

FOCUS ON RESEARCH

DEVELOPMENT AND VALIDATION OF AN ALGORITHM TO PREDICT EMERGENCY HOSPITAL ADMISSIONS IN SCOTLAND

Researchers

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Aim

The aim of this study was to test an existing tool to predict future emergency hospital admissions in patients aged 40 or over, and if necessary, improve with further patient, practice and hospital characteristics.

Project Outline/Methodology

Enhanced primary care data (Practice Team Information) was abstracted from 40 practices throughout Scotland and linked with hospitalisation data for those aged 40 or over (n=114,421). The first three years (Sept 2002 – Sept 2005) of information on prescribing, frequency of attendance at general practices, previous hospitalisation was then used to Predict Emergency admissions Over the Next Year (PEONY). Initially, the original Tayside PEONY model was applied to the Practice Team Information data and the predictive performance and accuracy at all levels of risk were assessed. Assessment of further practice level factors and variation of emergency admissions by practice and hospital were added and a new model (PEONY II) developed. The ability of the new model to predict future emergency admissions was compared to the Scottish Patients At Risk of Readmission and Admission (SPARRA) model. Finally, using different cut-off points to identify high risk people for PEONY II was assessed for potential cost savings to the NHS.

Key Results

The original PEONY model fitted the data reasonably well with probability of differentiating high from low risk of 79% but with lower accuracy than the original data. Additional prescribing factors improved performance further. Finally, additional factors of frequent attendance at their general practice, having a diagnosis such as heart failure, cancer, CHD, stroke significantly improved the predictive performance of the model. A final model (PEONY II) included among other factors: previous hospital use, especially prior emergency admissions, age, gender, deprivation,

smoking, alcohol dependence, history of prescribing, number of GP appointments, number of new nurse appointments, heart failure in deprived and very elderly, cancer, chronic obstructive pulmonary disease (COPD), coronary heart disease (CHD), stroke. Lower risk was associated with hypertension, prescribing of statins and ulcer healing drugs with non-steroidal anti-inflammatory drugs. A literature review identified a number of potential interventions.

Conclusions

The analysis along with a search in the health literature identified a number of potential targets for additional management such as heart failure especially in the very elderly and deprived, smoking cessation, interventions for alcohol dependence, and management of cancer, heart failure, COPD, CHD. Cost savings could be made if the additional patient management cost was kept low.

What does this study add to the field?

No other study has examined both individual patient risk factors as well as practice features together, which could predict emergency admissions across the whole population in Scotland. A prediction tool can be developed for everyday use in general practice.

Implications for Practice or Policy

The prediction tool could be used by practices or health boards to identify those at high risk of an emergency admission allowing development of appropriate and cost-effective interventions to prevent unnecessary unplanned admissions. This has the potential to benefit the patient as well as reduced costs in the NHS in Scotland.

Where to next?

We plan to develop the tool (PEONY II) into a user friendly version and test in general practice. The results of this study will inform further developments by policy makers in Scotland regarding the management of long term conditions.

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