External validation of the Norwegian survival prediction model in trauma – NORMIT 1 and 2 – in two Swedish trauma populations

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BACKGROUND

Mortality (or survival) prediction models can be used to adjust for case mix in heterogeneous trauma populations in trauma quality assessment. The recently developed Norwegian survival prediction model in trauma (NORMIT) derived in a population admitted to a designated trauma centre has recently been updated and validated (NORMIT 2). The aim of the present study was to compare NORMIT 1 and 2 with regards to its accuracy in two trauma populations; one including patients admitted to all hospitals in Sweden - the national trauma (NP) population, and one including patients admitted in one single designated trauma centre (TP) population.

METHODS

Eligible were patients registered in the national trauma register (SweTrau) during the study period 2014-2016 and who were primarily admitted to the reporting hospital. Outcome was 30 day mortality. Model validation included receiver operating characteristic (ROC) curves and the novel GiViTI calibration belt.

RESULTS

26,504 patients fulfilled the inclusion criteria. Exclusion due to missing data in was 18.5% in the NT (n=21,554) and 2.6% in the TC (n=3972) population. In NT (Figure 1) and TC population, NORMIT 1 and 2 showed excellent survival prediction abilities (discrimination). A poor calibration with underestimation of mortality was observed for NORMIT 1 and 2 in the NT population and in a subgroup of severely injured patients (NISS>15) . In the TC population, NORMIT 1 overestimated mortality independent of trauma severity. NORMIT 2 showed a good calibration in the TC population (Figure 2) and in the NISS >15 subgroup.

CONCLUSION

Our study suggests that NORMIT 2 is useful to predict survival in trauma centre populations in both less and severely injured patients, but the model performs poor in a more heterogeneous national trauma population.

Figure 1. The area under the receiver operating characteristic curves (AUROC) for NORMIT1 (straight line) and NORMIT2 (dashed line) for 30-day in-hospital mortality prediction, National trauma population.

Figure 2. Calibration belt for NORMIT 2 in the trauma centre population.