

THE GRADUATE COLLEGE OF THE  
UNIVERSITY OF OKLAHOMA HEALTH SCIENCES CENTER

ANNOUNCES THE FINAL EXAMINATION OF

# Kaitlin McGrew

FOR THE DEFENSE OF THE DOCTOR OF PHILOSOPHY DEGREE  
GRADUATE COLLEGE

*Department of Biostatistics and Epidemiology*



Monday, April 29, 2019 | 9:00 am  
Hudson College of Public Health | Room 320

## *Estimation of and Correction for Misclassification of Injection Drug Use Status among Infective Endocarditis Hospitalizations*

COMMITTEE IN CHARGE: Tabitha Garwe, PhD, Co-Chair; Hélène Carabin, DVM, PhD, Co-Chair; Mary B. Williams, PhD; Yan Daniel Zhao, PhD; Douglas A. Drevets, MD; S. Reza Jafarzadeh, DVM, PhD

ABSTRACT: Apparent increases in hospitalization for injection drug use (IDU)-associated infections have been observed concurrently with the progression of the US opioid epidemic. Evaluating the true impact of IDU on infectious morbidity and health care use is challenged by the lack of International Classification of Diseases (ICD) codes specific to IDU. Prior research has used surrogate ICD codes corresponding to broad illicit drug use disorders or Hepatitis C Virus (HCV) to measure IDU, which likely leads to misclassifying IDU status and consequently biased estimates of prevalence and measures of association. This work aimed to (1) conduct a systematic review of validation studies of ICD code algorithms for illicit drug use; (2) perform a single-center validation study of ICD algorithms to estimate the IDU prevalence among infective endocarditis (IE) hospitalizations without a reference standard using Bayesian latent class models (BLCM); (3) use BLCM to estimate the misclassification error (ME)-adjusted prevalence and prevalence proportion ratios (PPR) of IDU among IE hospitalizations in the 2007-2016 National Inpatient Sample (NIS). In Aim 1, five validation studies of ICD algorithms were found in the literature, all demonstrating imperfect classification characteristics. In Aim 2, based on the review of 321 medical charts of patients hospitalized for IE, an ICD algorithm for broad drug use disorders demonstrated a higher sensitivity with ICD-10 codes relative to ICD-9 codes. A combination drug/HCV ICD algorithm demonstrated the lowest specificity. Unadjusted IDU prevalence estimates produced by the drug algorithm underestimated the ME-adjusted IDU prevalence, while unadjusted prevalence estimates produced by the combination algorithm resulted in overestimation. In Aim 3, estimates of ICD algorithm sensitivity and specificity from Aim 2 were used as Bayesian priors. After ME-adjustment, the prevalence of IDU among IE hospitalizations increased consistently between 2008 (posterior median=10%, 95% Bayesian probability interval [BPI]: 6%, 15%) and 2016 (posterior median=35%, 95% BPI: 30%, 40%). This study demonstrated that ME-adjustment is critical when conducting ICD-based studies to accurately reflect the evolution of IDU-associated infections through time. Moreover, such adjustment will be crucial to monitor the impact that public health interventions will have on offsetting the consequences of the opioid crisis.