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Original research

The Predictive Accuracy of the CareMOSAIC Risk Assessment for Discharge Disposition in Medicare Bundle Patients After Total Joint Arthroplasty

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ABSTRACT

Background: This article evaluates the predictive accuracy of the CareMOSAIC Risk Assessment for discharge disposition in Medicare patients undergoing total joint arthroplasty.
Methods: Retrospectively collected data from a single institution on 499 consecutive Medicare patients who underwent primary total hip arthroplasty or total knee arthroplasty were reviewed. The CareMOSAIC Risk Assessment was completed by each patient during the preoperative period. The CareMOSAIC Risk Assessment scores were calculated via the CareMOSAIC software, and the scores indicate a risk category for each patient as it relates to post–acute care discharge needs.
Results: The CareMOSAIC Risk Assessment with a binary logistic regression area under the receiver operating characteristic curve of 0.798 appears to be a reliable tool for predicting discharge disposition. The assessment had a positive predictive value of 90.0% and negative predictive value of 76.3% for discharge disposition.
Conclusions: The CareMOSAIC Risk Assessment effectively predicts the discharge disposition for Medicare patients undergoing total hip or total knee arthroplasty.

Introduction

The aging population of the United States has led to an increase in demand for total joint arthroplasty (TJA). As the volume of TJA cases increases, the healthcare industry focuses on quality, cost containment, surgical outcomes, and overall value. It is often the postdischarge costs that drive up the total expenditures related to TJAs, and it is important to understand patient risk factors that predispose them to further postsurgical needs.

TJAs have become commonplace in the setting of orthopaedic surgery. The Centers for Medicare and Medicaid Services (CMS) data from 2014 indicate that almost 500,000 TJAs were performed in the U.S., costing $6.2 billion [1]. Research has projected that the number of total knee arthroplasties (TKAs) occurring in the United States will exceed 3.4 million per year by 2030 [2], with a projected cost of more than $11 billion a year [3]. Additionally, Medicare patients had a mean episode of care payment range of $25,568 for primary TJA in patients with no comorbidities to $50,648 for revision TJA in patients with significant comorbidities or complications [4]. Bozic et al. determined that postdischarge payments accounted for 36% of all total payments in Medicare patients undergoing TJA. Of all Medicare patients undergoing TJA, 49% of those patients were discharged to post–acute care (PAC) facilities, and that 49% of patients accounted for 70% of postdischarge payments [4]. Establishing predictive instruments that forecast discharge disposition will allow providers to prepare for discharge needs with some certainty.

Patients undergoing TJA are discharged to various locations such as home, home with home health, or PAC settings such as swing beds, skilled nursing facilities (SNFs), rehabilitation centers, or nursing homes. An evaluation of 106,360 patients undergoing TJA revealed that the more common discharge destinations include home (70%), SNF (19%), and inpatient rehabilitation facility (11%) [5]. The decision to discharge to a particular location is based on the

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patient's personal needs, physical skills, or medical status. It is essential that with the growing volume of TJAs being performed in the United States that healthcare organizations accurately identify those patients needing PAC and optimize their discharge plans before surgery.

London et al evaluated 14,315 TJAs throughout a 3-year period to determine the predictors of patient discharge location. It was determined that a patient's length of stay (LOS), age, illness severity, insurance, and physician affiliation played a role in determining discharge disposition. All non-Medicare patients were more likely to discharge home than the Medicare patients who were more likely discharged to an SNF or a rehabilitation center. Additionally, patients who were discharged home were, on average, 10 years young and stayed in the hospital for 0.7 fewer days [6]. London et al also determined that patients with less severity of illnesses were more likely to be discharged home, whereas patients with moderate, significant, or extreme severity of illness were more likely discharged to extended-care facilities.

Patients who live alone before undergoing a TJA may have an additional barrier for discharge to home after surgery. Fang et al evaluated 127 patients at a tertiary care academic hospital undergoing TJA who lived alone before surgery. Data analysis indicated that patients who lived alone were more likely to be discharged home if they were younger, were employed, were active, had a shorter LOS, had no expectation of being discharged to an SNF, and had a lower American Society of Anesthesiology score at the time of surgery. Further evaluation revealed that patient preference for discharge was the strongest predictor of discharge disposition, with patients wishing to go to an SNF being 29 times more likely to discharge there [7]. Although age and caregiver support at home were significant during a multivariate predictor analysis, it was patient expectations of discharge that was the most critical predictor of discharge disposition [8].

Keswani et al evaluated 106,360 patients undergoing TJA and assessed patient characteristics for associations with discharge disposition. When these researchers controlled for patient demographics, comorbidities, and severe adverse events before discharge, they were able to make some determinations about discharge disposition. Reliable indicators for patients requiring PAC placement included renal disease, prior dependent functional status, body mass index (BMI) > 40, severe adverse events before discharge, American Society of Anesthesiology classification of III or IV, pulmonary disease, bleeding-causing disorders, diabetes, steroids for chronic conditions within 30 days of surgery, hypertension, and history of smoking [5].

Although patient characteristics play a role in discharge disposition, it is also essential to understand discharge decision-making based on socioeconomic, geographic, and racial/ethnic factors. Inneh et al analyzed data on 7924 patients who underwent primary TJAs in an urban setting, and the data indicated that 5088 (64%) patients were discharged home and 2836 (36%) were discharged to a PAC setting. In a multivariate analysis, statistically significant predictors of discharge to a PAC setting include low-middle socioeconomic status, age, female gender, and TKA procedure. Patients who were non-black race/ethnicity were less likely to be discharged to a PAC facility [9].

With the inception of the bundled payment programs through CMS, healthcare providers are now responsible for the costs of the entire episode of care after the TJA. Researchers examined the costs associated with different PAC settings after participation in the CMS bundled payment program and demonstrated that the average cost of PAC for the 90-day episode was $4657 for home with health services, $11,719 for SNF, $3500 for home with home services after discharge from an SNF, and $9541 for a readmission [10]. Slover et al. [10] demonstrated that discharge to home was more cost-effective in the bundled payment program than was discharging to a PAC facility. The identification of risk factors will allow the healthcare team to implement strategies to optimize the patient, plan for discharge, maintain quality, and maintain patient outcomes.

The Risk Assessment and Prediction Tool (RAPT) is commonly utilized in the setting of TJA and is predictive of discharge disposition after a TJA. RAPT was developed by Oldmeadow et al. [11] through the use of logistic regression modeling and was based on 6 variables: age group, sex, walking distance, use of gait aid, use of community supports, and caregiver at home. Many healthcare institutions enrolled in the Medicare bundled payment programs have utilized the RAPT to assist with preoperative discharge planning to help identify patients who are at a low risk (score >9), medium risk (score between 6-9), or high risk (score <6) of discharge to a PAC facility. Slover et al. [12] evaluated RAPT and patient discharge disposition after TJA and concluded that RAPT was accurate in 73% of the high-risk group cases and 91% accurate in the low-risk group cases. These findings are consistent with previously reported data by Hansen et al. [13] that determined a 78% predictive accuracy rate for scores <6 and a 90% accuracy rate for scores >10. Based on the population sample, Hansen et al noted a 65.2% predictive accuracy for scores between 7 and 10. These researchers concluded that shifting the high-risk category to a score of <7 would help better identify patients potentially needing PAC placement. Overall, the RAPT has shown predictive accuracy for discharge disposition, and its implementation in the clinical setting has been thoroughly vetted and validated.

Workman et al set out to establish a tool that can be utilized by healthcare professionals on postoperative day 0 to help identify a patients' discharge disposition. The Predictor of Appropriate Discharge Destination (PADD) was developed as an extension to the RAPT. The PADD incorporated several of the RAPT metrics and added in functional metrics. The final instrument included variables such as gait distance, mobility-assist level, diagnosis, age, and gender [14]. Researchers have compared the patient's PADD score to the actual discharge destination in a retrospective and prospective sample. The investigators identified in the retrospective sample an 82.5% true-positive rate for discharge home, a 68.5% true-negative rate for those needing extended care services, a 31.5% false-positive rate, and a 17.5% false-negative rate. The investigators identified in the prospective sample an 83.4% true-positive rate for discharge home, a 74.5% true-negative rate for those needing extended care services, a 25.5% false-positive rate, and a 16.6% false-negative rate [14]. Overall, the investigators concluded that the PADD assessment demonstrated good predictive accuracy for determining the discharge destination.

The RAPT has been demonstrated [11] to be effective in determining discharge disposition. However, healthcare professionals continue to seek out instruments that will aid in their decision-making process to help improve patient outcomes and patient satisfaction.

The CareMOSAIC Risk Assessment is a preoperative questionnaire that has been developed to assist in making decisions about discharge disposition. The CareMOSAIC Risk Assessment is currently utilized as a part of the CMS Bundled Payment for Care Improvement program. The CareMOSAIC Risk Assessment consists of a 51-item questionnaire that assesses various aspects of a patient's social support, living arrangements, medical comorbidities, functional status, and mental status. A clinical staff member conducts the risk assessment, and each question is answered directly by the patient. The answers are then entered into the CareMOSAIC software, and through a Signature Care Management proprietary calculation, an overall risk score is determined. The CareMOSAIC Risk Assessment approaches risk stratification through the history of each patient. The

risk classification generated by the CareMOSAIC Risk Assessment reflects the patient's unique medical and social history. To date, the CareMOSAIC Risk Assessment has not been evaluated for its predictive accuracy of discharge disposition. Because the CareMOSAIC Risk Assessment has been deployed clinically and has been implemented for risk stratification in patients undergoing TJA, it is essential to proceed with evaluating the predictive accuracy of this risk assessment tool. The purpose of this study was to determine the CareMOSAIC Risk Assessment's predictive accuracy which has the potential to aid healthcare professionals in their decision-making process to better care for and manage their patients undergoing TJA.

Material and methods

A sample of 682 consecutive patients were reviewed for inclusion into this study; after applying inclusion and exclusion criteria, 499 patients were entered into the study. Retrospectively collected data from a single institution on 499 consecutive Medicare patients who underwent primary total hip arthroplasty (THA) or TKA from October 1st, 2018, to March 30th, 2020, were reviewed. We hypothesized that the CareMOSAIC Risk Assessment will predict the discharge disposition in the study participants. With a power level set at 80% and an alpha level of 0.05, the 499 participants provided a sufficient sample size to test the hypotheses.

Inclusion criteria were primary elective THA or TKA, age greater than 65 years, Medicare insurance, and patients who had preoperative CareMOSAIC Risk Assessment scores. Excluded from the study were patients who underwent conversion TJA, who underwent revision THA or TKA, who underwent unicompartmental knee arthroplasty, who underwent hip hemiarthroplasty, who are older than 65 years but did not use Medicare as their primary insurance, and with incomplete CareMOSAIC Risk Assessment scores. Patients with femoral neck fracture were excluded as they lacked the CareMOSAIC Risk Assessment scores.

The CareMOSAIC Risk Assessments were completed by each participant during the preoperative period (1-6 weeks before surgery) and facilitated by a single case manager. CareMOSAIC Risk Assessment scores are calculated via the CareMOSAIC software (2019). CareMOSAIC Risk assessment scores indicate a risk category for each patient as it relates to PAC needs;

- Low risk is indicated by a score >87%
- Medium risk is indicated by a score 71-86%
- High risk is indicated by a score <70%

Participant electronic medical records (EMRs) were reviewed to determine postoperative discharge disposition, which was categorized as home (home and home with home health care) vs PAC (SNF, swing-bed facility, rehab hospital, or nursing home).

Statistical analyses were conducted utilizing IBM SPSS Statistics, version 26 (IBM, Armonk, NY, USA). Descriptive statistics were used to describe the characteristics of the study participants. The study utilized a $P < .05$ for statistical significance. The association between CareMOSAIC Risk Assessment scores (cumulative and percent [%] score) and discharge disposition was assessed through binary logistic regression analysis. The effects of the logistic regression analysis were summarized as odds ratios with 95% confidence intervals (CIs). Following the logistic regression analysis, the predicted probabilities for discharge to home and discharge to PAC facility were calculated.

The performance of the logistic regression analysis was evaluated through both calibration and discrimination techniques. Calibration is the similarity between the probability of developing the outcome being evaluated and the frequency of that outcome in a group of patients [15]. The Hosmer-Lemeshow test was utilized as a calibration technique. In this technique, the predicted probabilities were stratified into categories, and a chi-square test was conducted on the observed and predicted outcomes for each category. A *P* value was calculated from the chi-square distribution to help determine the overall goodness of fit. A *P* value of >0.05 indicates a well-calibrated assessment, and a *P*-value <.05 indicates a poorly calibrated assessment [15].

Discrimination is the evaluation of the risk assessments' ability to differentiate between the study participants who experienced the outcome of interest and those who did not experience it. Discrimination is often evaluated by the C-index technique that determines the area under the receiver operating characteristic (AU-ROC) curve for the logistic model [15]. When evaluating a binary outcome, the concordance (c) statistic is equal to the AU-ROC curve, which plots sensitivity (p(true positive test)) against 1- (p(false positive rate)) for consecutive cutoffs for the probability of an outcome [16]. The C-index is a rank-order statistic for predictions against the true outcome measure. In general, the C-index is a chance that given 2 individuals, one will develop the outcome of interest and one will not; the model or assessment will assign a higher level of probability of an outcome to the former [17]. A C-index value of 0.5 indicates random predictions, and a value of 1.0 indicates an accurate prediction. A value > 0.8 has conventionally been used to indicate a strong predictive model [15]. Levels of discrimination are outlined by Hosmer et al. [18]. The AU-ROC was obtained for the dependent variable of discharge disposition.

Table 1
Descriptive statistics.

Variable	N = 499
	n (%)
Procedure	
TKA	305 (61.1%)
THA	194 (38.9%)
Age (γ)	
Mean	73.02
Median	72.00
Sex	
Male	194 (38.9%)
Female	305 (61.1%)
CareMOSAIC cumulative score (γ)	
Mean	75.60
Median	77.00
CareMOSAIC percent score (γ)	
Mean	84.01
Median	86.00
CareMOSAIC risk category	
Low risk	223 (44.7%)
Medium risk	245 (49.1%)
High risk	31 (6.2%)
Discharge disposition outcome	
Home	410 (82.2%)
Post–acute care	89 (17.8%)

Results

There were 499 patients included in the analysis; 305 had undergone a primary TKA, and 194 had undergone a primary THA. Descriptive statistics for patients who underwent TJA are

Table 2
Discharge destinations for CareMOSAIC risk categories.

Assessment risk category	Home	Post–acute care	Total
Low risk	210	13	223
Medium risk	190	55	245
High risk	10	21	31

Table 3
Logistic regression predicting likelihood of discharge home.

Assessment score	B	SE	Wald	df	*P*	Odds ratio	95% CI for odds ratio	
							Lower	Upper
Cumulative score	−0.162	0.020	68.60	1	.000	0.850	0.818	0.884
Percent score	−0.145	0.018	68.37	1	.000	0.965	0.836	0.895

summarized in Table 1. Discharge destinations for each CareMOSAIC Risk Category are summarized in Table 2.

Binomial logistic regression was used to ascertain the relationship between CareMOSAIC Risk Assessment cumulative scores, percent scores, and the likelihood that participants were discharged home. Linearity of the continuous variable with respect to the logit of the dependent variable was assessed via the Box-Tidwell [19] procedure. A Bonferroni correction was applied using all the terms in the model, resulting in statistical significance being accepted when $P < .05$ [20]. Based on this assessment, our continuous independent variable was found to be linearly related to the logit of the dependent variable. A casewise diagnostic procedure was performed to identify significant outliers in regard to the dependent variable. There were no cases that fell outside of 3 standard deviations. Cases that were in between 2 and 3 standard deviations were reviewed and evaluated. There were no errors with the data for these cases. As a result, the decision to include all data into the regression analysis was made to ascertain results that reflect the observed data. Therefore, all of the data from the 499 participants were included in the analysis.

The logistic regression model for the CareMOSAIC Risk Assessment cumulative score was statistically significant for discharge disposition, $\chi^2 = 90.286$, $P < .0005$. The model explained 27.2% (Nagelkerke R^2) of variance in discharge disposition and correctly classified 85% of cases. The sensitivity was 96.59%, specificity was 50.56%, positive predictive value was 90.00%, and negative predictive value was 76.27%. Predictor variable statistical findings are shown in Table 3. A Hosmer-Lemeshow test for calibration indicated a significant level of 0.292, indicating a well-calibrated assessment. The AU-ROC curve will quantify the discriminative power of a predictive instrument independently of the cutoff value utilized [21]. The ability of our model to discriminate between those who were discharged home and those who were discharged to PAC setting was measured using the AU-ROC curve analysis. The AU-ROC curve is equivalent to another often used statistic known as the C statistic or concordance statistic which is used to describe model discrimination. Therefore, an AU-ROC curve statistic of 1.0 indicated a perfect diagnosis and 0.5 represented chance. The AU-ROC curve (Fig. 1) was 0.798 (95% CI, 0.748 to 0.848), which is an acceptable level of discrimination according to Hosmer et al. [18].

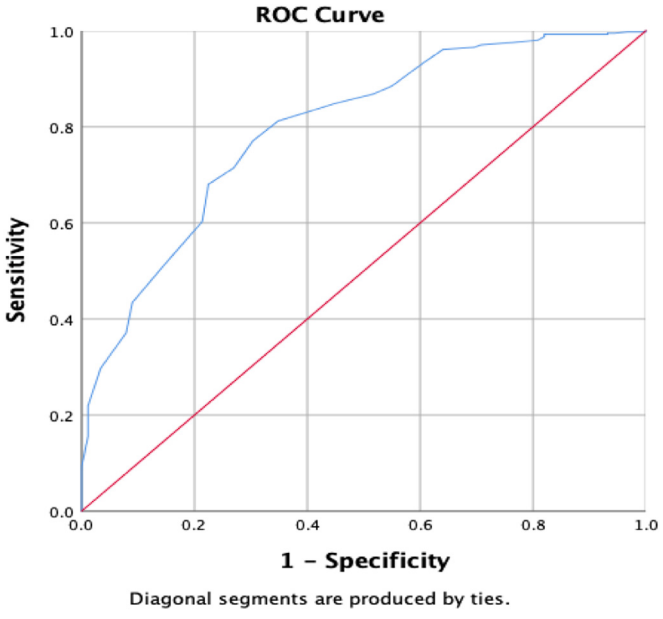

Figure 1. Logistic regression analysis: The receiver operating characteristic (ROC) curve for the sensitivity and specificity of the CareMOSAIC Risk Assessments cumulative score for discharge disposition. Area under the receiver operating curve (AU-ROC) is 0.798.

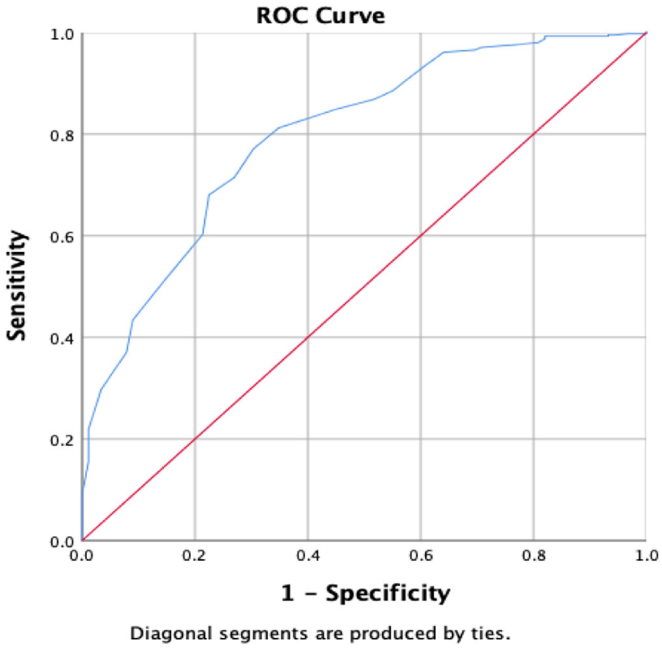

Figure 2. Logistic regression analysis: The receiver operating characteristic (ROC) curve for the sensitivity and specificity of the CareMOSAIC Risk Assessment percent (%) score for discharge disposition. Area under the receiver-operating curve (AU-ROC) is 0.798.

The logistic regression model for the CareMOSAIC Risk Assessment percent (%) score was statistically significant for discharge disposition, $\chi^2 = 89.611$, $P < .0005$. The model explained 27.0% (Nagelkerke R^2) of variance in discharge disposition and correctly classified 85% of cases. The sensitivity was 96.59%, specificity was 50.56%, positive predictive value was 90.00%, and negative predictive value was 76.27%. The Hosmer-Lemeshow test for calibration indicated a significant level of 0.232, indicating a well-calibrated assessment. The AU-ROC curve (Fig. 2) was 0.798 (95% CI, 0.748 to 0.848), which is an acceptable level of discrimination according to Hosmer et al.

Discussion

Patients undergoing TJA are discharged to home, home with home health, or PAC settings such as swing beds, SNFs, rehabilitation centers, or nursing homes. Deciding to discharge a patient to a particular location is based on the patient's personal needs (living arrangements, social support, financial means, and transportation), physical skills, or medical status. Research has linked discharge to PAC settings as a significant contributor to TJA expenditures and has shown these discharge locations to be associated with poor outcomes and higher incidence of complications and readmissions [22]. As such, many medical providers' priority is to identify those

Table 4
CareMOSAIC risk assessment performance measure comparison.

Study	Risk assessment	Outcome	Performance measure
Current study (2021) (unpublished data) (cumulative score)	CareMOSAIC	Discharge disposition	C statistic (AU-ROC): 0.798 Sensitivity: 0.966 Specificity: 0.506 PPV: 0.90 NPV: 0.763
Oldmeadow et al. (2003) [11] Hansen et al. (2015) [13]	RAPT	Discharge disposition	Predictive accuracy with internal validation: 74.6%; external validation: 78%
Workman et al. (2020) [14]	PADD	Discharge disposition	C statistic (AU-ROC): 0.82 Sensitivity: 0.83 Specificity: 0.68 PPV: 0.85 NPV: 0.65
Barsoum et al. (2010) [23]	PLAN	Discharge disposition	C statistic (AU-ROC): 0.867

NPV, negative predictive value; PPV, positive predictive value.

patients who can be safely discharged home. With reliable identification of discharge needs, there can be a more efficient utilization of beds at the PAC facilities, which will reduce the LOS and improve overall patient satisfaction [23]. Additionally, those who have a higher likelihood of going home can make arrangements for postoperative support systems, and patients may develop a sense of confidence as healthcare professionals can better manage expectations for discharge [23]. The development of predictive instruments for the clinical setting continues with aspirations of accurately identifying all patients' needs.

The CareMOSAIC Risk Assessment with a logistic regression C statistic or AU-ROC curve of 0.798 and a well-calibrated assessment calculated by external validation appear to be an accurate tool for predicting discharge disposition after a TJA. The model shows that without the independent (cumulative and percent score) variables included, the “best guess” assumes that all participants will be discharged home. If this were to be assumed, the model would correctly classify 82.2% of all discharges. If the independent variables are included separately in the model, the model now correctly classifies 85.0% of all discharges. Although this +2.8% increase in classifications may seem negligible, when applying this model to thousands of patients who underwent TJA, this increase in classification reliability could have a profound effect.

To evaluate the CareMOSAIC Risk Assessment performance measures, one must compare its predictions with other established risk assessments (Table 4). Comparatively, predictive instruments such as the RAPT have been investigated and found to have predictive accuracy measures of 74.6% with internal validation [11] and 78% with external validation [13]. Furthermore, the PADD instrument evaluated by Workman et al. was found to have an AU-ROC curve of 0.82 for retrospective data, along with a sensitivity of 83%, a specificity of 68%, a positive predictive value of 85%, and a negative predictive value of 65%. The Predicting Location after Arthroplasty Nomogram created and evaluated by Barsoum et al. had a prediction accuracy with a C statistic of 0.867. These statistical findings align with the data established during the analysis of the CareMOSAIC Risk Assessment. The CareMOSAIC Risk Assessment correctly predicted the patients who were discharged home 96.59% of the time (sensitivity) and correctly predicted participants discharging to a PAC facility 50.56% of the time (specificity). The CareMOSAIC Risk Assessment had a positive predictive value of 90.00% and a negative predictive value of 76.27%. The CareMOSAIC Risk Assessment model results show that it is more successful in accurately predicting patients who are discharged home than those discharged to a PAC facility.

An AU-ROC curve ranges from 0.5 (signals cannot be distinguished from noise) to 1.0 (perfect performance). The AU-ROC curve is interpreted as the proportion of times the risk assessment would correctly identify the signal if the signal (home discharge) and noise (PAC discharge) were presented simultaneously [24]. Thus, with logistic regression, the CareMOSAIC Risk Assessment has an AU-ROC curve of 0.78 with the cumulative and percent (%) scores. Therefore, the use of the CareMOSAIC Risk Assessment preoperatively for planning postoperative discharge needs is an effective tool. The CareMOSAIC Risk Assessment can help identify patients who may need some targeted intervention or optimization before surgery to increase their likelihood of being discharged home. Given that the CareMOSAIC Risk Assessment's performance measures are comparable with previously published assessments, its clinical utilization may be negatively impacted by the cumbersome process needed to complete the assessment. The CareMOSAIC Risk Assessment is longer than other assessments and requires access to software that generates the score and risk classification. This study did not analyze the stepwise approach to building the CareMOSAIC Risk Assessment model but instead evaluated the outcomes associated with the risk assessment itself. Future investigations should focus on the stepwise approach to the creation of the risk assessment. This study does, however, provide evidence of the CareMOSAIC Risk Assessment's effectiveness in predicting the discharge destination for Medicare patients undergoing THA or TKA.

The study's limitations include using a single-center design and the use of a majority-white patient cohort. We expect our estimations of postoperative discharge disposition to exhibit varying results in a sample with more variability. The extrapolation of our findings to other healthcare settings may be limited. The research team performed a thorough chart review; however, some patients may have been inadvertently missed during the chart review process. Additionally, patients with missing or incomplete data were excluded from the study, affecting the overall statistical evaluation. This study aimed to evaluate the CareMOSAIC Risk Assessment's predictive accuracy in the elderly, Medicare patients undergoing elective, primary inpatient TJA.

Further research should evaluate the CareMOSAIC Risk Assessment in the revision and outpatient TJA circumstances. Additionally, this study does not have a control cohort, as our institution was not collecting CareMOSAIC Risk Assessment data before the entrance into the Medicare Bundled Payment Program. As such, the findings of this study could be enhanced by utilizing a separate cohort of patients. Another limitation to consider is how the knowledge of a patient's risk score informs clinical practice. A high-risk score would generate an intervention to reduce the risk of a harmful outcome occurring. Therefore, if the interventions were successful, the patient's risk for harm would be reduced, weakening the association between the risk score and a particular outcome [25].

This study utilized one nurse case manager who conducted all of the CareMOSAIC Risk Assessments on the study participants. Throughout this study, our institution’s procedures dictated that

the nurse case manager acknowledged when a patient was considered high risk for needing discharge placement to an acute care setting. As a result, the nurse case manager was authorized to intervene and help establish discharge plans for high-risk patients and help medically optimize patients before surgical intervention. The nurse case manager's role and any intervening measures may increase discharge disposition to home postoperatively.

Furthermore, this study evaluated the predictive accuracy of the CareMOSAIC Risk Assessment instrument. The investigation of predictive accuracy is not the same as validating the modeling process for the instrument's development. This study was only able to externally validate the outcomes associated with utilizing the CareMOSAIC Risk Assessment instrument. Further research into the stepwise measures utilized is needed to further develop the CareMOSAIC Risk Assessment instrument and perform additional internal validation studies.

One delimitation of this study included utilizing an extensive data set of reliably collected data extracted from an EMR. The larger, more diverse sample may provide some additional confidence in our findings, while the EMR data collection process helped reduce any transcription errors. This study evaluated a consecutive number of Medicare patients who underwent primary TJA to reduce the potential of bias. Furthermore, this study carefully defined inclusion and exclusion criteria, which helped reduce any potential study bias. By using CareMOSAIC Risk Assessment scores, we were able to classify patients according to their risk, thereby minimizing potential misclassification bias in our study participants. In utilizing one nurse case manager, the CareMOSAIC Risk Assessment's rater unreliability was minimal across the data for this study. This study had clearly defined outcome measures that reduced the possibility of outcome misclassification.

Conclusions

Risk stratification of patients undergoing TJA will continue to improve as long as quality improvement initiatives are implemented. Clinicians and researchers continue to work to develop and implement a risk assessment that has good predictive accuracy, along with easy administration and interpretation abilities.

The present research evaluated the CareMOSAIC Risk Assessment's predictive accuracy for discharge disposition in Medicare patients undergoing total joint replacement. There are no peer-reviewed reports on evaluating the CareMOSAIC Risk Assessment in this manner. The present results provide outcome estimates for the CareMOSAIC Risk Assessment, which allow medical professionals to base patient management decisions on evidence-based findings, and presumably, improving patient outcomes. This study provides evidence that the CareMOSAIC Risk Assessment effectively predicts the discharge destination for Medicare patients undergoing THA or TKA.

Conflicts of interest

The authors declare that there are no conflicts of interest. There was no outside funding or grants for this study.

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