Duty-related risk of sudden cardiac death among young US firefighters

A. Farioli1,2,3, J. Yang1,2, D. Tcehan1,2, D. M. Baur1,4, D. L. Smith1 and S. N. Kales1,2

1Department of Environmental Health (Environmental & Occupational Medicine & Epidemiology), Harvard School of Public Health, Boston, MA 02115, USA; 2The Cambridge Health Alliance, Harvard Medical School, Cambridge, MA 02139, USA, 3Department of Medical and Surgical Sciences (DIMEC), University of Bologna, Bologna 40138, Italy, 4Interdisciplinary for Hormone and Metabolic Disorders, Endokrinologikum ULM, 89073 Ulm, Germany, 5Department of Health and Exercise Sciences, Skidmore College, Saratoga Springs, New York, NY 12866, USA.

Correspondence to: S. N. Kales, Cambridge Hospital Macht Building 427, 1493 Cambridge Street, Cambridge, MA 02139, USA. Tel: +617 665 1580; fax: +617 665 1672; e-mail: skales@hsph.harvard.edu

Background Little is known regarding duty-related risks for sudden cardiac death (SCD) among young firefighters.

Aims To investigate duty-related SCD among US firefighters aged 45 or younger.

Methods We collected data on duty-related SCD from the US Fire Administration (USFA) and the US National Institute for Occupational Safety and Health (NIOSH). Two physicians independently reviewed each record. The proportions of time spent by firefighters performing specific duties were estimated from a municipal department, 17 large metropolitan departments and a national database.

Results The USFA recorded 205 age-eligible on-duty SCDs between 1996 and 2012; 86 (42%) of these deaths and one additional SCD were investigated by NIOSH (total n = 206). NIOSH was more likely (P < 0.001) to report on SCD associated with physical training (69% of cases were investigated) and fire suppression (57%). Compared with non-emergency duties, the risk of SCD was increased for fire suppression (RR 22.1, 95% CI 14.8–32.9), alarm response (RR 2.6, 95% CI 1.5–4.6), alarm return (RR 4.1, 95% CI 2.7–6.2) and physical training (RR 4.8, 95% CI 3.2–7.2). RRs for SCD were higher among firefighters with a pre-existing history of a cardiac condition. All 16 SCDs associated with alarm response occurred among volunteer firefighters.

Conclusions The performance of strenuous emergency duties is strongly associated with an increased risk of SCD among young firefighters, particularly among those with a history of cardiovascular disease.

Key words Firefighters; longitudinal study; occupational disease; occupational exposure; sudden cardiac death.

Introduction

Despite the high risk of trauma during fires and other emergency activities, sudden cardiac death (SCD) is the leading cause of on-duty death among the 110 000 firefighters in the USA [1,2]. An increased incidence of SCD among firefighters has been documented during certain emergency and strenuous duties, which can trigger SCD among individuals affected by underlying coronary heart disease (CHD) and/or left ventricular hypertrophy (LVH) [3–6]. It is unknown whether these findings, mainly observed among middle-aged firefighters with CHD, also apply to younger firefighters. SCD among young and apparently healthy subjects is often associated with a structural cardiac abnormality, rather than CHD [7]. Nevertheless, a recent study of US firefighters aged 45 or younger found a major role for traditional cardiovascular risk factors (obesity, cigarette smoking and hypertension) in conveying an increased risk of SCD through the development of CHD and LVH/cardiomegaly [8].

Since little is known about the occupational determinants of on-duty SCD among younger firefighters, we investigated the duty-related risks of SCD among