Relationship Between Cardiovascular Disease Pathology and Fatal Opioid and Other Sedative Overdose: A Post-Mortem Investigation and Pilot Study

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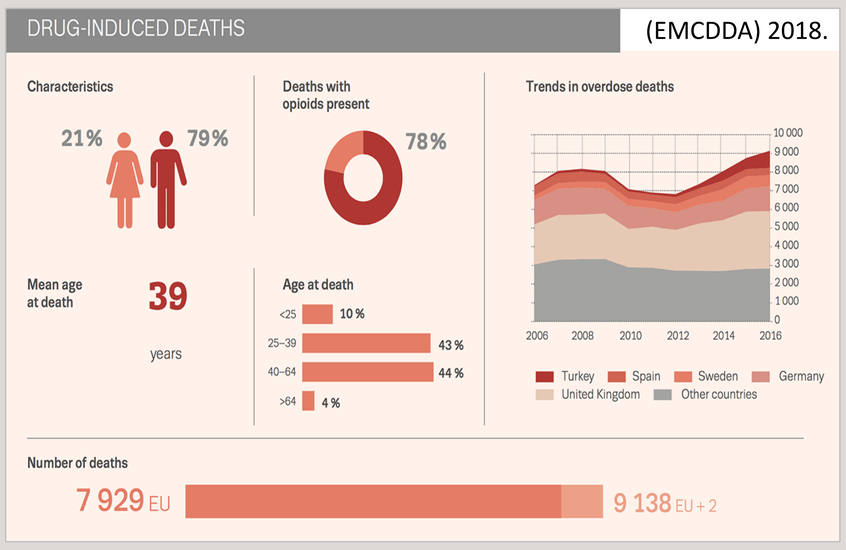
Introduction

- In Europe, > 9138 drug-related deaths (DDs) are reported yearly.
- The European Monitoring Centre for Drugs and Drug Addiction (EMCDDA) reported that opioid use contributed to 78% of those deaths.
- National Records of Scotland report, opioid use contributed to over 1092 deaths (86%) drug-related deaths in Scotland in 2019.
- Several studies suggested that opioids use/misuse is related to elevated risk of coronary artery stenosis, vascular endothelial dysfunction, and arterial stiffness.



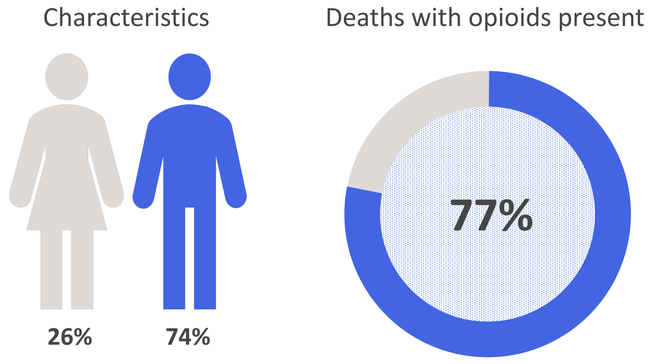
Aim

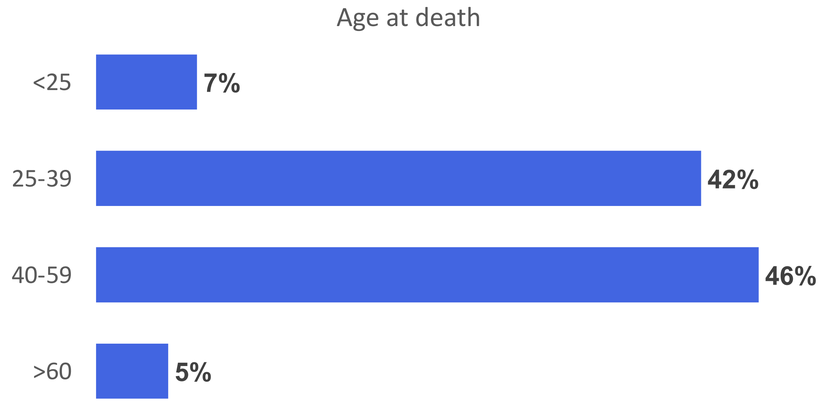
To investigate the association between polysedative use and the underlying cardiovascular pathologies in drug deaths.

Method

- DDs post-mortem reports (PMRs) between 2013-2019 were anonymised and made available for the study (n=436).
- Data pertaining age, biological sex, cardiovascular pathologies, and substances of abuse (e.g. opioids, stimulants, alcohol) were extracted from PMRs.
- Toxicology results were extracted and recorded.
- Cardiovascular pathologies were extracted and recorded using a defined scoring system based on the severity of each pathology.
- CVD scoring, 0 = No CVD, 1 = Mild, 2 = Moderate, and 3 = Severe.
- 12 CVD pathologies were recorded as atherosclerosis (left/right or aorta), atheroma (left/right or aorta), fibrosis, hypertrophy, inflammation, and stenosis (proximal/middle or distal).
- An accumulative score of CVD was calculated by summing up the scores of all the CVD pathologies with overall score of 36.
- Stepwise multiple regression models were employed to identify which substances predicted cardiovascular pathologies.

Results





Mean age at death **40** years

Distribution of cardiovascular pathologies:

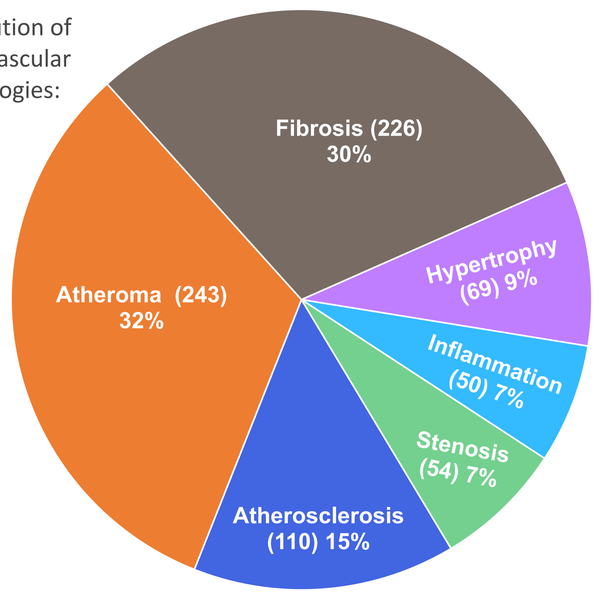


Table 1. Demographic characteristics at the time of death and drug classes identified in 436 PMRs.

Variable	N (%)	M	SD	Observed Range
Demographics				
Age at the time of death (years)	–	40.0	10.3	18.0-73.0
BMI (kg/m^2)	–	24.6	6.2	9.9-49.0
Biological sex (Males)	320 (73.4)			
Biological sex (Females)	116 (26.6)			
Drug classes				
Opioids	335 (76.8)			
Stimulants	61 (14.0)			
Alcohol	118 (27.1)			
Cannabinoids	96 (22.0)			
SSRIs	44 (10.1)			
TCAs	74 (17.0)			
Benzodiazepines	150 (34.4)			
Anticonvulsants	96 (22.0)			

Note. SSRI, Serotonin Reuptake Inhibitor; TCA, Tricyclic Antidepressants; N, number of cases; %, percentage; M, Mean; SD, Standard Deviation.

- Opioids, benzodiazepines, alcohol, age, and biological sex predicted CVD severity ***(p<0.0001)*** in DDs.
- Opioids, benzodiazepines, alcohol, and age predicted atheroma severity ***(p<0.0001)*** in DDs.
- Inflammation was predicted by age and opioids ***(p<0.01)*** in DDs.

Conclusion

- A significant positive association was identified between opioids use and CVD severity in DDs.
- These findings could contribute to future evidence-based guidelines indicating more extensive CVD monitoring in those clinical areas working with licit and illicit opioids users.
- the early identification of high risk/at-risk opioid users would contribute to the reduction of early morbidity/mortality in this population.

Future Work

- This study was conducted as part of a PhD project aiming at investigating the association between cardiovascular risk factors and opioids use/misuse.
- A systematic review identifying publications investigating the impact of other substances of abuse (e.g. stimulants, benzodiazepines, alcohol) and other co-morbidities and confounders on cardiac stiffness and other cardiac pathologies is presently being conducted.
- Lastly, a further study is being conducted by employing NHS datasets to investigate the association between opioid use/misuse and cardiovascular disease in current opioid users.