Identifying the high-risk hip fracture patient

**Background:** Hip fractures in elderly carry a high mortality and early identification of high risk patients may improve outcome. The overall objective of this thesis project is to evaluate accuracy of scoring systems for the prediction of outcome in hip fracture patients and to identify novel biomarkers of outcome. At the halftime seminar the results from the first two studies will be presented.

**Methods:** The studies were performed in a cohort of in total 997 patients suffering out-of-hospital hip fracture admitted in Lund 2011-2014. Data was prospectively collected.

1. The Physiological and Operative Severity Score for the enUmeration of Mortality and Morbidity (POSSUM), P-POSSUM and Nottingham Hip Fracture Score (NHFS) were assessed for calibration and discrimination by calculating the ratio of observed to expected events (O:E) and areas under receiver operating characteristics curves (ROC).

2. Lactate was assessed as predictor of 30-day mortality and a composite outcome of mortality and postoperative complications. Logistic regression was used for lactate only and adjusted for age, gender and American Society of Anesthesiology (ASA) score. Discrimination was evaluated using ROC analysis.

**Results:** The 30-day mortality was 6.2% and complications defined by POSSUM occurred in 41% of the patients. Overall O:E ratios for POSSUM, P-POSSUM and NHFS scores for 30-day mortality were 0.79-0.98. The models underestimated mortality in the lower risk bands and overestimated mortality in higher risk bands. POSSUM predicted morbidity well with
O:E ratios close to unity in most risk bands. The areas under the ROC curves for the scoring systems was 0.60-0.67.

In the lactate study the 690 patients in which lactate was obtained were included. Median lactate level was 1.3 mmol/l. The OR by each 1 mmol/l increase in the lactate concentration for mortality was 1.13 (95% CI 0.77-1.68) while for composite outcome it was 1.06 (95% CI 0.85-1.3). The area under the ROC curve was 0.51 (95% CI, 0.45-0.57).

**Conclusion:** The POSSUM scores and NHFS show moderate calibration and poor discrimination in this cohort. Plasma lactate at admission does not appear to be a useful biomarker to identify high-risk patients after hip fracture. The results suggest mortality and morbidity in hip fracture patients are dependent on factors not included in these studies.

**Manuscripts:**
