The Association of Metabolic Syndrome With Premature Out-of-Hospital Sudden Death

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Purpose

- Metabolic Syndrome (MetS) is defined by the presence of at least three established cardiovascular risk factors: Increased waist circumference (WC), elevated triglycerides (TG), low high-density lipoprotein cholesterol (HDL-C), elevated blood pressure (BP) or on an antihypertensive, and elevated fasting glucose (FG) or on glucose-lowering treatment.
- This cluster of risk factors multiplies the risk of sudden death beyond each risk factors' individual contribution.

We hypothesize that there is a higher prevalence of MetS and the individual components, and a greater association of out-of-hospital sudden death (OHSD) compared to a national sample of the US population.

Methods

- From March 1, 2013 to February 28, 2015 all out-of-hospital deaths reported by emergency medical services (EMS) aged 18-64 were adjudicated using EMS narratives, medical records, medical examiner reports and/or post-mortem examinations in Wake County (pop. ~ 950,000), North Carolina (NC), United States (Figure 1).
- A comparison group was formed of NHANES 2009-10 participants (Figure 2).
- MetS was defined as presence of ≥ 3 of the pre-established criteria as outlined by the National Cholesterol Education Program Adult Treatment Panel III (2005) guidelines.

Figure 1. Ascertainment process for OHSUD Victims

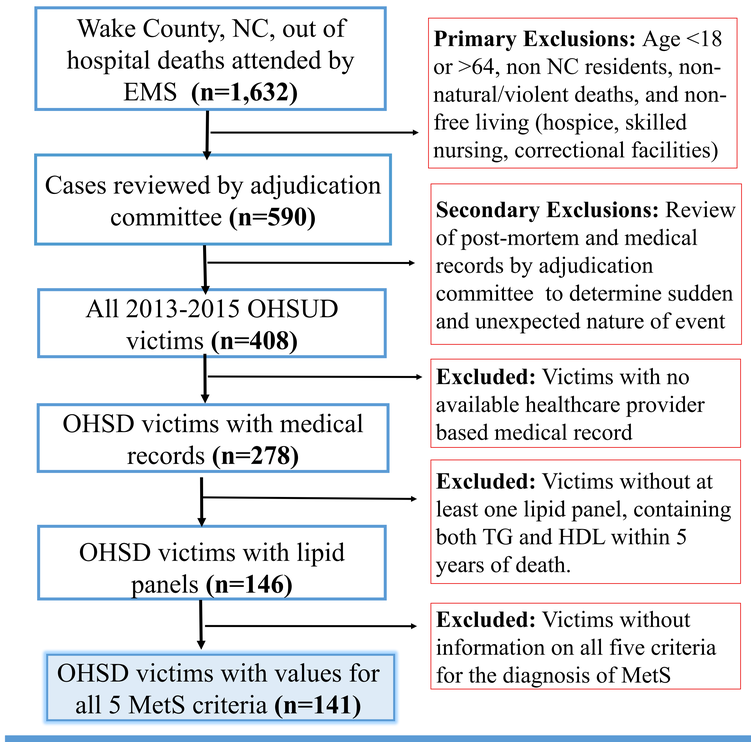
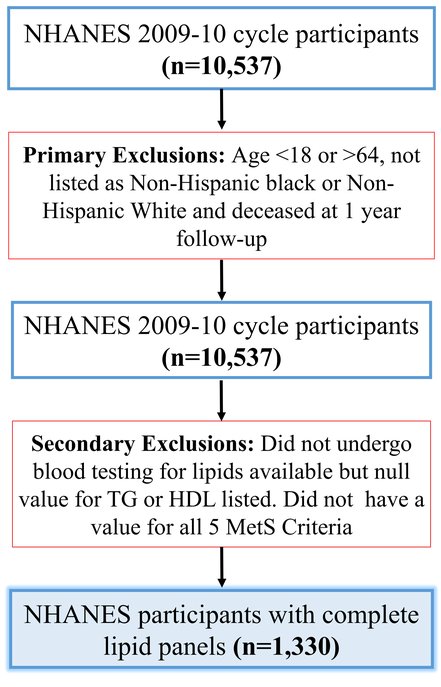


Figure 2. Ascertainment process for NHANES participants



Declaration of Interest and Acknowledgements

Declaration of interest: Ross J. Simpson Jr., MD, PhD consults with Merck, Pfizer, and Amgen

Acknowledgements: We thank Clarence Potter at the North Carolina Clinical and Translational Sciences Institute and Wake Emergency Medical Services for facilitating data collection.

Results

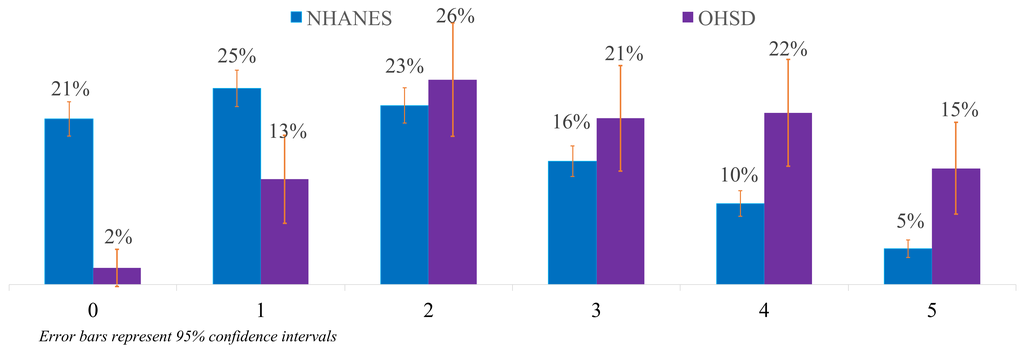
- OHSD cases had a higher overall prevalence of MetS than NHANES participants, elevated TG, low HDL-C, elevated BP, and elevated FG (Table 1).

	OHSD (N=141)	NHANES (N=1330)	p value
≥35 years old (%)	97.2% (137)	65.1% (866)	<0.001
Male (%)	68.5% (97)	47.7% (635)	<0.001
White (%)	62.4**%** **(88)**	70.2% (933)	0.013
Meet MetS Criteria	58.2% (82)	30.8% (409)	<0.001
Increased Waist Circumference (%)	61.7%	30.8%	<0.001
Elevated Triglycerides (%)	38.3%	22.6%	0.001
Low HDL-C (%)	45.4%	31.4%	0.001
Elevated Blood Pressure or on an antihypertensive treatment (%)	86.5%	31.4%	0.001
Elevated Fasting Glucose or on a glucose-lowering treatment (%)	60.3%	42.5%	0.001

Table 1: Baseline characteristics and overall prevalence of individual components of MetS in OHSD victims and NHANES participants

- Data on MetS criteria were available an average of 1.2 years prior to OHSD

Figure 3. MetS components in OHSD victims as compared to NHANES participants



Error bars represent 95% confidence intervals

Table 2: Unadjusted and adjusted odds ratio of OHSD

Odds Ratio	Unadjusted OR	p value	Adjusted OR	p value
Metabolic Syndrome	**3.13**	<0.001	1.94	0.001

Statistical Analysis

- Logistic regression models were used to assess the odds of OHSD associated with MetS, adjusted for age, race and sex (Table 2).
- Chi-square test was used to assess differences in prevalence of MetS and its individual components in OHSD and NHANES groups.

- Our limitations include requiring OHSD victims to have available values for all 5 MetS criteria to be included in the analysis, and using NHANES participants for comparison as opposed to an appropriately matched control group from the same population.

Conclusions

- Metabolic syndrome prevalence is twice as high among premature out-of-hospital sudden death victims compared to a sample of free living adult US population.
- Targeting metabolic syndrome risk factors have the potential to reduce the overall incidence of premature death.