More than 90 million surgeries are performed annually in the United States; 80% of patients experience pain after surgery. Patients at least 18 years old receiving opioids after common orthopedic and soft tissue surgeries (Table 1) experienced one or more ORADEs compared to only 6.9% of low-risk patients. In addition to predicting overall AEs as designed, the final composite risk score identified a high-risk group of patients with up to 10 times the ORADE rate of low-risk patients. When used in combination with current ORADE prevention and management strategies, this tool may provide a foundation for identifying patients at risk for postsurgical ORADEs.

## Methods

### Study Design and Setting

This retrospective cohort study utilized administrative data from the Memorial Hermann Health System, the largest non-profit health system in Texas, USA, containing 36 hospital locations in a 17-county area. Patients were included in the study if they were at least 18 years old, received opioids after common orthopedic and soft tissue surgeries, and had at least one ORADE during hospitalization. Patients were classified as high-risk (≥0.8872) or low-risk (<0.8872) based on the risk score.

### Variables

Risk factors included age, gender, race/ethnicity, smoking status, obesity, and comorbid diagnoses such as diabetes, hypertension, hyperlipidemia, osteoarthritis, depression, osteoporosis, obesity, chronic renal disease, CHF, and malignancy. Previous research and biologic plausibility were used to select candidate risk factors. Finally, statistically significant risk factors identified in univariate analysis were selected for the final risk score models.

### Study Sample

A total of 1,420 patients (29.1%) were classified as high-risk (24.5% of men and 31.5% of women). Overall, 22.0% of high-risk patients experienced one or more ORADEs compared to only 6.9% of low-risk patients. In addition to predicting overall AEs as designed, the final composite risk score identified a high-risk group of patients with up to 10 times the ORADE rate of low-risk patients. When used in combination with current ORADE prevention and management strategies, this tool may provide a foundation for identifying patients at risk for postsurgical ORADEs.

### Results

The best risk score model, illustrated in Table 3, was a composite of predictors that included specific risk factors and a risk of ≥0.8872, which is consistent with previous research (Achenbach et al., 2011). The model was developed using receiver operator characteristics (ROC) analysis and by calculating sensitivity, specificity, and area under the curve (AUC). All of the final models were evaluated in high-risk patients. The best risk score model was highly predictive of ORADEs in the patient population.

### Limitations

Many of the predictor variables were estimated by indirect distribution of numeric values due to lack of precision. Future research should aim to develop more accurate and precise ORADE risk factors to improve the predictive value of the model. Lack of control to chart review analysis using administrative data results in less specific inpatient data in coding errors, potential for under or over coding of ICD-9 CM codes for ORADEs and ORADE risk factors.

### Conclusion

The best risk score model, illustrated in Figure 2, was a composite of predictors that included specific risk factors and a risk of ≥0.8872, which is consistent with previous research (Achenbach et al., 2011). The model was developed using receiver operator characteristics (ROC) analysis and by calculating sensitivity, specificity, and area under the curve (AUC). All of the final models were evaluated in high-risk patients. The best risk score model was highly predictive of ORADEs in the patient population. The final models may be used to identify patients at risk for postsurgical ORADEs in the population. The economic burden to hospital systems.

### References


