'Can a Patient Focussed, and Procedure Specific Risk Calculator Predict Complications Post Total Knee Arthroplasty?

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Introduction

The number of primary total knee arthroplasty performed in Scotland almost doubled between 2001 to 2018, this is predicted to continue growing. This procedure comes with risks of complications, including the risk of Venous Thromboembolism and Cerebrovascular insult. Informing patients of the potential risks to themselves from surgery, is now a legal requirement and a crucial part of the shared decision making process between clinician and patient. The American College of Surgeon's Surgical Risk Calculator is a tool that attempts to predict post-operative complications following surgery. Several issues have been identified with this, namely there are no large scale studies that attempt to externally validate its efficacy and there are even few studies that aim to do this with orthopaedic procedures.

Aims

This study aimed to evaluate the American College of Surgeon's Surgical Risk Calculator, in its ability to predict post-operative complications following Total Knee Arthroplasty

Methods

Prospective data was collected on 66 patients that had underwent Total Knee Arthroplasty in NHS Fife. For each patient, their data was input into the surgical risk calculator, so that their risk predictions could be compared to the overall event occurrence using figures from the Scottish Arthroplasty Project for NHS Fife and Scotland. A one sample t test was then used to evaluate the ability of the surgical risk calculator to predict the occurrence of selected post-operative outcomes. A significance level of $p<0.05$ was used

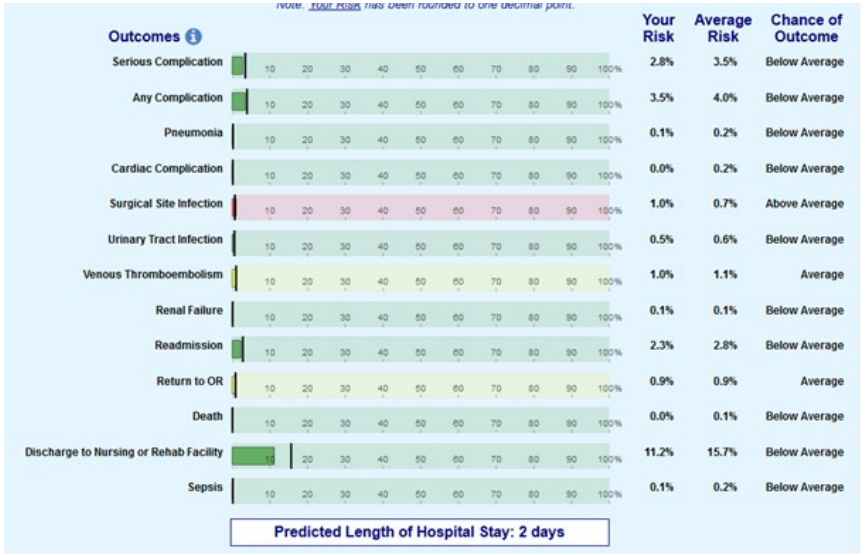

Figure 1: Example outcome from ACS SRC website (https://riskcalculator.facs.org/RiskCalculator/)

Infection Fife Average 2017 (%)	Infection Scottish Average 2017 (%)	Infection SRC predicted average (%)	VTE Fife average 2018 (%)	VTE Scottish Average 2018 (%)	VTE SRC predicted Average (%)
0.67	1	0.77±0.24	0.65	0.8	1.41±0.54

Table 1: Averages of Post-operative complications from the SAP and the ACS SRC predicted averages of the sample for Surgical Site Infection and VTE

MI Fife average 2018 (%)	MI Scottish average 2018 (%)	MI SRC predicted average (%)	ARF Fife average 2018 (%)	ARF Scottish Average 2018(%)	ARF SRC predicted average (%)
0.22	0.2	0.20±0.28	2.6	1.5	0.13±0.2

Table 3: Averages of post-operative complications from the SAP and the ACS SRC predicted averages of the sample for MI and AKI

Results

The most common post-operative complication for NHS Fife was ARF followed by Surgical site infection, then VTE and lastly Myocardial Infarction. This mirrored the national results. There was a statistically significant difference for the post-operative complications Surgical Site Infection, VTE and ARF for both NHS Fife and Scotland against their predicted outcomes. Only Myocardial Infarction showed no statistically significant difference between its predicted outcome and actual outcome, for both NHS Fife and Scotland.

Conclusion

This study found that the only post-operative complication to show no statistically significant difference between actual and predicted outcome was Myocardial Infarction. For all other complications there was a statistically significant difference between event occurrence and predicted. To our knowledge this is the first study to evaluate using this surgical risk calculator in the UK for Orthopaedic surgery, therefore, further research is required.

References

1. Scottish Arthroplasty Project. Scottish Arthroplasty Project. 2019. Accessed on: 03/05/20
2. Wood M, Mantilla C.B, Horlocker T.T, Schroeder D.R, Berry D.J et al. Frequency of Myocardial Infarction, Pulmonary Embolism, Deep Venous Thrombosis, and death following Primary Hip or Knee Arthroplasty. Anaesthesiology. 2002; 96: 1140-1146
3. Cohen M.E, Liu Y, Ko C.Y and Hall B.L. An examination of the American College of Surgeons NSQIP Surgical Risk Calculator Accuracy. Journal American College of Surgeons. 2017; 224(5): 787-795
4. Harris A.H, Kuo A.C, Bowe T, Gupta S, Nordin D and Giori N.J. Prediction models for 30-day mortality and complications after Total Knee and Hip Arthroplasties for Veteran Health Administration Patients with Osteoarthritis. Journal of Arthroplasty. 2018; 33(5): 1539-1545