An Electronic Version of the Post-operative Morbidity Score (EPOMS)

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Background and Rationale:
Increasing numbers of trusts are acquiring Electronic Health Records (EHRs). As they do so the opportunities for using ‘big data’ approaches to investigate perioperative care are increasing. However for a health record to be useful in such research information contained within it must be accessible in an easily extractable format.

The Postoperative Morbidity Score (POMS)¹ is a multi-dimensional score characterising morbidity of nine organ specific domains. Certain of its components do not lend themselves to easy extraction from an EHR, therefore we sought to develop an electronic surrogate of POMS (EPOMS) that we could build into our EHR.

Methods and Definitions:
207 patients who underwent elective surgery after attending a multi-disciplinary pre-assessment clinic for frail (Clinical Frailty Scale > 4) patients were evaluated. We manually calculated their POMS on postoperative D3 as well as identifying electronic surrogates for each domain. After initial comparison we performed backwards logistic regression to finalise domain definitions (Table 1). This score was then compared to the original POMS for discrimination of either: Complex Discharge (need for discharge to an institution or increased care package) and Prolonged Length of stay (8 days or more). Kaplan-Meier analysis was also performed. All analysis was performed in R. The work was performed as part of a trust approved service evaluation and quality improvement project. (PRN 657515)

Results, Performance, and Utility:
On D3 138 (67%) of patients had morbidity in at least one domain using the original POMS. Our final EPOMS definitions appeared more sensitive, identifying 152 patients as having morbidity. Both POMS and EPOMS had equivalent discriminative capability for identifying patients at risk of Complex Discharge and Prolonged LOS (Figure 1, above) (Area under the receiver operator curve (AUC) for CD: 0.66 v 0.66, for prolonged LOS: 0.66 v 0.67, p<0.05 for both).

Kaplan-Meier curves were created, dichotomising patients as being either POMS or EPOMS positive on D3. Being positive in either score appeared to be associated with an increased risk of longer length of stay (P<0.001 Log-Rank Hazard test). (Figure 2, right)

Conclusions
● It is feasible to identify electronic surrogates within an EHR that correspond to literature published standards
● In our studied population our derived score had equivalent discriminative capabilities to the ‘gold-standard’ POMS
● Integration of such a score into our EHR will standardise our definition of post-operative morbidity for ongoing QI work
● Our methodology is applicable to other centres with an EHR although without external validation of our score it is possible that different surrogates may have better performance in some settings.

Domain | EPOMS Definition
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Cardiovascular | Heart Rate > 100 OR positive troponin test
Respiratory | Supplemental Oxygen OR other respiratory support (ventilation, CPAP)
Neurological | Recorded need for nursing ‘specialling’ OR having undergone a CT Head
Haematological | Requirement for red cells, platelets, fresh frozen plasma or cryoprecipitate in the last 24 hours
Gastrointestinal | Anti-emetic drug administration
Pain | Active patient controlled analgesic infusion OR regional anaesthetic infusion
Wound | Further operation booked
Infectious | On antibiotics OR temperature of 38°C or higher in the last 24 hours
Renal | Rise in serum creatinine of >30% from baseline

References:

Legends:
Figure 1: Above Left: Receiver Operator Curves demonstrating discriminative capability of POMS and EPOMS for prediction of complex discharge and Prolonged LOS. For AUCs see text, left.
Figure 2: Above: Kaplan – Meier curves demonstrating increased hazard of longer length of stay in patients who are either EPOMS (A) or POMS (B) positive on postoperative D3.