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On Sudden Death

THE TERM sudden death is widely employed by the writers of mystery stories, journalists, pathologists, clinicians, epidemiologists, medical examiners, and others whose activities and interests touch upon the circumstances and nature of the ending of life. Customarily in the medical literature, it excludes deaths by non-natural causes, i.e., suicides, poisonings, trauma. In some instances, the adjective “unexpected” follows the word “sudden” for emphasis of the unanticipated as well as the abrupt nature of the demise, and there is much to recommend the use of such an adjective.

Just what is “sudden” in the temporal sense? A look at the literature on the subject discloses a wide range of interpretation. Some 22 papers on sudden death were reviewed, and 14 of these used a definition ranging from “instantaneously” to “less than 24 hr” from the onset of the fatal illness. In seven of the remainder, a precise time interval was not employed and, instead, the circumstances surrounding the event (D.O.A., certification by coroner, inadequate time for patient to receive medical care) were taken as a basis for selection. One article did not employ any temporal yardstick. It is apparent that “sudden” has been construed in a variety of fashions and that the lack of an accepted definition in terms of time has clearly resulted in such a broad range of acceptable case material that comparisons of conclusions become difficult.

In an attempt to approach the problem of sudden death with some agreement on definition, a small broadly constituted international committee supported by the Scientific Council on Arteriosclerosis and Ischemic Heart Disease of the International Society of Cardiology and by the Councils on Arteriosclerosis and Epidemiology of the American Heart Association has met twice during the past year. The committee has agreed upon the following: “Sudden unexpected (natural) death is defined as death occurring instantaneously or within an estimated 24 hours of the onset of acute symptoms or signs.” Such a definition will clearly not satisfy everyone. Nevertheless, representing as it does the view of an expert group including epidemiologists, clinicians, pathologists, and medical examiners, it brings to the medical profession, to forensic medicine, and to the various public bodies involved in the study and classification of sudden death, a definition which has been derived from a very considerable experience and thoughtful discussion. The committee has also provided a minimum protocol for the collection of data regarding this important subject.

The incidence of sudden death as reported in the literature not surprisingly varies also from 10 to 32% of all deaths by natural causes. In part this range is caused by the variability of the definition, in part by differing extent of coronary disease in the population under study, and in part by the age and sex of the population. It has been reported that the initial clinical manifestation of coronary disease has been sudden death in about 20–25% of the cases, and that such an abrupt ending of life occurs more often in the male with coronary disease than in the female. Although the total number of cases rises with age, the fraction of all coronary deaths that are sudden and unanticipated is higher in the young adult male than in the older male. What may be termed sudden expected death is common among patients with angina pectoris and survivors of myocardial infarction, and among the latter, it has been suggested by Denborough et al. that this event is especially liable to occur among those patients whose hospital
course had been complicated by a major arrhythmia.

The number of patients who have a warning or premonition of sudden death is impossible to estimate accurately, since the final episode itself may be too brief to permit any communication. It is nevertheless of particular interest that Kuller et al.\(^1\) determined that as many as 17% of the patients in their series with sudden death and without a history of heart disease had consulted a physician in the week prior to their demise. Among the small group of sudden unexpected deaths in our Western Electric study\(^26\) we have a similar finding, with more than half of those seeing their physician doing so only for a reported “check-up.” Important in forensic medicine is the lack of a time relation of sudden death to strenuous physical activity or even to work itself. Thus, only 2–5% of all cases of sudden death have been found to have been preceded by vigorous physical effort,\(^8\) and only 8–12% have occurred at work.\(^1,4,\)\(^24\) One-half to three-fourths of the events have taken place at home, most often in bed.\(^1,4,\)\(^24,\)\(^27\) Important to public safety was the observation by Myerburg and Davis\(^6\) that 4% of such episodes occurred at the wheel of an automobile.

The association between water “softness” and mortality rates for arteriosclerotic heart disease has been the subject of a growing and enigmatic literature. Recently, Anderson et al.\(^19\) have noted in Ontario that the excess of deaths from arteriosclerotic heart disease in the soft water areas as compared with the hard water areas studied in that province occurred among the sudden deaths. They suggested that a susceptibility to fatal arrhythmias may exist among individuals residing in regions supplied by soft water. Richardson et al.\(^28\) have also commented upon a possible link between the use of phenothiazine drugs and sudden death.

There continue to be unanswered problems as to the pathology and physiology of sudden death, particularly as relating to coronary atherosclerosis. For example, it has been reported repeatedly that no fresh thrombi have been found in the coronary arteries in the majority of autopsies performed on individuals succumbing abruptly with no other explanation for death than the presence of severe coronary atherosclerosis, with or without old occlusions or infarctions.\(^3,8,9–11,12,24,27,29\) How often is the failure to find a recent thrombotic occlusion caused by prompt lysis of a fresh thrombus? If no recent occlusion has existed, and the majority of sudden deaths have not occurred during physical or unusual emotional stress, does myocardial ischemia per se play any important role? If it appears that myocardial ischemia subsequent to coronary occlusion or increased cardiac work beyond the limits of arterial blood supply is not crucial, what is the nature of the final cardiac event? It is understandable that the recent greatly renewed interest in cardiac arrhythmias has emphasized the possibility that many cases of collapse and essentially immediate demise have occurred because of the onset of a ventricular tachycardia or fibrillation, or because of a sinus node arrest. If this is accepted as a reasonable hypothesis, much work remains to be done for documentation not so much of the existence of such a terminal arrhythmia as of its genesis.

The attack on decreasing the magnitude of the problem has multiple facets. Better education of the public on significant premonitory symptoms may be one approach. We would suggest that emphasis to the lay public that the chest symptoms indicative of impending or actual infarction are not interpreted by many patients as pain is crucial. In our experience, many patients who have acute myocardial infarction state that they have not experienced pain, and thus they did not believe they were having a heart attack, they do state that they observed a pressure, tightness, burning, squeezing, or other discomfort. The realization by the public of the potential significance of dull chest discomforts would, in our view, greatly assist in earlier awareness of the need to call for help. It also would
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assist in earlier hospitalization and treatment if patients with such symptoms were advised to proceed directly to a hospital emergency room rather than to wait to reach a physician by telephone.

Another approach is better education of the medical profession. Too many doctors still ask only the question, “Do you have any chest pain?”, without permitting the patient to give his story and without pursuing the history adequately using alternative terms. Episodes of faintness, weakness, and profuse sweats are not always viewed with appropriate concern. A single normal electrocardiogram is too often permitted to provide an unjustified reassurance. Crucially important S-T straightening and depression may be overlooked because the T waves are upright and appear normal. In addition, physicians must regard with especial suspicion persons whose history and examination indicate the presence of a number of risk factors, such as a family history of premature cardiovascular disease or diabetes, the presence of hypertension, known abnormality of the blood cholesterol, or the use of cigarettes.

The mobilization of community resources in terms of better ambulance service with well-trained resuscitation teams may offer a limited answer. Perhaps more important yet is the reorganization of emergency rooms so that the candidate for sudden death does not arrive where help should be immediately at hand only to wait minutes and hours because those in attendance are too busy and more interested in trauma and other surgical indications. Emergency room personnel should have periodic drills in resuscitation techniques so that their skills may be equal to the urgency of the problem.

The benefits to be derived from self-administration of drugs such as atropine and lidocaine at the time of onset of symptoms by those known to be at high risk are as yet unknown. Perhaps this might save some lives. The routine long term administration of anti-arrhythmic agents to patients who have angina or have had one or more infarcts is also in need of exploration. Unhappily, each drug presently available has its undesirable as well as desirable effects, and no ideal agent is currently at hand. It is hoped that before long, a single drug or combination of drugs may be found that provides that measure of protection against ventricular arrhythmias which might notably reduce the mortality from sudden death in high risk individuals.

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