

Variation of Hospital Expected Complication Rates after Total Knee Arthroplasty in the California Joint Replacement Registry

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Introduction

- Comparison of outcomes after total knee arthroplasty (TKA) at different institutions depends on an accurate risk adjustment model to account for variation in patient population characteristics.
- This study utilizes a risk adjustment model to determine the degree to which hospitals vary in their expected complication rates.

Methods

- 7,723 primary TKA procedures were performed in 26 hospitals in the CJRR between 2011-2015.
- 90 day complications were identified by ICD-9 codes, and a multivariable logistic risk model for postoperative complication was created using patient risk factors.
- The c statistic of the model was 0.646 and chi-squared value was 12.25.

Complications

Postoperative Arrhythmia	Acute Renal Failure
Congestive Heart Failure	Myocardial Infarction
Fracture	Dislocation
Wound Infection	Deep Venous Thrombosis
Pulmonary Embolus	Excessive Bleeding
Nerve Injury	Death

Patient Risk Factors

Age	Gender
Race	Bilateral Procedures
American Society of Anesthesiologists Class	Diabetes
History of Myocardial Infarction (MI)	Coronary Artery Disease
Congestive Heart Failure (CHF)	Peripheral Artery Disease
Chronic Lung Disease	History of Venous Thromboembolism

- Hospital expected complication rates were determined by applying the risk adjustment model to each hospital's patient case mix.
- A general linear model for analysis of variance was utilized to determine whether the hospitals' expected complication rates differed significantly.

Results

Hospital	Surgical Volume	Observed Complication Rate (%)	Expected Complication Rate (%)	Observed/Expected Outcome Ratio	Performance Rating
1	150	12.67	7.33	1.73	WORSE
2	21	0	7.02	0	AVERAGE
3	411	10.71	7.67	1.40	WORSE
4	154	5.84	7.50	0.78	AVERAGE
5	142	5.63	7.41	0.76	AVERAGE
6	245	1.22	7.28	0.17	BETTER
7	214	7.48	8.17	0.92	AVERAGE
8	2,872	5.05	6.64	0.76	BETTER
9	71	4.23	9.18	0.46	AVERAGE
10	116	6.90	7.42	0.93	AVERAGE
11	198	13.64	9.23	1.48	AVERAGE
12	129	7.75	8.73	0.89	AVERAGE
13	407	11.06	8.40	1.32	AVERAGE
14	182	4.95	8.46	0.59	AVERAGE
15	121	3.31	6.94	0.48	AVERAGE
16	7	0	7.30	0	AVERAGE
17	173	4.62	7.61	0.61	AVERAGE
18	204	9.31	8.08	1.15	AVERAGE
19	470	10.64	8.16	1.30	AVERAGE
20	165	13.33	7.78	1.71	WORSE
21	19	0	11.09	0	AVERAGE
22	33	0	7.75	0	AVERAGE
23	6	0	6.80	0	AVERAGE
24	99	4.04	8.23	0.49	AVERAGE
25	544	15.07	6.29	2.40	WORSE
26	720	6.67	8.27	0.81	AVERAGE

- A performance rating was determined by comparing each hospital's observed and expected complication rates.
- "Better" and "Worse" than expected performance ratings were designated for hospitals with a *significant* difference between observed and expected complication rates.

- Overall observed 90 day complication rate was 7.41%.
- There was a significant difference between the hospitals' expected complication rates ($p < 0.0001$).
- No significant correlation between hospital volume and expected complication rate (Spearman's rank coefficient 0.013, $p = 0.951$).

Conclusion

- There is a significant difference in expected 90 day complication rates after TKA in hospitals in the CJRR based on each hospital's patient characteristics.

References

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Disclosures

- James Huddleston – Chair of CJRR
- Kevin Bozic – Founder of CJRR