Title:
Prediction of Severe Postoperative Pain: Modification and Validation of a Clinical Prediction Tool

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Session Title:
Tools in Health Promotion
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9:20 AM

Keywords:
Severe Pain, Postoperative and Prediction Tool

References:


Abstract Summary:
Pre-operatively predicting patients at risk for severe postoperative pain may improve postoperative pain management, patient outcomes, and patient satisfaction. This study shows severe postoperative pain can be predicted through the use of a simple modified validated prediction equation.

Learning Activity:

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<th>LEARNING OBJECTIVES</th>
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<td>1. Appraise the evidence to assess the relationship between preoperative predictors and the development of severe postoperative pain.</td>
<td>1. Magnitude of Postoperative Pain 2. Evidence in the literature of Pain Predictors 3. Predictors of Interest</td>
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<td>2. Show patients at risk for the development of severe postoperative pain can be easily identified preoperatively through the use of a prediction tool for clinical practice.</td>
<td>4. Variables of Measurement 5. Data Analysis 6. Results 7. Discussion</td>
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Abstract Text:

Purpose: Under management of postoperative pain continues to exist with the incidence of moderate to severe postoperative pain reported to be as high as 25%-76% (Apfelbaum, Chen, Mehta, & Gan, 2003; Huang, Cunningham, Laurito, & Chen, 2001; Pavlin, Chen, & Penaloza, 2002; Rocchi, Chung, & Forte, 2002; Svensson, Sjostrom, & Haljamae, 2001). As a result, patients suffering from postoperative pain not only face increased rates of morbidity and mortality but also report decreased satisfaction with care (Agostini et al., 2010; Ferguson, Celauro, & Prachand, 2011). Early identification pre-operatively through the use of a prediction tool of patients at risk for severe postoperative pain may improve postoperative pain management, patient outcomes, and patient satisfaction.

Methods: A retrospective quantitative study design was conducted to examine the preoperative factors associated with the development of severe postoperative pain. The study sample was collected from the electronic health records (EHR) of all surgical patients at the University of Miami Hospital from October 2014 through April 2015. The first four months of data (N=1,794) was abstracted from the EHR to test the measurement and structural model using structural equation modeling (SEM), and to develop a prediction tool utilizing the regression coefficients. Validation utilized an independent sample (n = 1961) to confirm the prediction tools ability to predict severe postoperative pain.
Results: Preoperative predictors were gender, age, ethnicity, preoperative pain intensity, type of surgery, and baseline hemodynamic heart rate and blood pressure. Structural equation modeling (SEM) examined the factors to determine the relationship between the predictive variables and severe postoperative pain, a numerical rating scale (NRS) of ≥ 6. Results from the initial analysis supported independent links between baseline heart rate, preoperative pain intensity, expected surgical pain (low, moderate, high, highest), age, female gender, and Hispanic ethnicity to severe postoperative pain on postoperative day one (POD 1). The discrimination for the final model was fair, based on the receiver operator characteristic (ROC) curve 0.714.

Following development of the prediction model, the validity of the prediction equation was determined through use of an independent validation dataset (n=1,961). Using a data-derived cutoff point of 0.20, obtained from the ROC curve, the predicted scores were compared to the reported scores of severe postoperative pain showing a sensitivity of 73.33% and a specificity of 74.40%. An additional cutoff pint of 0.14 was analyzed, which showed an improved sensitivity of 74.19% and a specificity of 57.33%.

Conclusion: The study further demonstrates that severe postoperative pain can be predicted through the use of a simple modified validated prediction equation. Utilization of separate cutoff points allows for the development of intervention strategies based on the need for a higher sensitivity versus higher specificity. The developed prediction equation provides a tool for clinically anticipating patients at risk for the development of severe postoperative pain on postoperative day 1.

Although the prediction equation was validated through the use of a large validation sample of 19 individuals, further validation studies should be conducted in various geographical and clinical practice settings. It is yet to be seen if the application of the prediction equation might improve the management of severe postoperative pain but predicting individuals is an approach that has been utilized by a number of professions improving clinical outcomes. Future research is needed to show if preoperative measures and interventions based on the prediction equation improve postoperative pain management, and therefore decrease the incidence of severe postoperative pain. Without the combination of both identifying and managing of severe postoperative pain, another decade will pass with little change in patient pain outcomes.