Characteristics of the Standard 12-lead Holter ECG in Professional Firefighters

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Background: On-duty firefighters have twice as many cardiovascular deaths as police officers and four times as many as emergency medical responders. To date, despite the high cardiac risk for firefighters and its societal importance, there are no available high resolution continuous ECG recordings during firefighting activities that may reveal why firefighters are dying on duty. Purpose: The purpose of this study was to characterize the 12-lead ECG: resting cardiac rhythm, heart rate (HR), depolarization and repolarization patterns during ambulatory monitoring of on-duty professional firefighters. Methods: In this descriptive study, all firefighters underwent 24hr ambulatory Holter monitoring while on-duty using a standard 12-lead ECG high resolution recording (Mortara, Milwaukee WI). Results: 73 firefighters (age 45+5 yrs, mostly white males) were enrolled over a one year period. During monitoring the average 24-hr HR was 77 +11 bpm, it range from an average minimum of 47+8 to an average maximum of 144+22 bpm. Intermittent single PVCs occurred in 51 (70%) firefighters and none had life threatening arrhythmias. All were in normal sinus rhythm, however 4 (5%) had either right or left BBB and 15 (21%) had abnormal STT waves at baseline. During Holter monitoring, ST segment deviation of at least 1mm in $>$2 contiguous leads was detected in 12 firefighters (19%); 3 anterior wall, 3 inferior wall and 6 multiple wall involvements. Baseline QRS-T angle and QTc were 68+38 (range 8-161; 16% abnormal) and 419 +35msec (range 368-540msec; 12% abnormal), respectively. Conclusion: Although most firefighters were in sinus rhythm, some had abnormal intraventricular conduction delays or altered repolarization. Specifically, markers of annual cardiovascular mortality (e.g. abnormal QRS-T angle, prolonged QT interval) exist among professional on-duty firefighters and may contribute to their high rate of cardiovascular death.