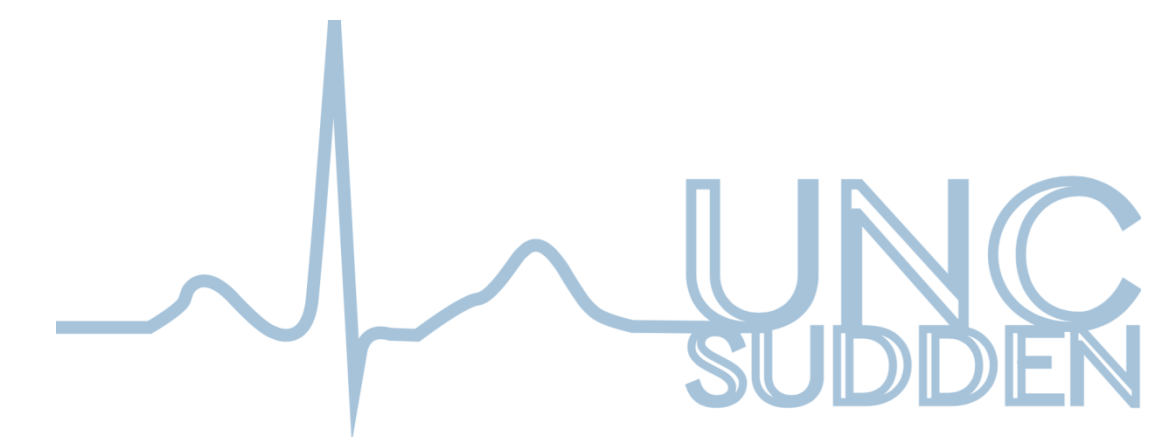


Use of Evidence-based Medications for Coronary Artery Disease and Diabetes in Women and Men with Out of Hospital Sudden Unexpected Death in the Sudden Unexpected Death in North Carolina (SUDDEN) Study



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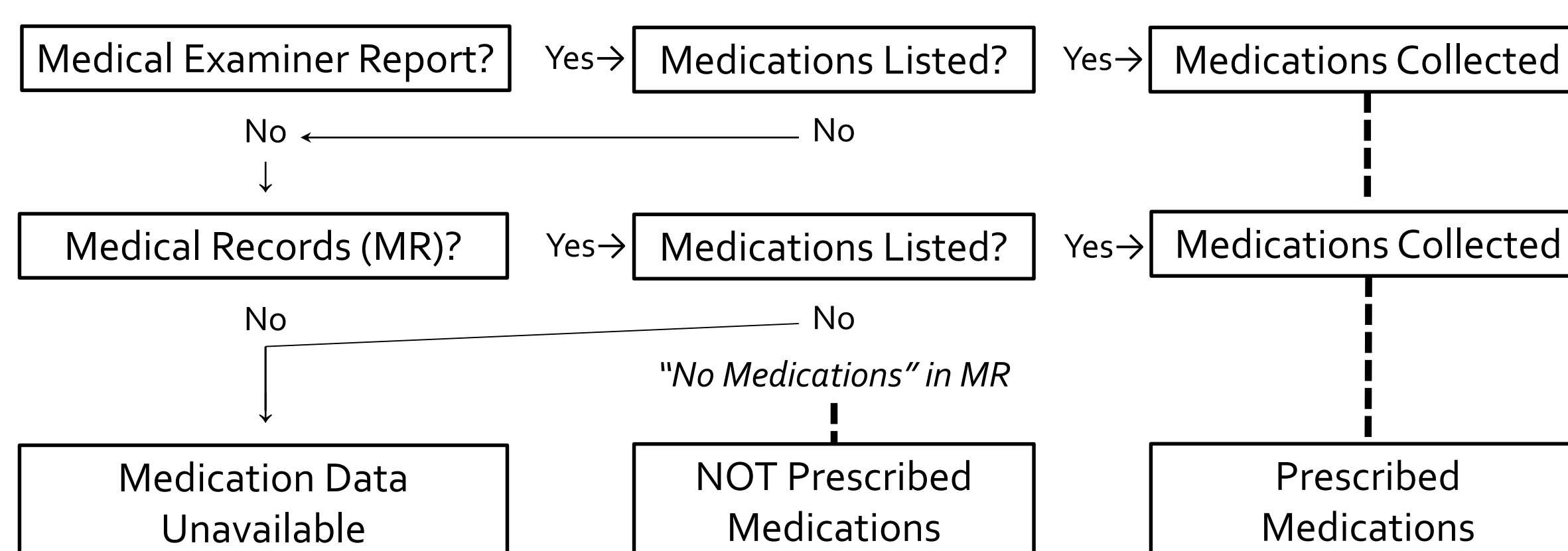
BACKGROUND

- The SUDDEN study aims to clarify risk factors for out-of-hospital sudden unexpected death (OHSUD) in a diverse population of men and women¹.
- Medications such as aspirin (ASA), angiotensin converting enzyme inhibitors (ACEIs), angiotensin receptor blockers (ARBs), HMG-CoA-reductase inhibitors (statins) and beta-blockers are recommended in consensus guidelines to reduce cardiovascular (CV) events^{2,3,4} and even sudden death (beta-blockers)⁵.
- Studies have shown that women are prescribed and report use of more medications than men⁶ but are less likely to receive guideline-directed medications for CV disease and diabetes (DM)¹ and are underrepresented in clinical trials⁷.

METHODS

- We analyzed 187 adjudicated cases of OHSUD, in 18-65-year-olds, in Wake County, North Carolina for 2013.
- These cases represent 14% of all natural deaths in adults under age 65.
- Medications were collected from available medical examiner reports and medical records and grouped using the third level of the Anatomical Therapeutic Chemical Classification System (ATC) codes.

Method for Medication Data Collection



- All analyses were conducted using Statistical Analysis Systems (SAS).
 - Two-proportion z-test used for binary and categorical variables
 - Two-sample t-test for continuous variables
- A sensitivity analysis was conducted to restrict to subjects with available medication records.
- We assessed the hypothesis that women are prescribed more medications than men overall but fewer guideline-directed medication therapies in those with coronary artery disease (CAD) and DM.

RESULTS

Patient Demographics

	Women		Men		All SUDDEN		P-value
	n	%	n	%	n	%	
Sex	70	37.4	117	62.6	187	100	---
Age (Mean), years (SD)	53.6 (9.1)	---	53.68 (8.4)	---	53.66 (8.7)	---	0.97
18-44	11	15.7	22	18.8	33	17.6	0.59
45-64	59	84.3	95	81.2	154	82.4	0.59
White	35	50	59	50.4	94	50.3	0.95
CAD	13	18.6	26	22.2	39	20.7	0.55
No Records	14	20	23	19.7	37	19.8	0.95
DM	26	37.1	31	26.5	57	30.5	0.13
No Records	12	17.1	22	18.8	34	18.2	0.78
Hypertension (HTN)	45	64.3	64	54.7	109	58.3	0.20
No Records	10	14.3	20	17.1	30	16	0.61

Number of Medications & Record Source

	Women		Men		All SUDDEN		P-value
	Mean	SD	Mean	SD	Mean	SD	
Number of Medications	5.34	6.5	3.59	4.8	4.2	5.5	0.05
All	5.34	6.5	3.59	4.8	4.2	5.5	0.05
≤ 44 years	4.1	6.7	2.2	3.8	2.9	4.9	0.36
45-64 years	5.5	6.5	3.9	4.9	4.5	5.6	0.99
All (Sensitivity Analysis)	9.1	6.4	5.9	5.1	7.0	5.8	0.0081
Medication Record Source	n	%	n	%	n	%	
Medical Examiner	7	10	13	11.1	20	10.7	0.81
Medical Records	33	47.1	56	47.9	89	47.6	0.92
No Records*	30	42.9	48	41.0	78	41.7	0.81
Time From Last Med List to Death (days)	Mean	SD	Mean	SD	Mean	SD	
	88.0	110	83.9	97.5	85.5	101.8	0.79

*Cases with no records seem to have received no chronic healthcare, so are often, prescribed no medications.

Medications for CAD, DM & HTN

	Women		Men		All SUDDEN		P-value
	n	%	n	%	n	%	
CAD	13		26		39		
ASA or other antiplatelet	4	30.8	7	26.9	11	28.2	0.80
Statin	2	15.4	7	26.9	9	23.1	0.42
ACEI or ARB	5	38.5	6	23.1	11	28.2	0.31
DM	26		31		57		
ASA	7	26.9	5	16.1	12	21.1	0.31
Statin	7	26.9	11	35.5	18	31.6	0.49
ACEI or ARB	14	53.8	10	32.3	24	42.1	0.10
Any antidiabetic agent	13	50.0	19	61.3	32	56.1	0.39
Insulin	8	30.8	11	35.5	19	33.3	0.71
Biguanides (Metformin)	5	19.2	7	22.6	12	21.1	0.76
Sulfonylurea	6	23.1	4	12.9	10	17.5	0.31
Other antidiabetic agent	1	3.8	4	12.9	5	8.8	0.23
HTN	16		13		29		
ACEI	16	35.6	13	20.3	29	26.2	0.08
Calcium channel blocking agents (dihydropyridine)	2	4.4	10	15.6	12	11.0	0.07
Beta-blocker	12	26.7	28	43.8	40	36.7	0.07

Top Medication Classes for Men and Women by ATC Code

Medication Class	Women		Men		All SUDDEN	
	Rank	%	Rank	%	Rank	%
Antidepressants	1	30.0	4	13.7	2	19.8
Angiotensin-Converting Enzyme Inhibitors, Plain	2	22.9	7	11.1	5	15.5
Beta Blocking Agents	3	21.4	1	25.6	1	24.1
Other Analgesics and Antipyretics	4	18.6	2	17.1	3	17.6
Antipsychotics	5	15.7	---	---	12	9.1
Opioids	5	15.7	10	8.5	9	11.2
Antiepileptics	5	15.7	6	11.1	7	12.8
Lipid Modifying Agents, Plain	5	15.7	3	16.2	4	16.0
High-Ceiling Diuretics	5	15.7	9	9.4	8	11.8
Drugs for Peptic Ulcer Disease and Gastro-Esophageal Reflux	6	14.3	5	12.8	6	13.4
Anti-inflammatory and Antirheumatic Products, Non-Steroids	6	14.3	---	---	13	8
Anxiolytics	6	14.3	10	8.5	10	10.7
Insulins and Analogues	7	11.4%	9	9.4	11	10.2
Blood Glucose Lowering Drugs, Excluding Insulins	7	11.4%	8	10.3	10	10.7
Antihistamines for Systemic Use	8	10.0%	---	---	---	---

The order of most commonly prescribed medication classes did not differ in sensitivity analysis

CONCLUSIONS

- Women were prescribed numerically more medications, yet overall use of guideline-directed medications was low.
- These findings highlight the importance of
 - Addressing reasons for under treatment with evidence based therapies in men and women with CAD and DM at the community level.
 - Exploring the relationship between under treatment and out-of-hospital sudden unexpected death.
- The higher use of antidepressants, opioids and anxiolytics in women warrants further investigation.

CLINICAL IMPLICATIONS

- Underuse of evidence based medications appears common in victims of sudden death. Interventions to improve appropriate medication use in at risk communities have the potential to lower the incidence of sudden death.

LIMITATIONS

- Ability to draw conclusions about:
 - Medication adherence
 - Interaction of multiple disease state and multiple medication combinations
- Availability of medical records in all subjects

FUTURE DIRECTIONS

- Increase sample size and power to detect differences by coding medications for expanded counties and years.
- Explore higher use of antidepressants, antipsychotics, antiepileptics, opioids and anxiolytics in women.
- Study the relationship between available toxicology and medication data.
- Utilize available pharmacy claims data to study medication adherence.

REFERENCES, ACKNOWLEDGMENTS & DISCLOSURES

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