Table 1: Basic statistics

Definition of variables	Total	High-tech treatments		Low-tech treatments (No CATH)	Significance of differences in means across hospitals
		CATH	Among CATH PTCA		
	(N=757)	(N=608)	(N=480)	(N=149)	
1. Treatments					
CATH	0.803	1.000	1.000	0.000	a
	(0.398)	(0.000)	(0.000)	(0.000)	
PTCA	0.634	0.789	1.000	0.000	a
	(0.482)	(0.408)	(0.000)	(0.000)	
Low-tech treatments only	0.197	0.000	0.000	1.000	a
	(0.398)	(0.000)	(0.000)	(0.000)	
2. Hospital expenditure and days					
First hospitalization-total hospital expenditure (yen)	2,291,870	2,512,184	2,631,310	1,392,868	b
	(1,556,774)	(1,565,133)	(1,487,167)	(1,148,839)	
First hospitalization-total hospital days	27.556	28.321	26.883	24.436	a
	(20.876)	(21.090)	(20.421)	(19.738)	
3. Density of medical facilities and mean income at the sphere level					
Number of high-tech hospitals (PTCA available) per 100,000 population	2.568	2.655	2.717	2.215	a
	(3.402)	(3.577)	(3.763)	(2.548)	
Number of low-tech hospitals (no PTCA available) per 100,000 population	15.571	14.932	13.642	18.177	a
	(13.259)	(13.034)	(12.622)	(13.885)	
Number of high-volume hospitals with more than 100 beds per 100,000 population	2.532	2.545	2.572	2.483	a
	(0.728)	(0.755)	(0.777)	(0.605)	
Number of physicians per 100,000 population	154.941	153.838	153.249	159.441	a
	(50.692)	(49.689)	(48.235)	(54.540)	
Number of hospital beds per 100,000 population	856.310	847.807	844.222	891.007	a
	(228.176)	(232.934)	(241.585)	(204.715)	
Population density (per square kilometer)	3,275	3,222	3,178	3,492	a
	(2,395)	(2,345)	(2,331)	(2,586)	
Mean taxable income (yen)	3,801,902	3,791,244	3,767,501	3,845,394	a
	(222,583)	(218,469)	(206,341)	(234,409)	
4. Patient characteristics					
Sex (Female=1)	0.252	0.227	0.219	0.356	
	(0.435)	(0.419)	(0.414)	(0.480)	
Age	64.507	62.617	62.638	72.221	
	(12.039)	(11.430)	(11.611)	(11.400)	
Number of family members living with a patient	2.184	2.189	2.219	2.161	a
	(1.472)	(1.449)	(1.445)	(1.564)	
Presence of spouse (=1 if yes)	0.753	0.785	0.806	0.624	a
	(0.432)	(0.411)	(0.396)	(0.486)	
Health insurance for the elderly (enrollment=1)	0.357	0.289	0.304	0.631	
	(0.479)	(0.454)	(0.461)	(0.484)	
5. Comorbidity variables (13/27)					
Continence: totally continent	0.950	0.961	0.952	0.906	a
	(0.218)	(0.195)	(0.214)	(0.293)	
Continence: occasionally incontinent	0.003	0.000	0.000	0.013	
	(0.051)	(0.000)	(0.000)	(0.115)	
Continence: no urine output	0.003	0.002	0.002	0.007	
	(0.051)	(0.041)	(0.046)	(0.082)	
Continence: unknown urinary continence	0.045	0.038	0.046	0.074	
	(0.207)	(0.191)	(0.209)	(0.262)	
Mobility: walks independently	0.956	0.969	0.967	0.906	a
	(0.204)	(0.174)	(0.180)	(0.293)	
Mobility: walks with assistance	0.015	0.012	0.013	0.027	
	(0.120)	(0.107)	(0.111)	(0.162)	
Mobility: unable to walk	0.007	0.002	0.002	0.027	
	(0.081)	(0.041)	(0.046)	(0.162)	
Mobility: unknown mobility	0.022	0.018	0.019	0.040	
	(0.148)	(0.133)	(0.136)	(0.197)	
Hypertension	0.390	0.387	0.385	0.403	
	(0.488)	(0.487)	(0.487)	(0.492)	
Hyperlipemia	0.157	0.164	0.158	0.128	a
	(0.364)	(0.371)	(0.365)	(0.335)	
Diabetes treated by insulin	0.052	0.058	0.056	0.027	c
	(0.221)	(0.233)	(0.231)	(0.162)	
Angina	0.156	0.140	0.150	0.221	a
	(0.363)	(0.347)	(0.357)	(0.417)	
Cardiac heart failure or pulmonary edema	0.070	0.039	0.031	0.195	a
	(0.255)	(0.195)	(0.174)	(0.397)	
Old myocardial infarction	0.098	0.094	0.094	0.114	
	(0.297)	(0.292)	(0.292)	(0.319)	
Current cigarette smoker	0.522	0.563	0.567	0.356	b
	(0.500)	(0.496)	(0.496)	(0.480)	
Arrhythmia	0.128	0.115	0.092	0.181	a

	(0.334)	(0.319)	(0.289)	(0.386)	
Family medical history of ischemic heart disease	0.164	0.164	0.158	0.161	
	(0.370)	(0.371)	(0.365)	(0.369)	
Renal failure	0.026	0.023	0.021	0.040	
	(0.160)	(0.150)	(0.143)	(0.197)	
Cirrhosis	0.004	0.003	0.004	0.007	b
	(0.063)	(0.057)	(0.064)	(0.082)	
Cerebrovascular accident: cerebral infarction	0.079	0.071	0.069	0.114	
	(0.270)	(0.257)	(0.253)	(0.319)	
Cerebrovascular accident: brain hemorrhage	0.008	0.010	0.010	0.000	b
	(0.089)	(0.099)	(0.102)	(0.000)	
Cerebrovascular accident: subarachnoid hemorrhage	0.004	0.003	0.004	0.007	
	(0.063)	(0.057)	(0.064)	(0.082)	
COPD	0.015	0.015	0.017	0.013	b
	(0.120)	(0.121)	(0.128)	(0.115)	
Aneurysm of aorta	0.011	0.012	0.008	0.007	
	(0.102)	(0.107)	(0.091)	(0.082)	
Ulcus pepticum	0.090	0.097	0.088	0.060	a
	(0.286)	(0.296)	(0.283)	(0.239)	
Cancer	0.036	0.035	0.035	0.040	
	(0.186)	(0.183)	(0.185)	(0.197)	
Autoimmune disease	0.012	0.003	0.004	0.047	
	(0.108)	(0.057)	(0.064)	(0.212)	
Drug allergy/medical reaction	0.055	0.056	0.048	0.054	
	(0.229)	(0.230)	(0.214)	(0.226)	
Dementia/Alzheimer's disease	0.016	0.016	0.017	0.013	
	(0.125)	(0.127)	(0.128)	(0.115)	
Terminal illness	0.001	0.000	0.000	0.007	
	(0.036)	(0.000)	(0.000)	(0.082)	
CAG history	0.091	0.090	0.088	0.094	b
	(0.288)	(0.287)	(0.283)	(0.293)	
PTCA history	0.045	0.049	0.050	0.027	
	(0.207)	(0.217)	(0.218)	(0.162)	
CABG history	0.005	0.007	0.006	0.000	
	(0.073)	(0.081)	(0.079)	(0.000)	
6. Variables on severity of health condition on admission (18/26)					
Heart rate	80.215	78.592	78.605	86.871	c
	(19.642)	(18.399)	(18.495)	(22.980)	
Temperature	36.234	36.211	36.154	36.337	a
	(0.744)	(0.729)	(0.754)	(0.802)	
Systolic blood pressure	131.356	133.148	133.901	123.695	a
	(28.079)	(27.694)	(28.816)	(28.522)	
Diastolic blood pressure	74.355	75.193	75.309	70.684	a
	(17.881)	(17.682)	(18.352)	(18.349)	
Mean arterial pressure (MAP: excluding <0 and >300)	93.599	94.730	95.059	88.640	a
	(19.507)	(19.176)	(20.035)	(20.234)	
Height	159.827	160.192	160.356	157.816	
	(10.699)	(10.994)	(11.276)	(8.681)	
Weight	59.405	59.911	60.089	56.612	
	(11.861)	(11.717)	(11.935)	(12.318)	
Boby Mass Index (BMI: Weight (kg)/((Height (m))^2))	19.143	20.348	20.156	14.229	a
	(9.314)	(8.347)	(8.513)	(11.274)	
Glucose	181.759	177.517	175.552	198.757	
	(91.631)	(83.799)	(77.243)	(116.739)	
Albumin	3.854	3.875	3.868	3.755	a
	(0.624)	(0.619)	(0.652)	(0.645)	
Highest creatinine	1.388	1.394	1.409	1.366	b
	(1.572)	(1.696)	(1.703)	(0.914)	
Hematocrit	45.162	46.213	47.350	40.831	a
	(17.601)	(18.071)	(19.258)	(14.801)	
White blood cells (unit:000)	10.396	10.412	10.330	10.333	
	(3.592)	(3.532)	(3.490)	(3.843)	
Platelets (unit:0000)	22.179	22.273	21.981	21.790	c
	(7.141)	(6.721)	(6.524)	(8.679)	
Blood urea nitrogen (BUN/SUN)	18.158	17.453	17.361	21.034	
	(9.192)	(8.820)	(8.071)	(10.110)	
EKG trace: MI/injury	0.841	0.836	0.844	0.866	a
	(0.365)	(0.371)	(0.363)	(0.342)	
EKG trace: transmural (new qwave) MI	0.106	0.104	0.121	0.114	a
	(0.308)	(0.305)	(0.326)	(0.319)	
EKG trace: old/remote MI	0.095	0.086	0.083	0.134	
	(0.294)	(0.280)	(0.277)	(0.342)	
EKG trace: ventricular tachycardia/flutter	0.129	0.118	0.127	0.174	a
	(0.336)	(0.323)	(0.333)	(0.381)	
EKG trace: atrial fibrillation/flutter	0.089	0.084	0.073	0.107	c
	(0.284)	(0.277)	(0.260)	(0.311)	
EKG trace: LBBB	0.022	0.016	0.017	0.047	c
	(0.148)	(0.127)	(0.128)	(0.212)	
EKG trace: RBBB	0.079	0.081	0.081	0.074	
	(0.270)	(0.272)	(0.274)	(0.262)	

EKG trace: left fascicular blocks	0.004	0.005	0.006	0.000	b
	(0.063)	(0.070)	(0.079)	(0.000)	
EKG trace: heart block, 2nd/3rd degree	0.069	0.072	0.077	0.054	
	(0.253)	(0.259)	(0.267)	(0.226)	
Congestive heart failure(CHF) /pulmonary edema on chest X rays	0.293	0.263	0.265	0.416	b
	(0.456)	(0.441)	(0.442)	(0.495)	
Stress test suggests ischemia	0.022	0.023	0.017	0.020	a
	(0.148)	(0.150)	(0.128)	(0.141)	
Killip 1 or Killip 2	0.597	0.638	0.633	0.430	a
	(0.491)	(0.481)	(0.482)	(0.497)	
Killip class 3	0.203	0.181	0.177	0.295	b
	(0.403)	(0.385)	(0.382)	(0.458)	
Killip class 4	0.199	0.181	0.190	0.275	a
	(0.400)	(0.385)	(0.392)	(0.448)	

Note: a, b, and c refer to differences among hospitals significant at the 1, 5, and 10 percent levels, respectively, based on ANOVA F-statistics.

Table 2: Probit estimates for the relationship between the choice of high-tech treatment and medical resource density at the sphere level

Medical resource density at the sphere level	CATH			PTCA		
	Coefficient (Std. err.)	Marginal effect		Coefficient (Std. err.)	Marginal effect	
Number of high-tech hospitals (PTCA available) per 100,000 population	0.457	0.095	a	0.502	0.124	a
	(0.152)			(0.154)		
Number of low-tech hospitals (no PTCA available) per 100,000 population	-0.076	-0.016	b	-0.088	-0.022	a
	(0.032)			(0.033)		
Number of high-volume hospitals with more than 100 beds per 100,000 population	0.336	0.070		0.464	0.115	b
	(0.208)			(0.217)		
Number of physicians per 100,000 population	0.009	0.002	c	0.013	0.003	b
	(0.005)			(0.006)		
Number of hospital beds per 100,000 population	-0.001	-0.0002	b	-0.002	-0.0004	a
	(0.001)			(0.001)		
Population density (per square kilometer)	-0.0003	-0.00005	b	-0.0003	-0.00007	b
	(0.0001)			(0.0001)		
Mean taxable income (log value)	3.194	0.665		3.231	0.800	
	(3.1012)			(3.1547)		
Constant	-52.776			-56.336		
	(47.273)			(47.964)		
Log-likelihood	-249.163			-227.691		

Note: For PTCA, we exclude 49 patients with CATH who did not undergo PTCA. a-c indicate significance at the 1, 5, and 10 percent significance levels, respectively. In all regressions, patient characteristics, shown in Table 1 and including demographic characteristics, comorbidity indicators and severity measures, are controlled for.

Table 3: High-tech treatment effects on hospital expenditure and hospital days by LS and propensity score model

Estimation Method	CATH versus no CATH (CATH versus Low-Tech) (608 versus 149)		PTCA versus no PTCA (PTCA versus Low-Tech) (480 versus 149)	
	Treatment effect (Std. err.)	t-statistics	Treatment effect (Std. err.)	t-statistics
1. Hospital expenditure				
LS treatment effect				
Treatment group	1,182,770	7.720	1,279,427	8.540
Control group	(153,240)		(149,857)	
ATT^{Kernel} with bootstrapping replication				
Treatment group	843,320	4.145	912,044	4.389
Control group	(203,456)		(207,813)	
2. Hospital days				
LS treatment effect				
Treatment group	3.474	1.660	2.744	1.320
Control group	(2.096)		(2.083)	
ATT^{Kernel} with bootstrapping replication				
Treatment group	5.714	1.938	5.414	2.085
Control group	(2.948)		(2.596)	

Note: For PTCA, we exclude 49 patients with CATH who did not undergo PTCA. In all regressions, patient characteristics, shown in Table 1 and including demographic characteristics, comorbidity indicators and severity measures, are controlled fc

Appendix Table 1: Fee schedule for reimbursement rates, number of high-tech hospitals an treatments performed in September 1993 and September 1996

	1993	1996
PTCA		
Fee schedule for reimbursement	13,800	15,500
Number of PTCA hospitals	381	609
Number of PTCA performed	3,648	5,818
CABG		
Fee schedule for reimbursement		
1	37,100	37,100
2 or more	60,500	60,500
Number of CABG hospitals	397	453
Number of CABG performed	2,699	2,814

Source: Ministry of Health, Labour and Welfare,*Shinryo Hoshu Tensu Hayamihyo* (Quick Reference Table of Fee Schedules) and*Iryo Shisetsu Chosa* (National Survey on Medical
Notes: Reimbursement rates for procedures are measured in points (1point=10yen). The number of general hospitals in Japan was 8,752 in 1993 and 8,421 in 1996