

## **Differences in Risk Factors and Primary Cause of Sudden Unexpected Death by Timing Criteria**

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### **Abstract**

**Background:** The World Health Organization (WHO) criteria for sudden unexpected death (SUD) describes either witnessed death or unwitnessed death occurring no more than 24 hours after the subject was last seen alive. Sudden Unexpected Death in North Carolina (SUDDEN) is a population-based study of out-of-hospital unexpected deaths using a clinical definition of sudden death without restrictions on the timing of death. Use of time-limiting definitions was found to underestimate the incidence of SUD by 4 to 19 fold. We sought to explore the characteristics and risk factors of this underestimated population.

**Methods:** From March 2013 to March 2014, all cases of possible sudden unexpected death were identified from electronic query of the Wake County EMS database. Expected deaths were excluded and independent cardiologists made determination for cohort inclusion by review of medical history. We stratified the cohort by timing of death (less than 24 hours versus above 24 hours and unknown) and analyzed the observed difference in incidence between the two groups.

**Results:** Out of 1138 total EMS referrals, 190 were adjudicated as SUD cases into the final cohort. SUDDEN captured 70% more people than studies that used WHO-based criteria. In comparison with cases excluded by WHO criteria, cases meeting WHO criteria were younger ( $50.1 \pm 9.8$  years  $54.5 \pm 8.2$  years,  $p < 0.001$ ) and had a higher likelihood of a medical examiner issued death certificate (86.3% vs. 34.9%). WHO-based criteria also include significantly more cases with the primary cause of death listed as unknown ( $p < 0.01$ ). Differences between the groups for BMI, smoking status and dyslipidemia were suggestive. There were no time-based differences in other comorbidities (coronary artery disease, diabetes mellitus, and hypertension) or demographic risk factors (race, gender, marital status, and educational status).

**Conclusion:** Time-limiting definitions underestimate SUD incidence. Preliminary study shows trends in some demographic and clinical characteristics between SUDDEN and WHO-recommended criteria. An expanded study sample of a population-based cohort similar to SUDDEN is needed to understand the differences in this often misclassified population.