

LACE Index Predicts High Risk of 30-Day Readmission

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The LACE index accounts for: Length of stay (L), Acuity of admission (A), Comorbidities (C), and recent Emergency department use (E). The incorporation of a high-risk LACE index showed favorable risk prediction and could be applied to predict 30-day readmission with chronic conditions.

Keywords: 30-day readmission ; hospital readmissions

1. Introduction

Hospital readmissions, especially unplanned ones are costly for the healthcare industry ^[1]. Readmission frequency is used to judge hospital quality as 30 days of unplanned readmission indicates the initial intervention was unsuccessful ^[2]. The Centers for Medicare and Medicaid Services (CMS) reported annual medical expenditures of \$17 billion as a result of hospital readmissions. CMS described chronic conditions with a high risk of frequent hospitalization as part of the 2010 Hospital Readmission Reduction Program (HRRP) ^[3].

The readmission rate metric was first developed in the United States (US) for quality improvement and cost reduction and is being used in several countries such as Canada ^[4], Australia ^[5], and the United Kingdom ^[6]. Policies such as the Affordable Care Act's (ACA) Hospital Readmission Reduction Program (HRRP) have attempted to improve quality by penalizing 30-day readmission rates above the national standard in the US ^{[4][5][6][7]}. Continuous quality improvement in local healthcare systems can lower readmission rates and cut costs, boosting the global economy. Beyond these assuagements, more sensitive methods and algorithms are needed to predict which patients are at risk of readmission before they are discharged.

There are several tools and scoring patterns that have been reported to measure or predict the risk of readmissions ^{[8][9][10]}. The LACE index is one of the most commonly used indices in the Canada ^{[9][10][11]}, and US ^{[12][13][14][15][16][17][18]}. The LACE index was first developed by van Walraven et al. ^[9] to predict the risk of unplanned readmission or death within 30 days after hospital discharge in medical and surgical patients. The model was derived and validated based on administrative data with a C-statistic of 0.68. The model includes the length of hospitalization stay (L), acuity of the admission (A), comorbidities of patients (C), and the number of emergency department visits in the six months before admission (E). Scores ranging from "0" to "19" and greater than ten are considered high risk for 30-day readmission ^[9]. The higher scores indicate a high risk of readmission. This tool is widely used primarily because of its simplicity makes it usable in day-to-day clinical practice ^{[9][10][11][12][13][14][15][16][17][18]}.

To this end LACE index was utilized in various settings including The Canadian Institute for Health Information (CIHI) evaluated the quality of care by suggesting 30-day unplanned readmissions in acute care that considered patient, hospital, and community factors ^{[4][10]}. The UK used the Emergency Readmission to Hospital within 28 Days of Discharge to monitor readmissions ^[19]. In Australia, the Ministry of Health of the Western Australia provincial government used 30-day unplanned readmissions for surgical events and all-cause admissions as a health service quality metric ^{[20][21][22]}. However, there is a question as to whether it is appropriate to apply the indicator in other regions across a range of settings and populations.

Multiple studies have been conducted to address the unplanned 30-day readmission after discharge from the hospital, which becomes an indicator of the quality of the healthcare system in South Korea ^{[23][24]} and also stands to benefit from a reduction in hospital readmissions. However, the readmission rate is an index that can be calculated using administrative data along with the mortality rate. As a result, discussion around the appropriate use of the LACE index has been emphasized. The risk prediction for 30-day readmissions in a health care facility is a very important concern for economic as well as quality considerations.

2. LACE Index Predicts High Risk of 30-Day Readmission

Numerous studies have been reported on the performance of the LACE index for 30-day readmission risk prediction, some of these have typically been conducted in small patient populations [14][16][25] of adults [26], middle [12][14][16][18][19][20][21], and older aged [10][11][13][15][17][22][27] group. The major disease conditions were included; cardiovascular disease [11][17][18], chronic obstructive pulmonary disease [20][21][25], all-cause [10][15][16][19][26][27] and neurosurgery [26][28]. These variabilities may be due to the varied disease settings including heart failure, craniotomy, neurosurgery, COPD, and pneumonia in the included studies. Interestingly, lung disease patients such as pneumonia and COPD appear to have the greatest risk of readmission, whereas all-cause is relatively low risk as expected. Variability may also be due to the use of LACE+ in addition to standard LACE. Despite a similar name LACE+ is quite different from LACE, having been derived from a logistic regression model [16].

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Most of the study findings performed the predictive model [11][17][18][19][20][21][22][23][24][25][26][28][29][30][31], the LACE index [10][11][12][13][14][15][16][17][18][19][20][21][22][25][26][27] although validated combined with hospital score [13][16][17], LACE index+ [13] by logistic regression analysis. A study compared the 30-day readmission and no readmission with different disease conditions, the overall pooled relative risk showed favorability in the prediction risk of 30-day readmissions. The variation in LACE score to predict all-cause readmissions [10][15][16][19][26][27] were cardiovascular, pulmonary conditions, and neurological conditions including surgery. Despite the potential heterogeneity of the meta-regression, it showed a significant and incremental effect of “favorable support” on reducing 30-day readmissions.

3. Conclusions

Numerous tools and models have been developed to predict hospital readmissions. However, some models are promising and easy to use with adequate discrimination such as the LACE index. It has the advantage of being available to identify the patients at high risk of readmission to receive interventions and potentially avoidable readmission. The LACE index can be applied to all hospitals that strive to optimize value-based medical care.

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