Centene Center
for HEALTH TRANSFORMATION

Trauma Recidivism and Musculoskeletal Injury – Can We Identify Opportunities for Secondary Prevention?

PURPOSE OF THE STUDY

To determine the frequency and risk factors of trauma recidivism among Medicaid beneficiaries.

STUDY AIMS

Aim 1: Describe the frequency and factors associated with trauma recidivism among a Medicaid managed care population.

- Hypothesis 1: Patients from the most disadvantaged neighborhoods and with a history of substance abuse and mental health diagnoses are at higher risk for trauma recidivism.

Aim 2: Describe the frequency and patterns of musculoskeletal injury that are associated with trauma recidivism.

- Hypothesis 2: Trauma recidivists are at significantly increased risk for more frequent and more debilitating musculoskeletal injuries than non-recidivists over the same time period.

STUDY BACKGROUND

The health, economic and societal burdens of interpersonal violence in the United States are remarkable, as non-fatal violent injury led to 1.6 million emergency department visits, 140,810 hospitalizations, and total costs over $31 billion in 2010 (CDC Data and Statistics [WISQARS]). For those individuals who survive interpersonal violence, the risk of another violent injury ("trauma recidivism") is substantial, with an estimated frequency ranging from 10-25 percent (Kaufman 2016). Violence intervention programs have shown potential to decrease future events, but the results are inconsistent (Strong 2016). This indicates the need for a better understanding of the population at risk to maximize the success of interventions targeting behavioral change.

Survivors of interpersonal violence are often afflicted by musculoskeletal trauma. These injuries to the spine, pelvis and extremities include bone fractures, joint dislocations, nerve injuries, open wounds and traumatic amputations. The opportunity to identify individuals at risk for trauma recidivism may allow the prevention of a second injury that could have life-altering consequence. It is conceivable that a patient who "walks away" from one assault relatively unscathed is at risk for a future injury that may be much more debilitating, like a brachial plexus injury from a gunshot wound that leads to complete loss of upper extremity function.

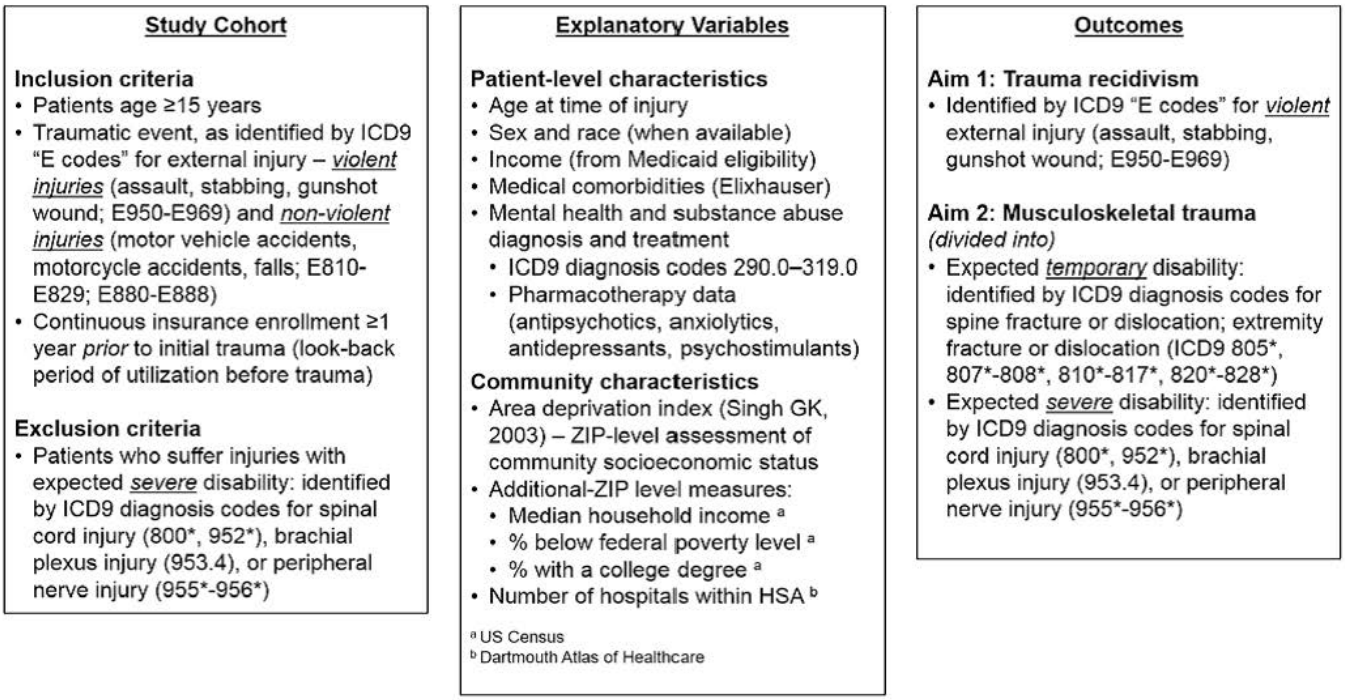
BRIEF DESCRIPTION

Patients who experience a traumatic injury are at potential risk for a second violent trauma ("trauma recidivism") and a more severe second injury. We will use the longitudinal claims data from Centene to identify patients and the frequency and risk factors for trauma recidivism and debilitating musculoskeletal injury. We will focus on the influence of mental health and substance abuse disorders on the likelihood of a second trauma. We expect these findings to enable a greater understanding of opportunities for secondary and tertiary prevention via behavioral change (such as violence prevention programs) and improved access to mental health resources.

STUDY METHODS

We will focus on the group previously identified as at highest risk for trauma recidivism: working-age Medicaid patients who are typically from socioeconomically disadvantaged neighborhoods (Chong 2016; Brooke 2006; McCoy 2013). Our prior work (Morris/Dy 2016; Mancuso/Dy 2014) and studies from other centers (Franzblau 2014; Nota 2015) have demonstrated the influence of mental health on outcomes following severely debilitating musculoskeletal injury, highlighting this as an opportunity to improve delivery of care for these patients. In

order to accomplish the research methodology described below, we will request access to data regarding member demographics, enrollment and eligibility information; all medical claims from inpatient and outpatient facilities and providers; and all pharmacy claims. We will request these data for the entire duration that claims data are available in the maximum number of states available, but ideally from 2005 through 2015.



Following assembly of the cohort described above, we will use separate hierarchical multivariable Cox survivorship models to examine potential associations between the explanatory variables and time-to-event for the outcomes of interest – trauma recidivism (Aim 1) and severely debilitating musculoskeletal trauma (Aim 2). We will examine patient-level and community-level characteristics in these models, but will control for year and state fixed effects to adjust for unobservable variation among states and years for the index trauma event. Any patients who die in the time period following the index trauma event will be censored.

The complete nature of Centene data allows us to include surrogate markers for access to care and utilization of other medical services, such as primary care and non-trauma emergency department visits. In addition to using the Area Deprivation Index (Singh 2003), additional community and facility characteristics from the U.S. Census and Dartmouth Atlas of Healthcare will be included, as detailed above. We will capture the 30 comorbidities in the Elixhauser algorithm to include them as covariables, as comorbidities may influence outcomes following trauma (Duron 2012). All potential predictors will be included unless the model becomes unstable, at which time we will use a variable reduction process based on adjusted p-values (least significant removed first). Interaction between predictors will be assessed systematically with significant interaction terms retained to improve fit. I will work with Margie Olsen's team at the WU Center for Administrative Data Research to conduct this advanced modeling.

REFERENCES

1: Brooke BS, Efron DT, Chang DC, Haut ER, Cornwell EE 3rd. Patterns and outcomes among penetrating trauma recidivists: it only gets worse. J Trauma. 2006 Jul;61(1):16-9. PMID: 16832245.

2: Chong VE, Lee WS, Victorino GP. Neighborhood socioeconomic status is associated with violent reinjury. J Surg Res. 2015 Nov;199(1):177-82. PMID: 25986212.

3: Duron VP, Monaghan SF, Connolly MD, Gregg SC, Stephen AH, Adams CA Jr, Cioffi WG, Heffernan

DS. Undiagnosed medical comorbidities in the uninsured: a significant predictor of mortality following trauma. J Trauma Acute Care Surg. 2012 Nov;73(5):1093-8. PMID: 23117376.

4: Franzblau LE, Maynard M, Chung KC, Yang LJ. Medical treatment decision making after total avulsion brachial plexus injury: a qualitative study. J Neurosurg.2015 Jun;122(6):1413-20. PMID: 25839930.

5: Kaufman E, Rising K, Wiebe DJ, Ebler DJ, Crandall ML, Delgado MK. Recurrent violent injury: magnitude, risk factors, and opportunities for intervention from a statewide analysis. Am J Emerg Med. 2016 Sep;34(9):1823-30. PMID: 27460511.

6: Mancuso CA, Lee SK, Dy CJ, Landers ZA, Model Z, Wolfe SW. Expectations and limitations due to brachial plexus injury: a qualitative study. Hand (N Y). 2015 Dec;10(4):741-9. PMID: 26568734.

7: McCoy AM, Como JJ, Greene G, Laskey SL, Claridge JA. A novel prospective approach to evaluate trauma recidivism: the concept of the past trauma history. J Trauma Acute Care Surg. 2013 Jul;75(1):116-21. PMID: 23778450.

8: Morris MT, Daluiski A, Dy CJ. A Thematic Analysis of Online Discussion Boards for Brachial Plexus Injury. J Hand Surg Am. 2016 Aug;41(8):813-8. PMID: 27311862.

9: Nota SP, Bot AG, Ring D, Kloen P. Disability and depression after orthopaedic trauma. Injury. 2015 Feb;46(2):207-12. PMID: 25015790.

10: Singh GK. Area deprivation and widening inequalities in US mortality, 1969-1998. Am J Public Health. 2003 Jul;93(7):1137-43. PMID: 12835199.

11: Strong BL, Shipper AG, Downton KD, Lane WG. The effects of healthcare-based violence intervention programs on injury recidivism and costs: A systematic review. J Trauma Acute Care Surg. 2016 Aug 18. [Epub ahead of print] PMID: 27537505.