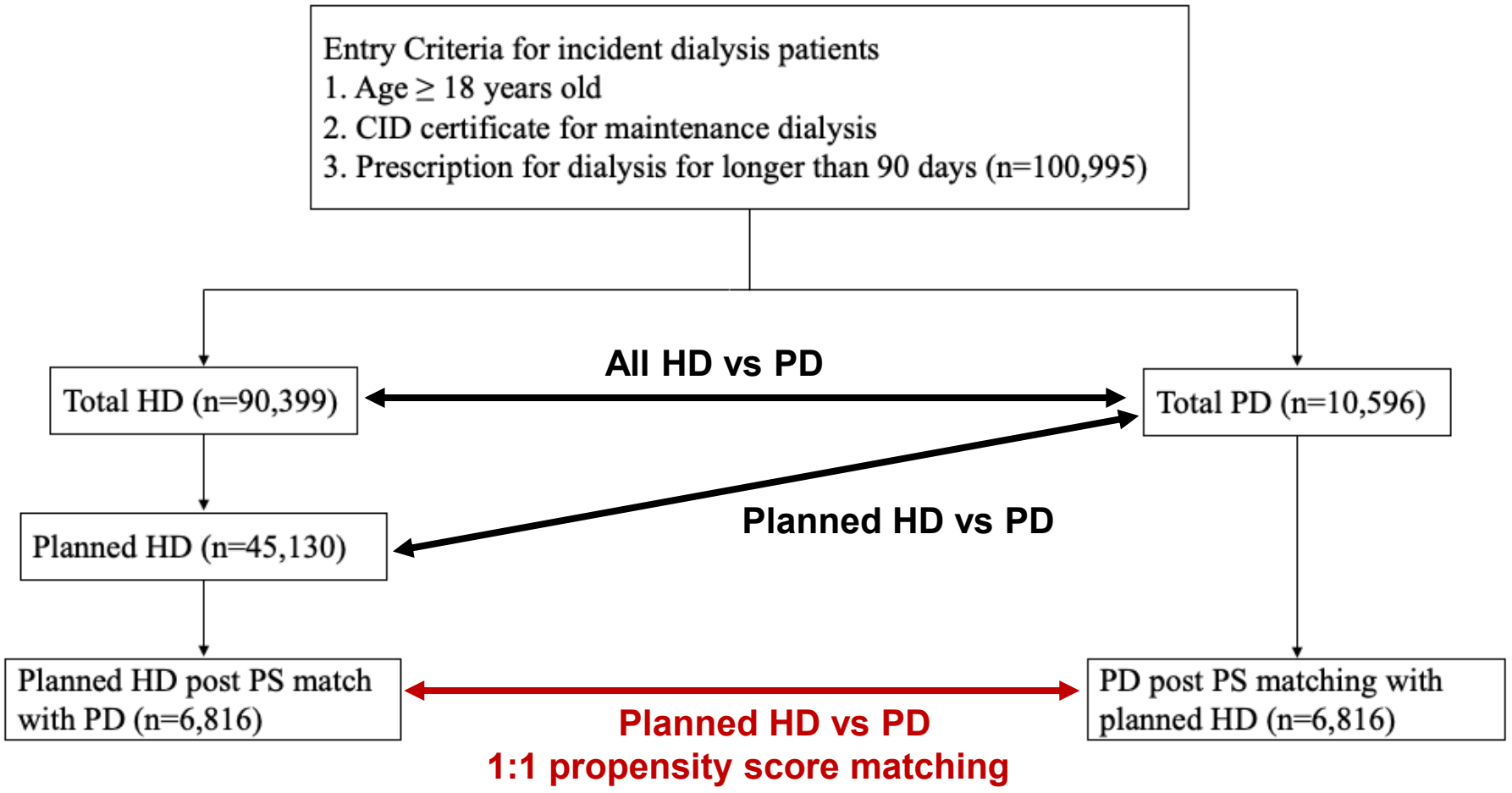
Methods

- **Definition of planned HD:**
  - **No claim for either double lumen** device or insertion within 1 month before or after first HD
  - **Establishment of peripheral vascular access** before the first HD session.

Methods

- **Outcomes:**
  - **All-cause mortality:** denied as withdrawal from the National Health Insurance program due to death
- **Statistic analysis:**
  1. 1:1 propensity score matching in planned HD and PD
  2. After adjusted for demographic, socioeconomic, and comorbidity information, Cox-proportional hazard models was used to compare:
     - HD vs. PD
     - Planned-HD vs. PD
     - Planned-HD vs. PD (after 1 to 1 propensity score matching)

Result: study flowchart



Total incident patients	Before matching			After matching		
	All-HD	Planned-HD	PD	Planned-HD	PD	P-value[a]
HD(n=90399)/PD(n=10596)	90399	45130	10596	6816	6816	
Age years(mean±SD)	68.0±13.5	66.1±12.9	56.8±15.5	59.5±13.3	59.5±13.2	0.98
Gender, female (%)	44.3	41	46.3	44.5	44.5	0.93
Socioeconomic status(%)						0.71
< 35,000 NTD	80.5	80.3	72.8	78.0	78.3	
≥ 35,000 NTD	19.5	19.7	27.2	22.0	21.7	
Urbanization(%)						0.28
Rural	82.4	81.9	86.5	89.8	90.3	
Urban	17.6	18.1	13.5	10.2	9.7	
Major comorbidity(%)						
Diabetes	50.1	50.4	35	37.8	38.2	0.66
Hypertension	95	95.2	93.7	95.7	95.6	0.74
Hyperlipidemia	51.5	53.1	49.3	50.4	49.8	0.52
Cardiovascular Disease	36.7	33.8	21	19.2	18.8	0.5
AMI	7.2	5.8	3.3	3.4	4.4	0.6
Ischemic stroke	11.4	9.8	5.8	3.7	3.7	0.89
Heart failure	31.1	26.1	17.1	15.2	14.8	0.58
Gout	14.1	15.5	16.6	11.3	10.9	0.46
PAD	67	64	62.8	66.5	67.0	0.52
Charlson Comorbidities Index						
Median (IQR)	5.9(2.3)	5.7(2.3)	4.5(2.3)	4.6(2.3)	4.5(2.3)	0.014

Event rates among various groups

	Patient number (n)	Death (n)	Crude mortality rate(%)
All-HD	90,399	**36,175**	**40.0%**
Planned-HD	45,130	**15,673**	**34.7%**
PD	10,596	**3,035**	**28.6%**
PD after PS matching	6,816	**2,006**	**29.4%**
Planned-HD after PS matching	6,816	**1,616**	**23.7%**

Mean follow-up: 3.3 years

Outcome

	Crude HR (95% CI)	Adjusted* HR (95% CI)
All-HD vs PD	1.64 (1.58-1.70)	**0.82** (0.79-0.85)
Planned-HD vs PD	1.27 (1.22-1.32)	**0.67** (0.65-0.70)
Planned-HD vs PD after 1:1 PS matching		**0.66** (0.62-0.71)

* Adjusted for age, gender, socioeconomic status, dependency status, income, residency urbanization, Charlson comorbidity index score

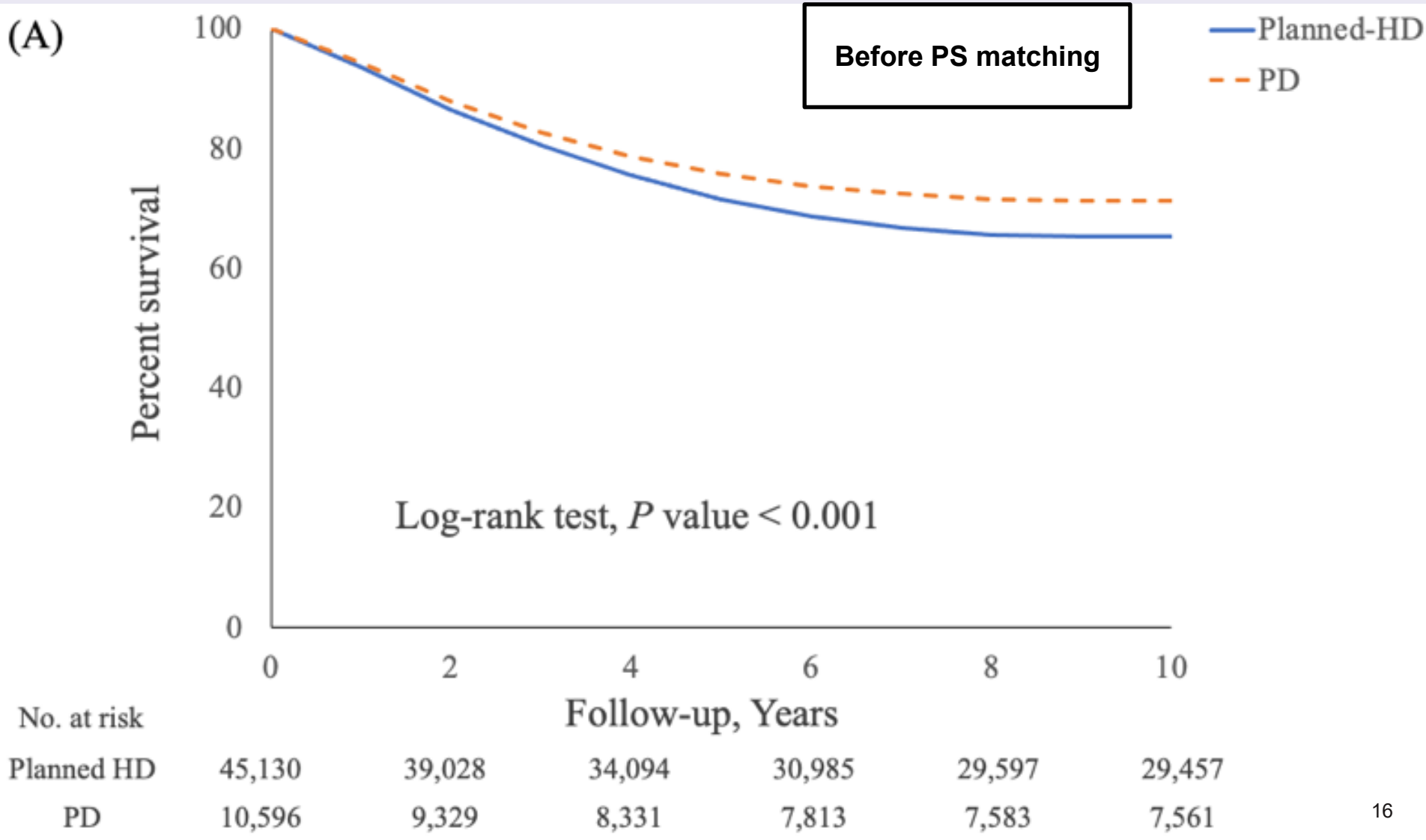
- Adjusted mortality risk:

  HD vs PD: HR = 0.82

  Planned-HD vs PD: HR = 0.67
- Mortality risk after PS matching:

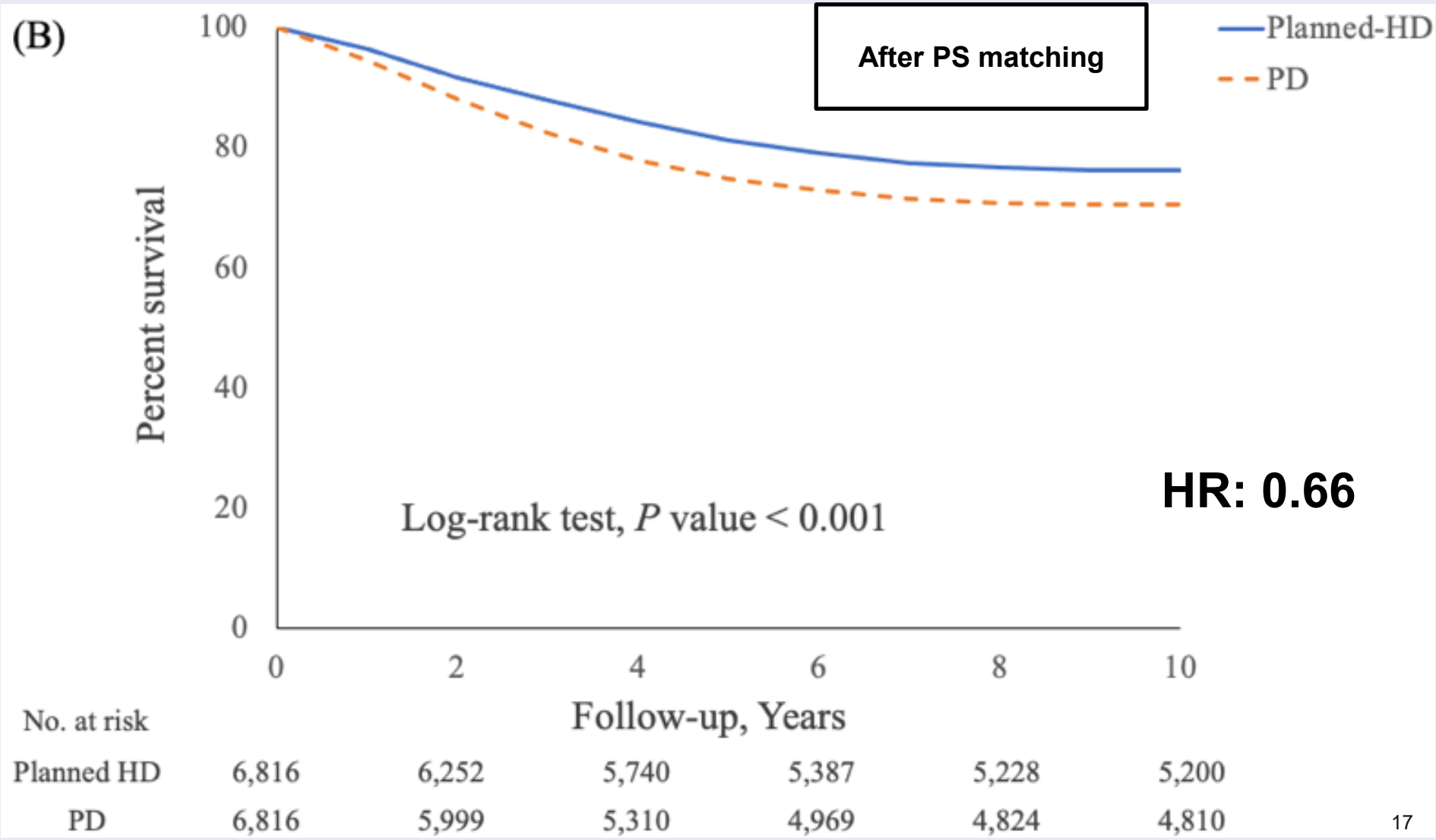
  Planned-HD vs PD (matched): HR = 0.66

Crude mortality risk **before** PS matching (Planned HD vs PD)



No. at risk						
Planned HD	45,130	39,028	34,094	30,985	29,597	29,457
PD	10,596	9,329	8,331	7,813	7,583	7,561

Crude mortality risk **after** PS matching (Planned HD vs PD)



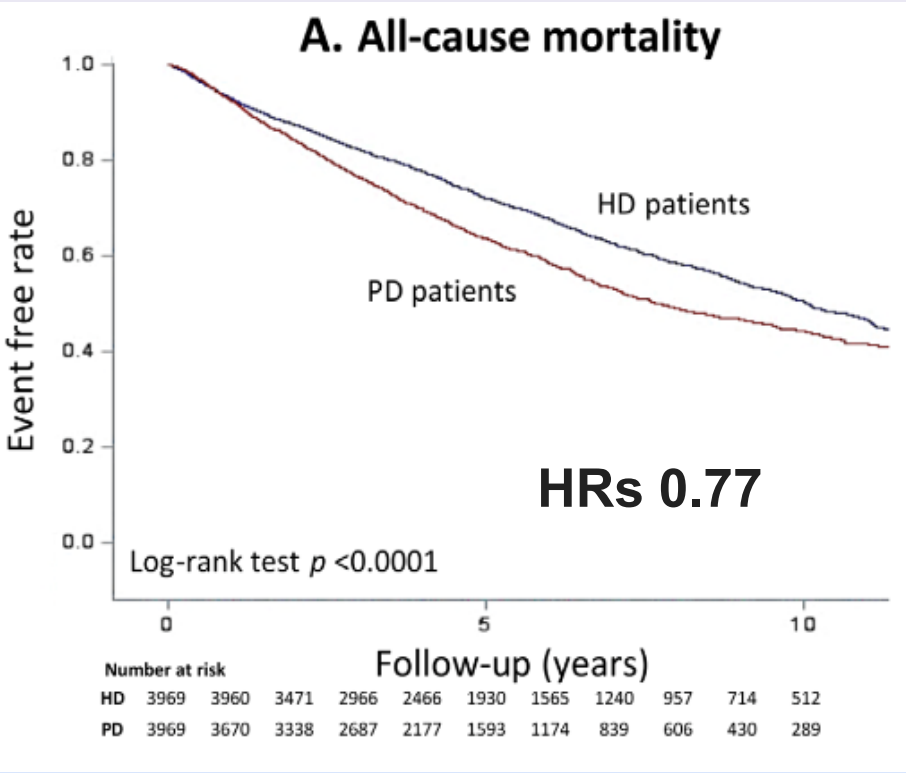
Discussion

• Crude mortality: highest in HD, lowest in PD, but this **reverses after adjustment** → **PD has higher adjusted mortality risk.**

• The use of **planned-HD** further enhanced the observed survival superiority of HD compared to PD.

Long-Term Outcome Analysis of Peritoneal Dialysis and Hemodialysis in Patients With End-Stage Kidney Disease: A Real-World Data Analysis

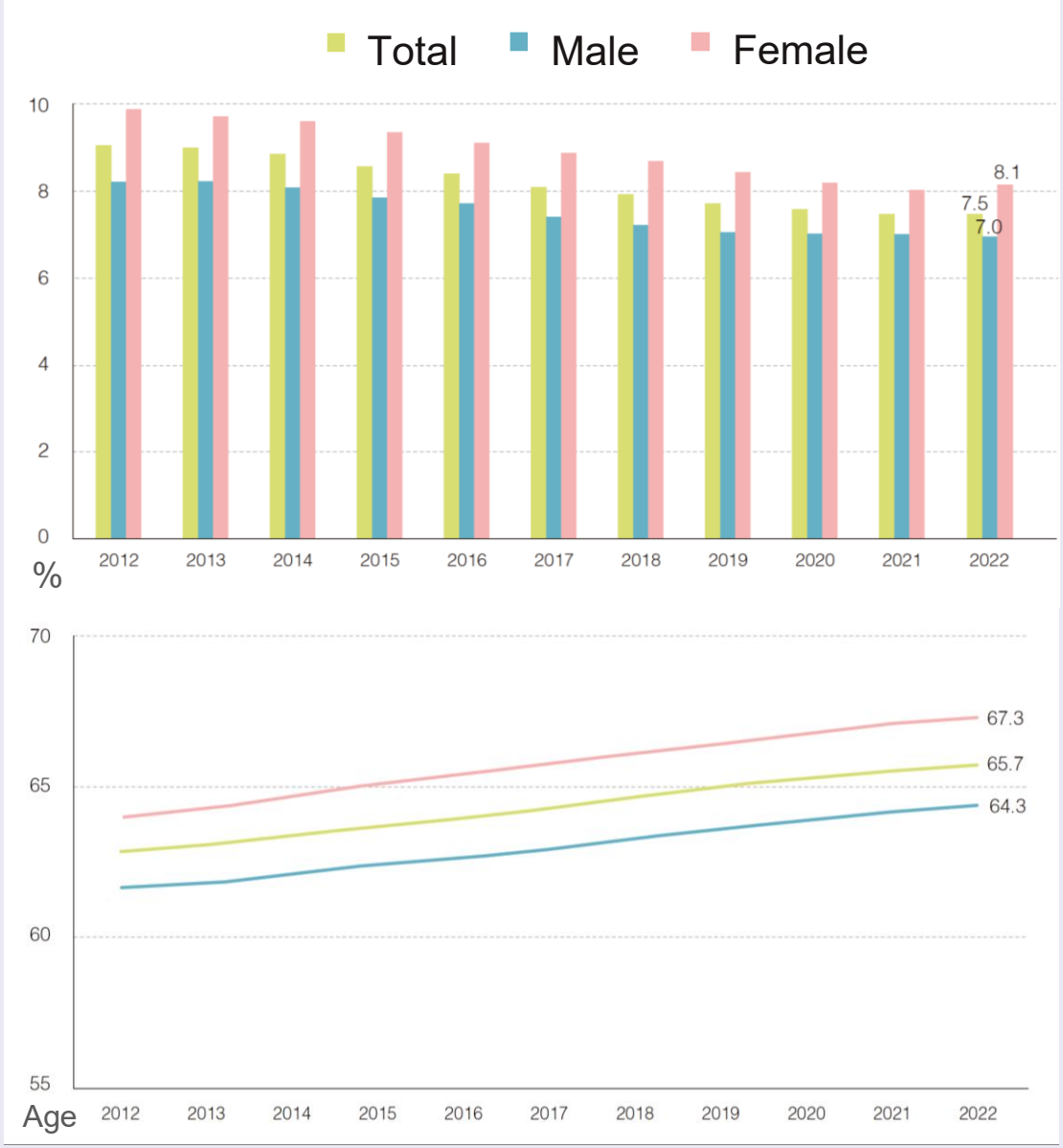
Design: Nationwide NHIRD cohort
Comparing: **(1)HD-only, (2)PD-only, (3)PD → HD switchers**
Outcomes: mortality, hospitalization, infection, MACE
Period: **2006–2017; follow up to 2020**
Statistics:
(1) Initial 1:1 propensity score matching
(2) multivariable adjustment (age, gender, comorbidities, medications)



HD-only group exhibited **significantly lower all-cause mortality** (HRs 0.77, CI: 0.72-0.83) and **infection-related admissions** (HRs 0.75, CI: 0.70-0.80) compared to PD-only group.

Chen YH, is. Hemodial Int. 2025 Oct;29(4):599-608.

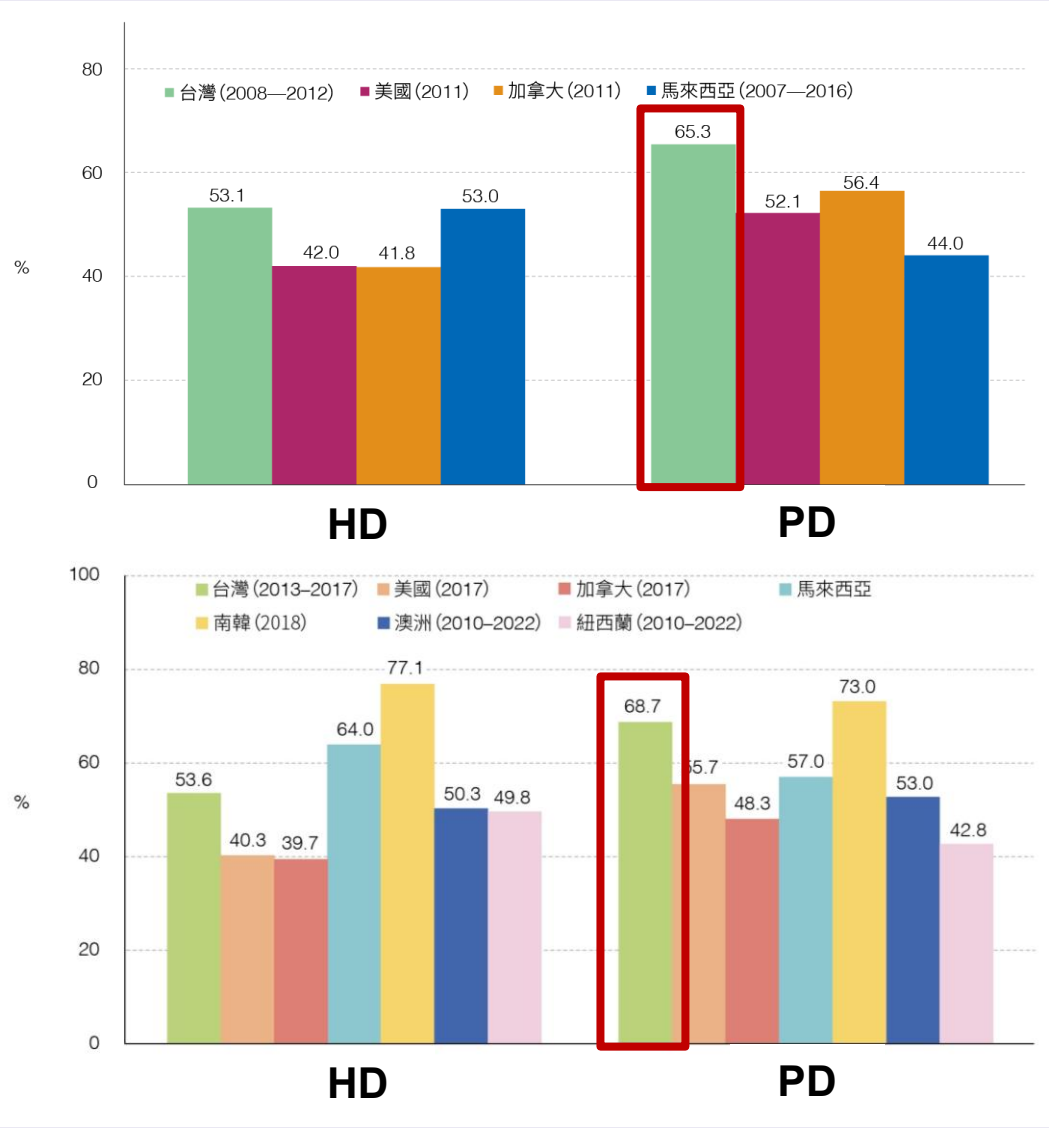
Trends in PD Utilization in Taiwan



Nationwide trends in the **prevalence** (%) of PD patients in Taiwan in 2012-2022.

The **average age** of the dialysis population in Taiwan in 2012-2022.

The mortality rate among PD patients has not increased



Five-Year Cumulative Survival Rate of Incident PD Patients in Taiwan (2008-2012): 65.3%

Five-Year Cumulative Survival Rate of Incident PD Patients in Taiwan (2013-2017): 68.7%

2019 Annual Report on Kidney Disease in Taiwan
2024 Annual Report on Kidney Disease in Taiwan

Limitations

- Observational design → residual confounding possible
- Lack of lab data (e.g. residual function)
- Cannot assess cause-specific mortality
- Modality switchers analyzed by initial treatment (intent-to-treat)

Conclusions

HD — especially planned-HD — offers better long-term survival than PD in Taiwan's modern dialysis era.

Further research needed to identify mechanisms behind survival differences and guide individualized ESRD care.

Thank you for your attention!