

## Statistical Fact Sheet — Miscellaneous

### Out-of-Hospital Cardiac Arrest — Statistics

There is a wide variation in the reported incidence and outcome for out-of-hospital cardiac arrest. These differences are due to in part to differences in definition and ascertainment of cardiac arrest, as well as differences in treatment after its onset.

*Cardiac arrest* is the cessation of cardiac mechanical activity as confirmed by the absence of signs of circulation. Available epidemiological databases do not record deaths due to cardiac arrest or the subset of cases that occur with sudden onset (*sudden cardiac arrest*). Therefore, surrogate data are often used for epidemiological purposes to estimate the incidence of cardiac arrest, especially in the out-of-hospital setting. Those surrogate data include deaths due to "*coronary heart disease*" (ICD codes I20-I25) and "*cardiac arrest*," defined as coronary death that occurred within one hour of symptom onset in the out-of-hospital setting, and without other probable cause of death. Datasets based on either definition are not optimal. Out-of-hospital data that are based on the latter definition of cardiac arrest can be especially unreliable because of the difficulty in determining the duration of symptoms prior to the onset of the episode. The following information summarizes representative data from several sources in an attempt to characterize the incidence and outcome of sudden cardiac arrest and demonstrate the need for a comprehensive system of capturing more meaningful data.

- 330,000 *coronary heart disease deaths* occur out-of-hospital or in hospital emergency departments annually (2002) (ICD-10 codes I20-I25: CDC/NCHS data for 2002.)
- The annual incidence of *sudden cardiac arrest* in North America is ~0.55 per 1,000 population. With an estimated US population of 296,766,821, this implies that about 163,221 out-of-hospital *sudden cardiac arrests* occur annually in the US. (ICD-10 codes I20-I25; Vaillancourt C, Stiell IG. *Cardiac arrest care and emergency medical services in Canada. Can J Cardiol* 2004;20:1081-90; *Monthly Postcensal Resident Population (8/1/2005): U.S. Census data.* <http://www.census.gov/> accessed on Oct. 19, 2005; Myerburg RJ, Kessler KM, Castellanos A. *Sudden cardiac death: epidemiology, transient risk, and intervention assessment. Ann Intern Med* 1993; 15;119:1187-97.)
- About two-thirds of *unexpected cardiac deaths* occur without prior recognition of cardiac disease. (Chugh SS, Jui J, Gunson K, Stecker EC, John BT, Thompson B, et al. Current burden of sudden cardiac death: multiple source surveillance versus retrospective death certificate-based review in a large U.S. community. *J Am Coll Cardiol* 2004;44:1268-75.)
- About 60 percent of *unexpected cardiac deaths* are treated by EMS. (Cobb LA, Fahrenbruch CE, Olsufka M, Copass MK. *Changing incidence of out-of-hospital ventricular fibrillation, 1980-2000. JAMA* 2002;288:3008-13.)
- Incidence of EMS-treated out-of-hospital *cardiac arrest* is 36/100,000 to 81/100,000. This implies EMS treats 107,000 to 240,000 *cardiac arrests* in the United States annually. (Cobb LA, Fahrenbruch CE, Olsufka M, Copass MK. *Changing incidence of out-of-hospital ventricular fibrillation, 1980-2000. JAMA* 2002;288:3008-13; Nichol G, Stiell IG, Laupacis A, Pham B, De Maio V, Wells GA. *A cumulative meta-analysis of the effectiveness of defibrillator-capable emergency medical services for victims of out-of-hospital cardiac arrest. Ann Emerg Med* 1999;34:517-25.)
- Of these, 20 to 38 percent have ventricular fibrillation or ventricular tachycardia as the first recorded rhythm. This implies 21,000 to 91,000 ventricular fibrillation arrests annually. (Vaillancourt C, Stiell IG. *Cardiac arrest care and emergency medical services in Canada. Can J Cardiol* 2004;20:1081-90; Nichol G, Stiell IG, Laupacis A, Pham B, De Maio V, Wells GA. *A cumulative meta-analysis of the effectiveness of defibrillator-capable emergency medical services for victims of out-of-hospital cardiac arrest. Ann Emerg Med* 1999;34:517-25.)

- The incidence of ventricular fibrillation among *cardiac arrest* victims with any first initial rhythm is decreasing over time. (Nichol G, Stiell IG, Laupacis A, Pham B, De Maio V, Wells GA. A cumulative meta-analysis of the effectiveness of defibrillator-capable emergency medical services for victims of out-of-hospital cardiac arrest. *Ann Emerg Med* 1999;34:517-25.)
- The median reported survival to discharge after any first recorded rhythm is 6.4 percent. Survival in 2004 in Seattle of all treated *cardiac arrests*, considered to be of *cardiac origin*, was reported to be 20 percent. (Personal communication, L. Cobb, MD, Seattle Medic One, Dec. 7, 2005; Culley LL, Rea TD, Murray JA, Welles B, Fahrenbruch CE, Olsufka M, et al. Public access defibrillation in out-of-hospital cardiac arrest: a community-based study. *Circulation* 2004;109:1859-63.)
- The average proportion of cases of out-of-hospital *cardiac arrest* that receive bystander CPR is 27.4 percent. (Personal communication, Seattle Medic One, Aug. 2, 2005)
- The incidence of lay responder defibrillation is low, 2.05 percent in 2002, but increasing over time.
- Unexpected death in the pediatric patient is usually due to trauma, sudden infant death syndrome, respiratory causes or submersion. Ventricular fibrillation is an uncommon cause of *cardiac arrest* in children but it is observed in approximately 5 to 15 percent of children with out-of-hospital *cardiac arrest*. (Young KD, Gausche-Hill M, McClung CD, Lewis RJ. A prospective, population-based study of the epidemiology and outcome of out-of-hospital pediatric cardiopulmonary arrest. *Pediatrics* 2004 Jul;114:157-64; Mogayzel C, Quan L, Graves JR, Teidman D, Fahrenbruch C, Herndon P. Out-of-hospital ventricular fibrillation in children and adolescents: causes and outcomes. *Ann Emerg Med* 1995;25: 484-91.)
- The reported incidence of out-of-hospital pediatric *cardiac arrest* vary widely in number (from 2.6 to 19.7 annual cases per 100,000) and inclusion criteria (age, cause of arrest, etc). (Donoghue A, Nadkarni V, Berg RA, Osmond MH, Wells GA, Nesbitt L, et al. Out-of-hospital pediatric cardiac arrest: an epidemiologic review and assessment of current Knowledge. *Ann Emerg Med* [in press])
- Since there are 73,559,232 individuals under age 18 in the United States, this implies that there are 1,900 to 14,000 pediatric out-of-hospital *cardiac arrests*, annually, from all causes (including trauma, sudden infant death syndrome, respiratory causes, cardiovascular causes and submersion). (Myerburg RJ, Kessler KM, Castellanos A. Sudden cardiac death: epidemiology, transient risk, and intervention assessment. *Ann Intern Med* 1993; 15:119:1187-97.)
- The incidence of *sudden cardiac arrest* in children in the out-of-hospital setting is unknown. Studies that document voluntary reports of deaths among high school athletes suggest that the incidence of *sudden cardiac arrest* ranges from 0.28 to 1.0 death per 100,000 high school athletes annually nationwide. Although incomplete, these numbers provide a basis for estimating the number of deaths in this age range. (Luckstead EF, Patel DR. Catastrophic pediatric sports injuries. *Pediatr Clin North Am* 2002;49:581–91; Maron BJ, Gohman TE, Aeppli D. Prevalence of sudden cardiac death during competitive sports activities in Minnesota high school athletes. *J Am Coll Cardiol* 1998;32:1881–4.)
- The reported average survival to discharge after pediatric out-of-hospital *cardiac arrest* is 6.7 percent. (Donoghue A, Nadkarni V, Berg RA, Osmond MH, Wells GA, Nesbitt L, et al. Out-of-hospital pediatric cardiac arrest: an epidemiologic review and assessment of current knowledge. *Ann Emerg Med*. [in press])