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EXTERNAL VALIDATION AND COMPARISON OF EARLY READMISSION'S RISK SCORES IN THE ELDERLY: PROSPECTIVE OBSERVATIONAL STUDY

READMISSION SCORES: EXTERNAL VALIDATION & COMPARISON

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Brief summary: We conducted a prospective observational study to externally validate and statistically compare eight clinical risk scores in order to identify elderly at high risk of unplanned hospital readmission within 30 days.

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RESEARCH LETTER

Introduction

Unplanned readmissions in older patients are a prominent and current issue for healthcare professionals and regulators. They can indeed be very deleterious for patients, leading to an increased risk of dependence and functional or psychosocial decline¹ and for hospitals as these readmissions are costly². Moreover, the reduction of readmissions was introduced into guidelines by health system organizations as quality indicators^{3,4}

Several clinical care interventions have been shown to reduce the risk of early unplanned readmission⁵ but they may be difficult to implement and costly in terms of time, money and caregiving if delivered to all patients. Thus, it is necessary to predict patient readmission risk to target the patients who will most likely benefit from these interventions. Clinical risk scores can help physicians and pharmacists select these patients.

Eight clinical risk scores identifying inpatients at risk of unplanned readmission have been published to date (ISAR, TRST, Nomogram, LACE, VIP, SST, HOSPITAL, 80+ score⁶⁻⁹). They were externally validated in diverse populations and with different readmission time lapses.

In order to have a reliable comparison of these eight scores, we aimed to externally validate them in a homogeneous older population and with a unique definition of early unplanned readmission (i.e. emergency department (ED) visit or hospitalization 30 days after discharge).

Methods

An observational prospective cohort study was conducted in seven medical wards of two French university hospitals (February-August 2018). This study was approved by an ethic committee (*Comité de Protection des Personnes Ouest 6*, number 1086 RNI).

All patients aged 65 and older, discharged home (or nursing home) after hospitalization and reachable by telephone the 31st day after discharge, were included.

For each included patient, the eight scores were calculated from the electronic medical records (EMR). On the 31st day after discharge, medical records were checked and/or a phone call was made to ascertain unplanned readmission (ED visit or hospitalization).

Scores contain 3 to 8 questions divided into five categories: demographics, functional impairment, hospitalization, medication, comorbidities.

The discrimination of each score was assessed with the area under the receiver operating characteristic curve (AUC ROC) and metrological characteristics were calculated.

Results

Among 503 included patients, 134 (26.64%) had an early unplanned readmission. All the AUC ROCs of the scores were between 0.56 and 0.65. The VIP score had the lowest AUC ROC (0.56, 95%IC: 0.51-0.61) and LACE had the highest (0.65 95%CI: 0.60-0.70). The metrological characteristics of each score are presented in table I. The ISAR score had the highest sensitivity (76.12%) but the lowest specificity (40.38%). The SST, the VIP and the HOSPITAL scores had the highest specificity but the lowest sensitivity. Furthermore, the SST had also the highest positive predictive value and accuracy.

The HOSPITAL score and LACE index could not be calculated before discharge, because one of the items is the length of stay.

The ISAR, TRST and VIP scores might not be automatable since they call for a reading of the EMR, or even a face to face interview.

Discussion

In this observational prospective study, we externally validated eight clinical risk scores for 30-day unplanned readmissions in an older population. These eight scores had all fair discrimination (AUC ROC greater than 0.5, but lower than 0.7), which is consistent with the literature^{6,10}.

In order to implement an intervention, an early and ideally automatable identification of patients is essential. Three scores (80+, Nomogram and SST) meet these requirements but have very scattered metrological characteristics. The SST has the highest specificity and, therefore, the best ability to correctly rank patients who will not be readmitted as they are at low risk for readmission.

As it seems more convenient to choose a specific test and intervene with patients classified as low risk of readmission but who will be readmitted (i.e. not missing false negative) rather than a sensitive test, the SST, which has the highest specificity, might be preferable. Moreover, it has good negative predictive values (76.52%) and low positive predictive values (50%).

The limitations of our study were that we included only certain medical wards and not surgical specialties, we included only persons discharged home (no rehabilitation) and 5.45% of the participants were lost to follow up.

Conclusion and implications

In this external validation study, we showed that the SST score is a useful tool to predict the risk of early unplanned readmission of the elderly patients. The perspectives of this study are to integrate the score into medical software in order to assess its ability to be automatically calculated, thus facilitating its implementation.

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Table : Metrological characteristics of the scores

Score	Cut-off (≥)	Specificity (%)	Sensitivity (%)	npv* (%)	ppv* (%)	Accuracy (%)
ISAR	3	40.38	76.12	82.32	31.68	49.90
80+ Score	4	43.63	71.64	80.90	31.58	51.09
LACE	11	50.68	69.40	82.02	33.82	55.67
Nomogram	100	50.95	64.18	79.66	32.21	54.47
TRST	3	72.09	38.81	76.44	33.55	63.22
VIP	2	87.26	22.39	75.68	38.96	69.98
HOSPITAL	7	90.79	11.19	73.79	30.61	69.58
SST	3	91.87	22.39	76.52	50	73.36

*npv = negative predictive value, ppv = positive predictive value