

# Effects of Patients Solicitation of Dialysis Facilities on Patients' Survival in Korea

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## Introduction

- The incidence and prevalence rates of end-stage renal disease are increasing every year in Korea (Figure 1).
- However, there is an excessive supply of hemodialysis (HD) machines in relation to the number of patients (Figure 2).

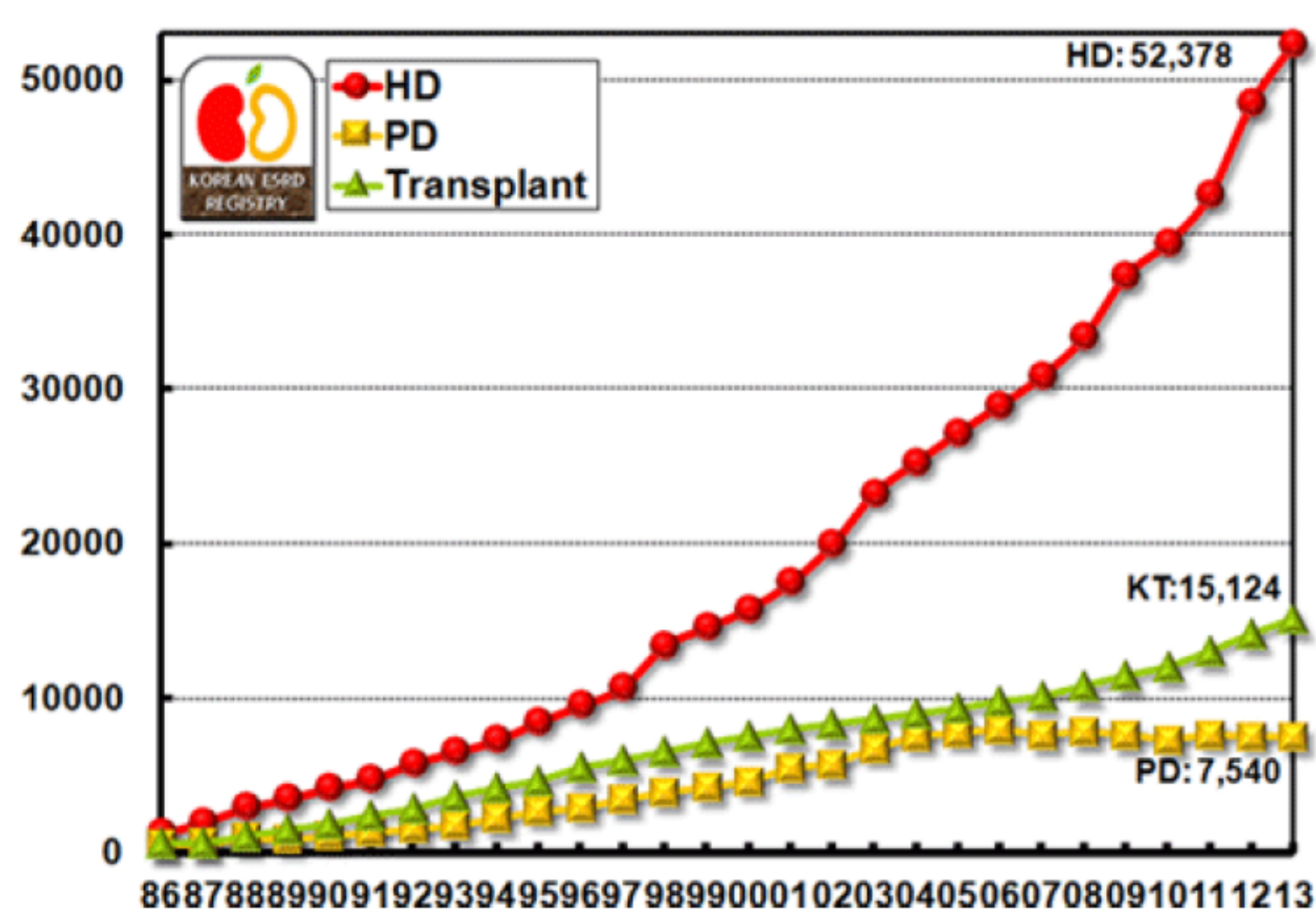


Figure 1. Patient numbers of renal replacement therapy at the end of each year.

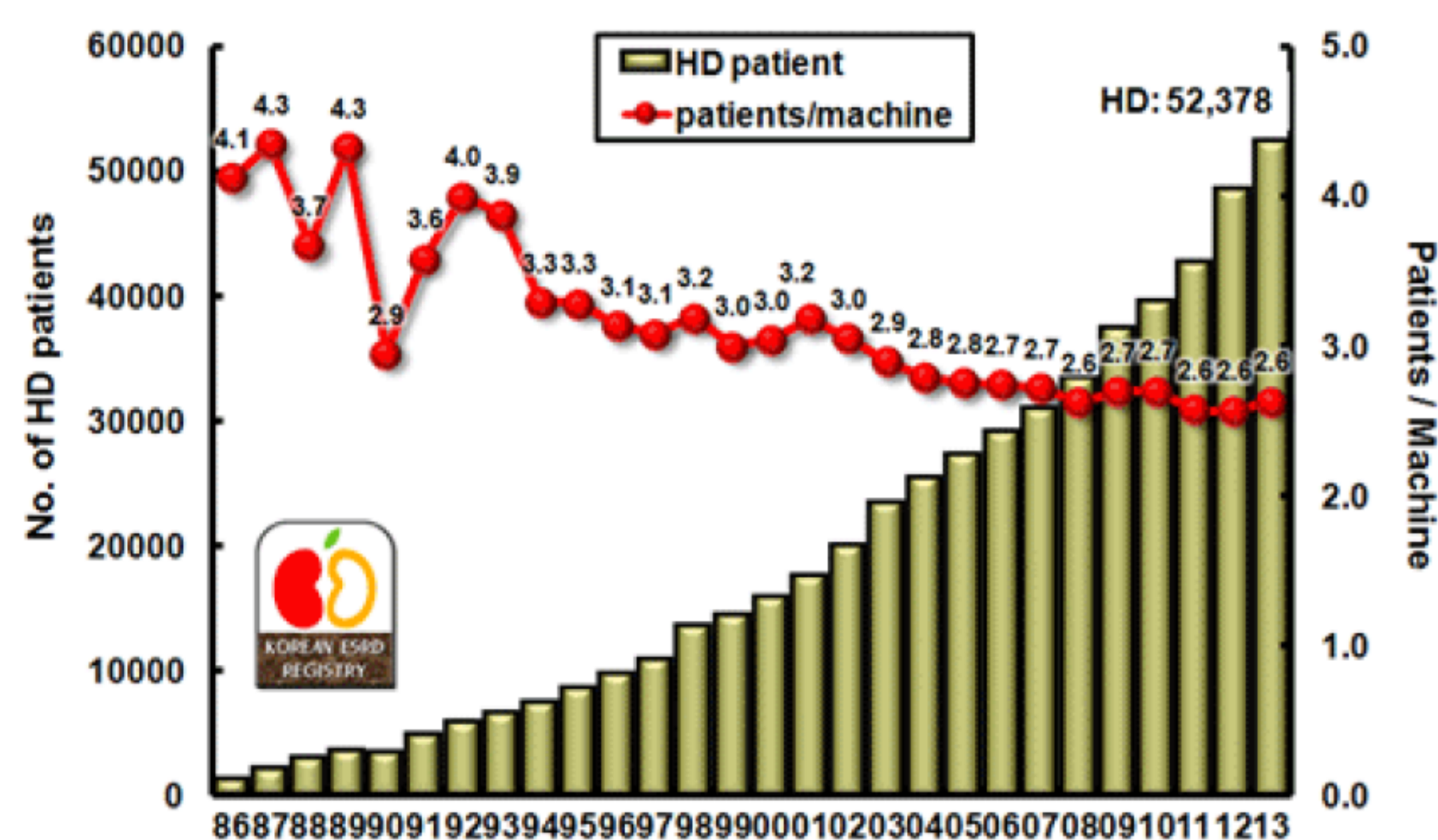


Figure 2. Numbers of HD patients and HD patients per HD machine.

- There is a concern that over-competition and illegal activities such as patient solicitation by some dialysis clinics may threaten patients' health.
- Therefore, we investigated the effect of unethical behavior of dialysis facilities on patients' survival.

## Methods

- We identified 19 unethical dialysis facilities and matched up 19 ethical facilities nearby to rule out bias in location.
- Unethical behavior was defined as the reduction of medical fees or providing money to attract HD patients.
- We identified in these facilities all of the patients who had started HD therapy between 1 January 2009 and 31 December 2012. We excluded patients who had been followed for fewer than 90 days.
- The differences in mortality between the two groups were analyzed using the Korean Health Insurance Review and Assessment Service database.

## Results

- A total of 2,231 incident HD patients was included and followed for a median of 36.1 months. A comparison of the baseline characteristics between ethical facilities and unethical facilities patients is shown in Table 1.
- Survival analysis showed that crude mortality was significantly higher in unethical facilities patients than in ethical facilities patients (Figure 3).
- The mortality rate of the unethical facility patients was significantly higher than that of the ethical center patients, even after adjustment for the effects of many other independently predictive covariates (adjusted relative hazard, 1.298; 95% CI, 1.062-1.588; P=0.01, Table 2).

- Subsequent subgroup analyses indicated that in patients younger than 75 years, unethical facilities were consistently associated with a higher mortality rate (Table 3).

Table 1. Baseline characteristics of the participants

	Ethical facilities (n=1,218)	Unethical facilities (n=1,013)	P-value
Age (years)	56.8±14.8	60.4±12.6	<0.001
>60 years of age	548 (45.0%)	560 (55.3%)	0.01
Males	729 (59.9%)	648 (63.4%)	0.05
National Health Insurance	1,099 (90.2%)	882 (87.2%)	0.03
Diabetes mellitus	626 (51.4%)	625 (61.7%)	<0.001
<i>Comorbidities other than DM</i>			
Myocardial infarction	109 (9.0%)	138 (13.6%)	<0.001
Congestive heart failure	164 (13.5%)	219 (21.6%)	<0.001
Peripheral artery disease	67 (5.5%)	107 (10.6%)	<0.001
Cerebrovascular accident	106 (8.7%)	149 (14.7%)	<0.001
Chronic pulmonary disease	118 (9.7%)	253 (25.0%)	<0.001
Peptic ulcer disease	139 (11.4%)	227 (22.4%)	<0.001
Liver disease	206 (16.9%)	120 (11.9%)	<0.001

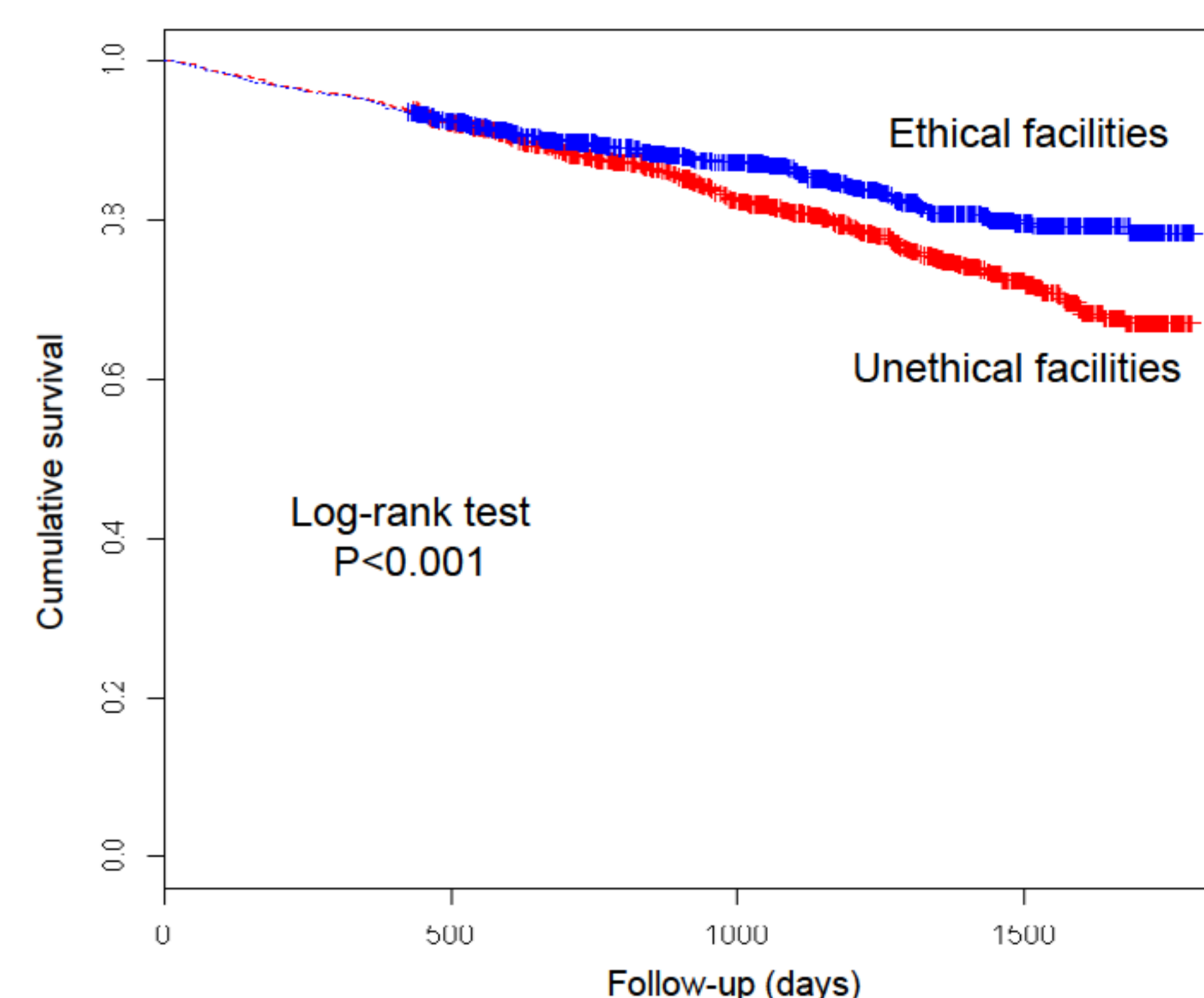


Figure 3. Crude Kaplan-Meier survival curves for ethical facilities patients and unethical facilities patients

Table 2. Mortality among patients according to the unethical behavior of the facility

Facility type	Crude mortality rate	Age, sex-adjusted relative hazard	Age, sex, comorbidities adjusted relative hazard
Ethical facilities	1.000	1.000	1.000
Unethical facilities	1.397 (1.152-1.694)	1.197 (0.987-1.451)	1.298 (1.062-1.588)

Table 3. Subgroup analyses comparing hazard ratios for mortality between ethical facilities patients and unethical facilities patients

Subgroup	Yes		No	
	Hazard ratio	P-value	Hazard ratio	P-value
Age <75years	1.468	<0.001	1.045	0.82
Diabetes mellitus	1.119	0.36	1.347	0.06
Myocardial infarction	0.952	0.89	1.259	0.02
Congestive heart failure	1.281	0.31	1.187	0.11
Peripheral artery disease	0.453	0.01	1.329	0.01
Cerebrovascular accident	1.275	0.42	1.204	0.08
Chronic pulmonary disease	0.935	0.78	1.320	0.01
Peptic ulcer disease	1.248	0.38	1.219	0.07
Liver disease	1.265	0.39	1.177	0.12

## Conclusion

- This study demonstrated that the overall mortality rate was higher in incident HD patients of unethical facilities than in those of ethical facilities in Korea.