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Predicting and validating a scoring system to estimate laparoscopic cholecystectomy operative duration using pre-operative patient factors

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Background: The ability to consistently predict operative duration can revolutionise patient care and staff satisfaction whilst optimising theatre efficiency and utilisation, thus reducing costs. With laparoscopic cholecystectomies being one of the most commonly performed procedures worldwide, a tool to predict operative duration could be extremely beneficial to healthcare organisations.

Methods: Data collected on patients undergoing cholecystectomy in acute UK and Irish hospitals between 03/2014 and 05/2014 formed the CholeS dataset, which was used as the basis for duration prediction. Data were evaluated to assess the effect of age, gender, BMI, ASA and results of any pre-operative imaging on operative duration. A binary logistic regression model was produced, with a forwards stepwise approach used to select variables for inclusion. The resulting model was converted to a risk score and its predictive accuracy was assessed using ROC curves. The model also applied to a second cohort of patients for external validation.

Results: After exclusions, data were available for 7,227 surgeries in the derivation (CholeS) cohort. The risk score was then applied to a cohort of N=2,405 patients from a tertiary centre for external validation. This cohort had a similar operative duration to the derivations cohort, with a median of 66 minutes (IQR: 52-85), and 20% (N=481) of operations taking >90 minutes. The score as a whole had a similar degree of predictive accuracy to that observed in the derivation cohort. ASA was a significant predictor of duration and all other factors but gender (p=0.480) and planned intra-op cholangiogram (p=0.306) were found to be significantly predictive of operative duration.

Conclusion: Through validating the score using a large and comparable cohort, this tool has shown to have the potential to enable organisations to better organise theatre lists and deliver greater efficiencies in care.

Biography

Reshma Bharamgoudar and Aniket Sonsale are final year medical students at the University of Birmingham, with a keen interest in improving healthcare delivery and optimising organisational performance. James Hodson is an experienced statistician at University Hospitals Birmingham (UHB) with previous experience in the CholeS dataset as well as expertise in producing various scoring tools. Mr Griffiths is a Consultant Upper GI Surgeon at UHB with a passion for research and improving care quality. He has published extensively in this field and is a widely respected surgeon.

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