Title: A Population-based Approach to Sudden Unexpected Death

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Introduction: Sudden cardiac death accounts for 150,000 to 400,000 deaths in the United States annually. Published studies of sudden death use restrictive inclusion criteria such as timing of death, death-certificate disease attribution, hospital transport, attempted resuscitation, and victim survival status. These case definitions may undercount minority victims, victims who are socially isolated, or victims with limited healthcare access, leading to mischaracterization of sudden death in the general population. The SUDDEN study is a population-based epidemiologic analysis of out-of-hospital sudden unexpected death (OHSUD) in North Carolina that aims to characterize OHSUD incidence in the general population and identify associated risk factors.

Methods: Wake County, North Carolina, is a predominantly urban county with approximately 4,700 adult deaths in a 2013 population of 974,289. All possible sudden unexpected deaths over one year in Wake County were collected via EMS. Death certificates, medical records, and post mortem examination data were used to determine demographic information and comorbidities. Of 1,138 18- to 64 year olds identified as possible OHSUD victims, 187 cases were adjudicated into the study population. Population-based estimates were age- and sex-standardized to 2013 North Carolina mortality tables to estimate a statewide OHSUD count.

Results: Out-of-hospital sudden unexpected death accounted for approximately 14% of all deaths in adults under age 65. Up to 13.5% of all 2013 Wake County deaths outside of a healthcare institution were attributable to OHSUD. Approximately 2/3 of SUDDEN cases would have been excluded by timing criteria in commonly used sudden death case definitions. Hypertension, ischemic heart disease, hypercholesterolemia, COPD, and diabetes were all highly prevalent in Wake County OHSUD victims.

OHSUD accounted for 48% of deaths in 18- to 64-year-olds with diseases of the heart, stroke/cerebrovascular disease, or chronic lower respiratory disease listed as the cause of death. 52% of all 2013 OHSUD in Wake County listed a cardiac primary cause on the death certificate; 37% were listed as having non-cardiac causes, with the remaining listing an unknown or a non-natural cause (e.g., trauma). Excluding non-cardiac causes of death would misclassify over 1,500 OHSUD victims per year in North Carolina alone.

Discussion: Sudden death incidence estimates vary widely according to published exclusion criteria, leading to a mischaracterization of a disease that needs to be addressed on a national level. Restrictive exclusion criteria used in published studies of sudden death underestimate the incidence of OHSUD and divert resources from populations that would benefit the most from targeted interventions.