

TABLE E-1 Baseline Characteristics of Patients at Teaching and Nonteaching Institutions, Before and After Resident Duty-Hour Reforms (RDHR)

| Variables          | Category    | Nonteaching              |                           | Teaching               |                         |
|--------------------|-------------|--------------------------|---------------------------|------------------------|-------------------------|
|                    |             | Pre-RDHR<br>(n = 12,857) | Post-RDHR<br>(n = 18,145) | Pre-RDHR<br>(n = 7802) | Post-RDHR<br>(n = 9626) |
| Age*               |             | 80.85 ± 8.65             | 80.47 ± 9.16              | 80.43 ± 9.05           | 79.89 ± 9.33            |
| Sex†               | Male        | 25.78 (3315)             | 27.56 (5002)              | 26.78 (2089)           | 28.65 (2759)            |
|                    | Female      | 74.22 (9542)             | 72.42 (13,143)            | 73.22 (5713)           | 71.30 (6867)            |
| Race‡              | White       | 63.36 (8146)             | 64.29 (11,668)            | 57.38 (4477)           | 63.16 (6083)            |
|                    | Black       | 2.15 (276)               | 2.23 (405)                | 4.86 (379)             | 3.75 (361)              |
|                    | Hispanic    | 2.20 (283)               | 2.57 (466)                | 2.54 (198)             | 2.54 (245)              |
|                    | Other       | 2.36 (303)               | 2.04 (371)                | 2.78 (217)             | 3.60 (347)              |
| Hospital region†   | Northeast   | 13.75 (1768)             | 11.87 (2155)              | 19.46 (1518)           | 22.17 (2135)            |
|                    | Midwest     | 19.50 (2507)             | 20.39 (3701)              | 30.52 (2381)           | 27.62 (2660)            |
|                    | South       | 44.72 (5750)             | 45.23 (8208)              | 30.49 (2379)           | 32.88 (3167)            |
|                    | West        | 22.03 (2832)             | 22.51 (4085)              | 19.53 (1524)           | 17.33 (1669)            |
| Hospital bed size† | Small       | 9.18 (1180)              | 9.95 (1805)               | 16.82 (1312)           | 13.31 (1282)            |
|                    | Medium      | 23.33 (3000)             | 25.14 (4562)              | 28.07 (2190)           | 30.29 (2917)            |
|                    | Large       | 67.49 (8677)             | 64.92 (11,782)            | 55.11 (4300)           | 56.40 (5432)            |
| Payer†             | Medicare    | 88.19 (11,339)           | 87.77 (15,930)            | 82.52 (6438)           | 84.64 (8152)            |
|                    | Medicaid    | 1.24 (160)               | 1.37 (249)                | 1.96 (153)             | 2.01 (194)              |
|                    | Private/HMO | 8.52 (1096)              | 8.47 (1537)               | 12.87 (1004)           | 10.92 (1052)            |
|                    | Self-pay    | 0.65 (84)                | 0.76 (138)                | 0.77 (60)              | 0.98 (94)               |
|                    | No charge   | 0.03 (≤10)               | 0.06 (≤10)                | 0.08 (≤10)             | 0.06 (≤10)              |
|                    | Other       | 1.26 (162)               | 1.53 (278)                | 1.58 (123)             | 1.34 (129)              |
| Deyo†              | 0           | 63.54 (8169)             | 58.15 (10,554)            | 64.46 (5029)           | 58.63 (5647)            |
|                    | 1           | 26.14 (3361)             | 28.10 (5099)              | 25.39 (1981)           | 26.35 (2538)            |
|                    | >1          | 10.32 (1327)             | 13.75 (2496)              | 10.15 (792)            | 15.01 (1446)            |

\*The values are given as the mean and the standard deviation. †The values are given as the percentage with the number in parentheses. ‡Race is routinely not collected by selected hospitals, which results in a high level of missing values. To compensate for missing values, models were run with and without imputation; no difference was found.

TABLE E-2 Multivariate Comparisons of Complications Between the Four Classified Groups Associated with Teaching Facility and RDHR\*

| Variables                                    | Nonteaching Pre-RDHR | Nonteaching Post-RDHR | Teaching Pre-RDHR  | Teaching Post-RDHR | P Value |
|--|----------------------|-----------------------|--------------------|--------------------|---------|
| Death†                                       | 2.86 (334)           | 2.29 (110)            | 2.79 (217)         | 2.51 (241)         | 0.0720  |
| Central nervous system complications†        | 0.27 (35)            | 0.28 (50)             | 0.32 (25)          | 0.37 (36)          | 0.4676  |
| Respiratory complications†                   | 4.57 (587)           | 5.60 (1017)           | 5.43 (424)         | 6.72 (647)         | <0.001  |
| Pneumonia†                                   | 3.64 (468)           | 4.56 (828)            | 3.10 (242)         | 4.72 (455)         | <0.001  |
| Cardiac complications†                       | 2.94 (378)           | 2.99 (542)            | 3.44 (268)         | 4.15 (400)         | <0.001  |
| Vascular complications†                      | 0.18 (23)            | 0.23 (41)             | 0.22 (17)          | 0.34 (33)          | 0.0844  |
| Postoperative hypertension†                  | 0.02 ( $\leq 10$ )   | 0.03 ( $\leq 10$ )    | 0.01 ( $\leq 10$ ) | 0.04 ( $\leq 10$ ) | 0.6876  |
| Hematomas†                                   | 1.29 (166)           | 1.15 (208)            | 0.95 (74)          | 1.24 (119)         | 0.1455  |
| Serum reactions†                             | 0.12 (15)            | 0.12 (21)             | 0.12 ( $\leq 10$ ) | 0.10 ( $\leq 10$ ) | 0.9917  |
| Transfusion†                                 | 19.03 (2447)         | 25.84 (4689)          | 15.46 (1206)       | 25.45 (2451)       | <0.001  |
| Intraoperative complications†                | 0.06 ( $\leq 10$ )   | 0.03 ( $\leq 10$ )    | 0.06 ( $\leq 10$ ) | 0.07 ( $\leq 10$ ) | 0.4901  |
| Complications of operative wound†            | 0.05 ( $\leq 10$ )   | 0.05 ( $\leq 10$ )    | 0.05 ( $\leq 10$ ) | 0.06 ( $\leq 10$ ) | 0.9776  |
| Postoperative infection†                     | 0.21 (27)            | 0.26 (47)             | 0.35 (27)          | 0.39 (38)          | 0.0459  |
| Systemic inflammatory response syndrome†     | 0.68 (87)            | 1.02 (185)            | 0.59 (46)          | 1.19 (115)         | <0.001  |
| Delirium†                                    | 0.63 (81)            | 0.93 (168)            | 0.87 (68)          | 1.27 (122)         | <0.001  |
| Renal complications†                         | 2.11 (271)           | 3.56 (647)            | 2.24 (175)         | 4.59 (442)         | <0.001  |
| Digestive complications†                     | 0.79 (102)           | 0.71 (128)            | 0.72 (56)          | 0.67 (65)          | 0.7352  |
| Other complications†                         | 1.45 (186)           | 1.79 (325)            | 1.59 (124)         | 1.43 (138)         | 0.0494  |
| Decubitus ulcers†                            | 1.81 (233)           | 0.71 (129)            | 2.00 (156)         | 1.02 (98)          | <0.001  |
| Routine discharge†                           | 8.09 (1026)          | 5.63 (1022)           | 9.70 (753)         | 8.25 (795)         | <0.001  |
| Mean length of stay ( <i>days</i> )          | 6.35                 | 6.23                  | 6.81               | 6.94               | <0.001  |
| Mean inflation-adjusted cost ( <i>US\$</i> ) | 30,592               | 36,742                | 33,179             | 39,444             | <0.001  |

\*Multiple chi-square analyses were used to compare the data; cost and length of stay were analyzed with analysis of variance when the data were normally distributed and the Kruskal-Wallis test when they were not. †The values are given as the percentage of complications in the population as a whole, with the number in parentheses reflecting the actual number of complications.

TABLE E-3 Delta-Hat Assessment of Differences in Residuals\*

| Outcomes                                | Nonteaching              |                    | Teaching                 |                    | Delta-Hat Coefficient |
|---|--------------------------|--------------------|--------------------------|--------------------|-----------------------|
|   | Mean Value for Residuals | Standard Deviation | Mean Value for Residuals | Standard Deviation |                       |
| Death                                   | −0.028                   | 0.979              | −0.023                   | 0.975              | −0.093                |
| Central nervous system complications    | 0.001                    | 0.991              | −0.007                   | 0.949              | 0.318                 |
| Respiratory complications               | −0.014                   | 0.985              | −0.027                   | 0.998              | −0.138                |
| Pneumonia                               | −0.023                   | 0.982              | −0.023                   | 0.993              | −0.150                |
| Cardiac complications                   | −0.043                   | 0.976              | −0.045                   | 0.977              | −0.033                |
| Vascular complications                  | 0.004                    | 0.990              | −0.003                   | 0.980              | 0.821                 |
| Postoperative hypertension              | −0.008                   | 0.803              | −0.015                   | 0.900              | –                     |
| Hematomas                               | −0.002                   | 0.995              | −0.007                   | 0.994              | –                     |
| Serum reaction                          | −0.002                   | 0.9939             | 0.004                    | 0.930              | –                     |
| Transfusion                             | 0.002                    | 1.016              | −0.007                   | 1.015              | 0.036                 |
| Intraoperative complications            | −0.006                   | 0.837              | −0.008                   | 0.897              | –                     |
| Complications of operative wound        | −0.001                   | 0.816              | −0.005                   | 1.038              | –                     |
| Infection                               | −0.001                   | 0.999              | −0.004                   | 0.991              | 0.062                 |
| Systemic inflammatory response syndrome | −0.018                   | 0.975              | 0.000                    | 1.014              | −0.076                |
| Delirium                                | 0.003                    | 1.028              | 0.000                    | 1.010              | 0.195                 |
| Renal complications                     | −0.016                   | 0.990              | −0.024                   | 0.996              | 0.148                 |
| Digestive complications                 | −0.003                   | 0.991              | −0.002                   | 0.995              | −0.061                |
| Other complications                     | 0.006                    | 1.018              | −0.002                   | 1.010              | −0.119                |
| Decubitus ulcers                        | −0.011                   | 0.989              | −0.001                   | 0.984              | −0.203                |
| Routine discharge                       | 0.004                    | 1.031              | −0.001                   | 1.039              | 0.007                 |

\*Residuals are observable estimates of unobservable statistical error within a sample. No residual error is represented as 0% error, whereas numbers that are positive or negative, and different from zero, reflect a probability of error specific to that number. We considered variations of <15% as low group residual variation and deemed values below this figure as acceptable. When no delta-hat coefficient is given, there was no residual error to report.