

# Profile of Sudden Death in an Adult Population (1999-2008)

MR Downes, J Thorne, TN Tengku Khalid, HA Hassan, M Leader  
Department of Histopathology, Beaumont Hospital, Beaumont, Dublin 9

## Abstract

Sudden death is the sudden and unexpected death of an individual within 24 hours of symptom onset. The vast majority of these cases are found, at autopsy, to be due to underlying ischaemic cardiac disease. We retrospectively reviewed all adult post mortems performed at Beaumont Hospital over a decade (1999-2008). Our aim was to identify all sudden death cases (natural and accidental) and subclassify them according to age profile and organ system involved. We identified 1,230 sudden death cases in the review period with 775 (63%) deaths attributable to ischaemic heart disease. The rate of sudden death remained constant over the decade with 663 (54%) deaths occurring in the first five years. Our negative autopsy rate was 2.8% corresponding to 35 cases. This is the first Irish study to retrospectively review all adult sudden deaths within a defined catchment area and analyse them as outlined above.

## Introduction

Sudden death is the sudden and unexpected death of a person within 24 hours of symptom onset<sup>1</sup>. There has been lack of agreement in the literature regarding the time interval qualifying a death as "sudden"<sup>2,3</sup> but the above definition is pragmatic as it includes unwitnessed deaths in patients who were well in the preceding 24 hours. It thus encompasses deaths that may not be discovered for a period of time (e.g. the following morning) and is the definition adopted by the WHO. The majority of these cases are sudden cardiac deaths attributable to underlying ischaemic heart disease<sup>4</sup>. We analysed over 1,200 autopsy cases performed over one decade (1999-2008) to identify and subclassify the causes of death in an Irish adult population within the catchment area of a university affiliated, academic teaching hospital (population catchment area: 290,000). The autopsies all fell under the remit of the district Coroner.

## Methods

A retrospective audit was conducted within the department reviewing all autopsies performed over a ten year period at our institution. Post mortems were divided into those identified as "sudden deaths" and "other". The cohort of interest were 1) All adult patients (16 years of age or older), found dead outside the hospital and subsequently brought to the hospital who had been seen alive in the 24 hours prior to discovery and 2) Those that died unexpectedly within 24 hours of admission to the Accident and Emergency department. The methods used to identify these patients included review of departmental Autopsy log books and filed Coroners Authorisation forms. The autopsy reports of the subjects of interest were accessed on the departmental computer system. The circumstances of death and the final cause of death following histological analysis and other relevant investigations (including toxicology) were noted. The results were then analysed according to age, sex and cause of death by organ system involved. For the purposes of this study, the organ systems were designated: cardiovascular (CVS), gastrointestinal (GI), respiratory, central nervous system (CNS) and haematological. The category "accidental" included toxicology related deaths and other non-suspicious accidents. Autopsies in which no final diagnosis was identified were assigned to "unascertained".

Table 1: Subdivision of sudden deaths according to age, year and organ system involved. Unasc.- denotes unascertained deaths

### Results

A total of 2,809 post mortems were performed in the defined review period, 1,230 of which were within the study parameters (see Table 1). The majority of subjects were over forty, n= 1,057 (86%) and overall males outnumbered females in a 2:1 ratio, n=827: 403. In 35 cases (2.8%) a definitive cause of death was not found. Cardiovascular deaths dominated in the over forties. Overall 775 of all sudden deaths (63%) were ascribed to a cardiovascular cause (two thirds of which were myocardial infarction/severe coronary artery disease). Death due to a respiratory cause was the second commonest listed cause of death, n=158 (13%). Accidental death was the third commonest cause of death, n= 138 (11%) and the commonest in the under forties. Toxicology was performed on over two thirds of all the cases, n= 833, and positive results were reported in 351 of the specimens analysed (42%). This consisted of a low level of blood alcohol (1- 100mg%) in 155 of the positive results (44%).

### Discussion

This is the first Irish study to examine all sudden deaths in an adult population and subclassify these according to age and organ system. The results from our cohort demonstrate that the vast majority of sudden adult death is cardiac in nature, 775 of 1,230 patients (63%), due to underlying coronary artery disease. This is in keeping with the published literature (59-86% in the UK). The rate of sudden death in adults remained relatively constant over the study period with 663 of the deaths occurring in the first five years (54%). The negative autopsy rate i.e. no cause of death identified after full post mortem examination is between 4-10% in published work<sup>7,8</sup>. This autopsy series of over 1,200 cases successfully identified a cause of death in 1,195 (97.2%) cases. Nine patients in the under 40's age group had an unidentifiable cause of death. The recent literature regarding sudden cardiac death in the structurally and microscopically normal heart raise the possibility of a potential genetic aetiology to these deaths<sup>9,10</sup>. This study thus highlights the value of such retrospective audits in identifying areas that may inform future clinical practice.

Correspondence: MR Downes  
Department of Histopathology, Beaumont Hospital, Beaumont Rd, Dublin 9  
Email: [michelle.downes@ucd.ie](mailto:michelle.downes@ucd.ie)

### References

1. Virmani R. Sudden cardiac death. *Cardiovasc Pathol* 2001; 10: 211-218
2. Langlois NEI. Sudden adult death. *Forensic Sci Med Pathol* 2009; 5: 210-232
3. Soilleux EJ, Burke MB. Pathology and investigation of potentially hereditary sudden cardiac death syndromes in structurally normal hearts. *Diagn Histopathol* 2009; 15: 1-26
4. Roberts WC. Sudden cardiac death: definitions and causes. *Am J Cardiol* 1986; 57: 1410-3.
5. [www.coronerdublincity.ie/fags](http://www.coronerdublincity.ie/fags)
6. Thomas AC, Knapman PA, Krikler DM. Community study of the cause of a natural sudden death. *BMJ* 1988; 297-1453-6.
7. Langlois NEI. The use of histology in 638 coronial postmortem examinations of adults: an audit.

Med Sci Law 2006; 46: 310-20.

8. Lawler W. The negative coroners necropsy: a personal approach and consideration of difficulties. J Clin Pathol 1990; 43: 977-80.

9. Fabre A, Sheppard MN. Sudden adult death syndrome and other non-ischaemic causes of sudden cardiac death. Heart 2006; 92: 316-320

10. Morris VB, Keelan T, Leen E, Keating J, Magee H, O' Neill JO, Galvin J. Sudden cardiac death in the young. Ir J Med Sci 2009; 178: 257-261

Comments: