

Acknowledgements

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Table 1. Summary of subjects

Item	Admitted to	Admitted to	p value
	residence MA	distant MA	
Total number of subjects	409,834	111,142	
Male to female ratio	1.063	1.145	<0.001 [‡]
Age (years, mean \pm SEM)	52.7 \pm 0.0	48.5 \pm 0.1	<0.001 [‡]
Age \leq 14 years	11.6%	12.1%	<0.001 [‡]
Age \geq 65 years	42.2%	32.6%	<0.001 [‡]
Length of stay (25 th , 50 th , 75 th percentiles)	5, 10, 19 days	6, 11, 20 days	<0.001 [‡]
Length of stay: 2 to 7 days	36.9%	34.6%	<0.001 [§]
Length of stay: 8 to 14 days	28.1%	27.8%	
Length of stay: 15 to 30 days	27.1%	27.4%	
Cancer surgery	6.0%	8.2%	<0.001 [§]
Brain surgery [†]	0.4%	0.4%	0.075 [§]
Cardiac surgery [†]	1.7%	3.1%	<0.001 [§]
Gastrointestinal surgery [†]	5.5%	4.9%	<0.001 [§]
Orthopaedic surgery [†]	1.7%	3.0%	<0.001 [§]
Urological surgery [†]	1.6%	2.0%	<0.001 [§]
Gynaecological surgery [†]	3.4%	4.6%	<0.001 [§]
Trauma surgery [†]	5.4%	5.4%	0.6654 [§]
Other surgery [†]	11.0%	16.3%	<0.001 [§]

Admission to teaching hospital	5.8%	8.8%	<0.001 [‡]
Admission to hospital with ≥500 beds	4.1%	6.7%	<0.001 [‡]
Distance to hospital of admission (25 th , 50 th , 75 th percentiles)	1.3, 3.0, 7.2 km	11.8, 22.0, 44.6 km	<0.001 [‡]
Number of MAs	363		
Number of subjects per MA (25 th , 50 th , 75 th percentiles)	529, 1002, 1954		
Area of MA (25 th , 50 th , 75 th percentiles)	375, 752, 1340 km ²		
Rate of admission to distant MA (25 th , 50 th , 75 th percentiles)	13.0%, 21.3%, 34.1%		
Geometric mean of distance to hospitals in MA (25 th , 50 th , 75 th percentiles)	3.8, 5.0, 6.9 km		

MA, secondary medical area; [†]Cancer surgery was not included; [‡]Van der Waerden's test; [§]chi-square test

Table 2. Single variate analysis for admission rate to distant MA and distance to hospital of admission

Attributes	Admission to distant MA [†]		Distance to hospital of admission [‡]		
	Odds ratio (C.I.)	P value	Mean (km)	Ratio to control (C.I.)	p value
Male	1.077 (1.062 to 1.091)	<0.001	4.748	1.056 (1.048 to 1.065)	<0.001
Age ≤ 14 years	1.046 (1.025 to 1.067)	<0.001	4.751	1.031 (1.018 to 1.044)	<0.001
Age ≥ 65 years	0.662 (0.653 to 0.671)	<0.001	4.064	0.806 (0.799 to 0.812)	<0.001
Cancer surgery	1.414 (1.379 to 1.450)	<0.001	5.665	1.242 (1.222 to 1.263)	<0.001
Brain surgery	1.096 (0.991 to 1.213)	0.075	5.384	1.165 (1.094 to 1.241)	<0.001
Cardiac surgery	1.832 (1.750 to 1.900)	<0.001	6.770	1.476 (1.434 to 1.519)	<0.001
Gastrointestinal surgery	0.878 (0.851 to 0.904)	<0.001	4.371	0.942 (0.926 to 0.959)	<0.001
Orthopaedic surgery	1.820 (1.745 to 1.899)	<0.001	7.085	1.545 (1.500 to 1.591)	<0.001
Urological surgery	1.228 (1.170 to 1.289)	<0.001	5.255	1.139 (1.104 to 1.175)	<0.001
Gynaecological surgery	1.387 (1.342 to 1.433)	<0.001	5.557	1.210 (1.184 to 1.236)	<0.001

Trauma surgery	0.994 (0.965 to 1.023)	0.665	4.750	1.029 (1.011 to 1.047)	0.002
Other surgery	1.577 (1.547 to 1.606)	<0.001	5.801	1.294 (1.279 to 1.311)	<0.001
Teaching hospital	1.567 (1.531 to 1.601)	<0.001	5.651	1.234 (1.211 to 1.258)	<0.001
Hospital with ≥ 500 beds	1.683 (1.636 to 1.731)	<0.001	5.358	1.170 (1.151 to 1.190)	<0.001

MA, secondary medical area; [†]logistic regression for admission to distant MA; [‡]linear regression for log of distance to hospital of admission; C.I., 95% confidence interval

Table 3. Multivariate analysis for admission rate to distant MA and distance to hospital of admission

Attributes	Admission to distant MA [†]		Distance to hospital of admission [‡]		
	Odds ratio or intercept (C.I.)	p value	b	e ^b (C.I.)	p value
Intercept	-1.403 (-1.417 to -1.390)	<0.001	1.480	4.392 (4.356 to 4.429)	<0.001
Male	1.082 (1.067 to 1.097)	<0.001	0.056	1.058 (1.049 to 1.067)	<0.001
Age ≤ 14 years	0.974 (0.953 to 0.995)	0.018	-0.009	0.991 (0.978 to 1.005)	0.207
Age ≥ 65 years	0.645 (0.635 to 0.655)	<0.001	-0.224	0.800 (0.793 to 0.807)	<0.001
Cancer surgery	1.734 (1.690 to 1.780)	<0.001	0.326	1.385 (1.362 to 1.409)	<0.001
Brain surgery	1.353 (1.222 to 1.498)	<0.001	0.266	1.305 (1.225 to 1.389)	<0.001
Cardiac surgery	2.318 (2.222 to 2.418)	<0.001	0.513	1.670 (1.623 to 1.719)	<0.001
Gastrointestinal surgery	1.033 (1.001 to 1.066)	0.042	0.028	1.028 (1.010 to 1.047)	0.002
Orthopaedic surgery	2.158 (2.067 to 2.253)	<0.001	0.525	1.690 (1.641 to 1.741)	<0.001
Urological surgery	1.487 (1.415 to 1.562)	<0.001	0.229	1.257 (1.218 to 1.296)	<0.001

Gynaecological surgery	1.489 (1.438 to 1.542)	<0.001	0.235	1.265 (1.237 to 1.294)	<0.001
Trauma surgery	1.146 (1.112 to 1.181)	<0.001	0.104	1.110 (1.090 to 1.130)	<0.001
Other surgery	1.809 (1.774 to 1.845)	<0.001	0.333	1.395 (1.378 to 1.413)	<0.001
Teaching hospital	1.296 (1.253 to 1.339)	<0.001	0.061	1.062 (1.040 to 1.085)	<0.001
Hospital with ≥ 500 beds	1.340 (1.290 to 1.392)	<0.001	0.141	1.151 (1.123 to 1.180)	<0.001

MA, secondary medical area; ¹logistic regression for admission to distant MA; ²linear regression for log of distance to

hospital of admission; C.I., 95% confidence interval; b, partial regression coefficient or intercept; e, natural logarithmic

base