# Nationwide Public-Access Defibrillation in Japan

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## ABSTRACT

*Background* It is unclear whether dissemination of automated external defibrillators (AEDs) in public places can improve the rate of survival among patients who have had an out-of-hospital cardiac arrest.

*Methods* From January 1, 2005, through December 31, 2007, we conducted a prospective, population-based, observational study involving consecutive patients across Japan who had an out-of-hospital cardiac arrest and in whom resuscitation was attempted by emergency responders. We evaluated the effect of nationwide dissemination of public-access AEDs on the rate of survival after an out-of-hospital cardiac arrest. The primary outcome measure was the 1-month rate of survival with minimal neurologic impairment. A multivariate logistic-regression analysis was performed to assess factors associated with a good neurologic outcome.

*Results* A total of 312,319 adults who had an out-of-hospital cardiac arrest were included in the study; 12,631 of these patients had ventricular fibrillation and had an arrest that was of cardiac origin and that was witnessed by bystanders. In 462 of these patients (3.7%), shocks were administered by laypersons with the use of public-access AEDs, and the proportion increased, from 1.2% to 6.2%, as the number of public-access AEDs increased ($P<0.001$ for trend). Among all patients who had a bystander-witnessed arrest of cardiac origin and who had ventricular fibrillation, 14.4% were alive at 1 month with minimal neurologic impairment; among patients who received shocks from public-access AEDs, 31.6% were alive at 1 month with minimal neurologic impairment. Early defibrillation, regardless of the type of provider (bystander or emergency-medical-services personnel), was associated with a good neurologic outcome after a cardiac arrest with ventricular fibrillation (adjusted odds ratio per 1-minute increase in the time to administration of shock, 0.91; 95% confidence interval, 0.89 to 0.92; $P<0.001$). The mean time to shock was reduced from 3.7 to 2.2 minutes, and the annual number of patients per 10 million population who survived with minimal neurologic impairment increased from 2.4 to 8.9 as the number of public-access AEDs increased from fewer than 1 per square kilometer of inhabited area to 4 or more.

*Conclusions* Nationwide dissemination of public-access AEDs in Japan resulted in earlier administration of shocks by laypersons and in an increase in the 1-month rate of survival with minimal neurologic impairment after an out-of-hospital cardiac arrest.

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