# Models to predict readmission rates – trying to sand the wings of the boomerang

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In clinical jargon, patients who return to hospital within a short period of time are sometimes disrespectfully called boomerang patients. Indeed, hospital readmission rates within 30 days of discharge are a widely accepted measure for the quality of hospital care. They serve as a proxy for optimal discharge planning and are published yearly by the Swiss National Association for Quality Development in Hospitals (ANQ). For example, the 2015 statistics for five Swiss University Hospitals reveal an average readmission rate of 5.45%, based on the results of the SQLape® algorithm. This program calculates the differences between estimated and expected readmissions, which in turn can be used as an instrument to benchmark between institutions [1]. Ideally such feedback leads to a close analysis of the results and finally the implementation of measures which aim to reduce readmission rates.

In a study now published in *Swiss Medical Weekly*, Uhlmann and colleagues [2] examined the predictive strength of data derived from the SQLape® and compared it with two nationally and internationally validated clinical scoring systems for potentially avoidable readmissions. After exclusion of ineligible cases, they were able to identify 6792 patients, of whom 777 (10.4%) were readmitted within 30 days. Given that the study was conducted with a dataset from a department of internal medicine, it is not astonishing that the readmission rate was higher than the average percentage reported for the Swiss University Hospitals, which also included surgical patients. The authors identified seven clinical risk factors for potentially avoidable readmissions, with metastatic cancer being the one with the highest predictive value followed by hyponatraemia and the number of hospital admissions (>1) in the 12 months preceding the index admission. Less important predictors of readmission rate were comorbidity assessed by use of the Charlson index, length of stay and the number of medications. Although the ANQ 2015 report stated that older patients are more frequently readmitted to hospitals than expected [1], age was not a predictor for readmission in this cohort. The authors concluded that the model performed well however there is still room for improvement. To strive for optimal quality is an important goal for hospital care providers. Governmental bodies and insurance companies have big, albeit different, interests in low readmission rates. Whereas some countries publish quality indicators, others have taken even more rigorous steps. In 2010, the US health system introduced a nationwide hospital readmission reduction programme with financial penalties for hospitals with high readmission rates after treatment of defined medical conditions (acute myocardial infarction, congestive heart failure, pneumonia). Such programmes led to a significant reduction in readmission rates for index diseases and penalised hospitals had lower 30 day readmission rates than nonpenalised institutions. In contrast, however, thousands of hospitals also paid nearly US$ 1 billion in penalties [3]. Interestingly, readmission rates dropped more often in small, public or rural hospitals [4].

Patients treated in internal medicine wards present with multiple chronic conditions, numerous medications and overlapping problems. Currently available prediction models play an increasing role from a hospital management perspective, and should help to improve quality of clinical care. However, even very sophisticated models taking up to 119 chronic conditions into account cannot be used interchangeably and have 30 day readmission sensitivities that range between 33% and 96% [3]. Thus, such models still deliver a blurred picture of the clinical reality.

From a clinical perspective, we should not only look at potentially avoidable readmission but also at non-avoidable readmissions. Applying such a flipside view to the paper by Uhlmann and colleagues demonstrates that only the number of medications and hyponatraemia could have been modified. In contrast, the length of stay, the number of admissions and the Charlson Comorbidity Index are very likely to reflect disease severity. So why should very sick patients with metastatic cancer not have enough clinical reasons to be admitted to a hospital within 30 days after discharge when their condition worsens? Is a readmission in such a patient really a sign of poor quality? Instead of avoiding the boomerang patients we should also take efforts to catch them, provide optimal medical care and find solid arguments to do so.

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