Location of Cardiac Arrest in a City Center
Strategic Placement of Automated External Defibrillators in Public Locations

Fredrik Folke, MD; Freddy Knudsen Lippert, MD; Søren Loumann Nielsen, MD; Gunnar Hilmar Gislasson, MD, PhD; Morten Lock Hansen, MD; Tina Ken Schramm, MD; Rikke Sørensen, MD; Emil Loldrup Fosbøl, MB; Søren Skott Andersen, MD; Søren Rasmussen, MSc, PhD; Lars Køber, MD, DMS; Christian Torp-Pedersen, MD, DMSc

Background—Public-access defibrillation with automated external defibrillators (AEDs) is being implemented in many countries worldwide with considerable financial implications. The potential benefit and economic consequences of focused or unfocused AED deployment are unknown.

Methods and Results—All cardiac arrests in public in Copenhagen, Denmark, from 1994 through 2005 were geographically located, as were 104 public AEDs placed by local initiatives. In accordance with European Resuscitation Council and American Heart Association (AHA) guidelines, areas with a high incidence of cardiac arrests were defined as those with 1 cardiac arrest every 2 or 5 years, respectively. There were 1274 cardiac arrests in public locations. According to the European Resuscitation Council or AHA guidelines, AEDs needed to be deployed in 1.2% and 10.6% of the city area, providing coverage for 19.5% (n=249) and 66.8% (n=851) of all cardiac arrests, respectively. The excessive cost of such AED deployments was estimated to be $33 100 or $41 000 per additional quality-adjusted life year, whereas unguided AED placement covering the entire city had an estimated cost of $108 700 per quality-adjusted life year. Areas with major train stations (1.8 arrests every 5 years per area), large public squares, and pedestrianized areas (0.6 arrests every 5 years per area) were main predictors of frequent cardiac arrests.

Conclusion—To achieve wide AED coverage, AEDs need to be more widely distributed than recommended by the European Resuscitation Council guidelines but consistent with the American Heart Association guidelines. Strategic placement of AEDs is pivotal for public-access defibrillation, whereas with unguided initiatives, AEDs are likely to be placed inappropriately. (Circulation. 2009;120:510-517.)

Key Words: cardiopulmonary resuscitation ■ defibrillation ■ defibrillators ■ heart arrest

Increased survival after out-of-hospital cardiac arrest is directly associated with reduced time from collapse to first defibrillation. Therefore, strategic placement of publicly available automated external defibrillators (AEDs) provides an opportunity to improve survival after out-of-hospital cardiac arrest. Such strategies are known as public-access defibrillation. Placing AEDs in public has proved valuable in airports, airplanes, and casinos1–4 and has promoted a more widespread placement in densely populated public areas.5–8 Public-access defibrillation programs require strategic placement of defibrillators where the risk of cardiac arrest is high; however, data on the benefit and economic consequences of different strategies are scarce. Since 2005, the guidelines for public-access defibrillation from the European Resuscitation Council (ERC) and the American Heart Association (AHA) have differed in recommendations for strategic deployment of AEDs. The ERC recommends AED placement in areas with at least 1 cardiac arrest every 2 years,9 whereas the AHA proposes AED placement in areas with at least 1 cardiac arrest every 5 years.10 This disparity reflects the current uncertainty for appropriate AED placement. Furthermore, few studies have addressed the actual distribution and localization of AEDs in communities without predefined high-incidence sites of cardiac arrests.
graphic characteristics are associated with increased likelihood of cardiac arrest in public and thereby to predict strategic AED placement in a community setting.

Methods

Study Setting
Copenhagen has a resident population of ∼600,000 and covers 97 km² (60 sq miles). The central part of the city is served exclusively by a single emergency medical service (EMS) and physician-staffed ambulances. The emergency physicians systematically recorded data from all cardiac arrests, including presumed cause of arrest, the initial heart rhythm, and the address and type of location of arrest.

Study Population
All patients with sudden cardiac arrest confirmed by the absence of consciousness, pulse, and breathing were included. From January 1994 through December 2005, we registered 5420 arrests. Because of incomplete electronic registration in 1999, no arrests were obtained from that year. We defined public areas as all areas accessible to the general public, including all outdoor locations, public transportation sites, schools, outpatient clinics, and commercial and civic establishments. In accordance with the Utstein criteria,11 cardiac arrests resulting from suicide, poisoning, drowning, trauma, and exsanguinations and in patients judged to be terminally ill by the doctor on location were excluded (n=544); 48 patients were excluded because of a missing address or because the arrest occurred outside the study area. Of the remaining 4828 cardiac arrests, 3554 (74%) occurred in private residences (including senior housing and nursing homes), and 1274 arrests occurred (26%) in public areas. Only patients with arrest in public who were judged eligible for resuscitation attempt by the physician on location were analyzed further.

Study Design
The exact locations of cardiac arrests in public were geographically coded through the use of a geographic information system12 and marked on a digital city map. Throughout 2005, 104 AEDs were placed in municipal and public buildings; these locations also were marked on the city map. The AED distribution was driven by political or local initiatives because municipal institutions were offered a favorable purchasing price from a main AED vendor in 2005. Use of any of the municipal-placed AEDs until the end of 2005 was registered by the EMS.

We defined 2 categories of high-incidence areas of cardiac arrest occurring within a 100-m radius. The first category matched the current ERC guideline of placing AEDs in areas with at least 1 cardiac arrest every 2 years8 in accordance with the Public Access Defibrillation trial.5 The second category matched the AHA guideline of placing AEDs in areas with at least 1 cardiac arrest every 5 years.10 The 100-m radius was considered the maximum distance a publicly placed AED could be transported by laypersons in a 1½-min brisk walk in the event of nearby cardiac arrest in accordance with the AHA recommendations.10

The European Grid System, a defined and harmonized grid net for Europe with standardized size and location of grid cells,13 was used to count cardiac arrests in all 100×100-m grid cells included in the study area. From Statistics Denmark, we obtained information for all arrests, from January 1978 to December 2005, with that used in other cost-effectiveness studies.17,18 Without an AED program, the 30-day survival rate was 13.9% in Copenhagen (Table 1). On the basis of several studies examining the use of AEDs by laypersons,1,4,19 we assumed that an AED would be used in all cases of out-of-hospital cardiac arrest occurring at a site equipped with an AED. We estimated a hospitalization cost of $17 000 for cases of out-of-hospital cardiac arrest occurring at a site equipped with an AED. We estimated a hospitalization cost of $17 000 for cases of out-of-hospital cardiac arrest occurring at a site equipped with an AED. We estimated a hospitalization cost of $17 000 for cases of out-of-hospital cardiac arrest occurring at a site equipped with an AED. We estimated a hospitalization cost of $17 000 for cases of out-of-hospital cardiac arrest occurring at a site equipped with an AED.
years gained. Valuations of the quality of life of cardiac arrest survivors were derived from a cohort study by Nichol et al., a method used in several other cost-effectiveness studies. The calculated costs represent the incremental costs of adding an AED program to the established EMS system because the cost of the EMS is the same with or without the AED program. The economic calculations were performed in accordance with the study by Cram et al; however, only mean costs were calculated without the use of Markov models.

Statistical Analysis
We used a modified Poisson regression to estimate the rate ratio of cardiac arrests for 100 × 100-m grid cells containing a given geographic characteristic. The reference group chosen was other grid cells not containing the given geographic characteristic examined. The cumulative number of cardiac arrests in the grid cells served as the dependent variable, and the geographic characteristics of the grid cell served as the independent variables. The estimated rate ratio for a geographic characteristic was calculated by taking the exponential to the regression coefficient in the Poisson regression because of the constant follow-up time for all grid cells (11 years). Univariable and multivariable Poisson regression models adjusted for the presence of all geographic characteristics were done. We found a reasonable fit of the modified Poisson model but with a slight overdispersion. We used SAS PROC GENMOD with the REPEATED statement so that in the univariable and multivariable analyses we instead used Poisson regression with robust SEs, also known as the general estimating equation approach. All statistical calculations were performed with the SAS version 9.1.4 (SAS Institute Inc, Cary, NC).

Ethics
Compliance with Danish laws governing data security was maintained, and the study was approved by the Danish Data Protection Agency (No. 2008–41–2685). In Denmark, no ethical approval is required for retrospective registry studies.

Results
The demographic characteristics of the 1274 individuals with out-of-hospital cardiac arrest in public are shown in Table 1. Figure 1 shows the exact locations of all 1274 cardiac arrests in public from 1994 through 2005. The arrests were scattered around the city but with a higher incidence in the city center and along major traffic points. Isolated cardiac arrests accounted for 80.1% (n = 1020) of the arrests in public, although many of these arrests were clustered in areas with a large census. Throughout 2005, 104 AEDs were placed in municipal buildings in Copenhagen. The location categories of AED placement and the annual cardiac arrest incidence per AED are shown in Table 2; none of the AEDs was ever used during the study period. Assuming that 1 AED could provide coverage for all the cardiac arrests in 1 grid cell, the 104 AEDs would cover 29 arrests during the study period. Of these arrests, 11 (38%) occurred at a railway station; however, the AED was located in the same grid cell but in a municipal office. Table 3 shows the absolute number and rate ratio of cardiac arrest in relation to the geographic character-
Table 2. AED Location Categories Following Unguided AED Placement in Copenhagen*

<table>
<thead>
<tr>
<th>Location Category</th>
<th>Sites, n (%)</th>
<th>AEDs, n (%)</th>
<th>Annual Cardiac Arrest Incidence per AED†</th>
</tr>
</thead>
<tbody>
<tr>
<td>Municipal office</td>
<td>37 (48.1)</td>
<td>53 (51.0)</td>
<td>0.04</td>
</tr>
<tr>
<td>City hall</td>
<td>1 (1.3)</td>
<td>10 (9.6)</td>
<td>0.03</td>
</tr>
<tr>
<td>Kindergarten</td>
<td>8 (10.4)</td>
<td>8 (7.7)</td>
<td>0.01</td>
</tr>
<tr>
<td>Public swimming pool</td>
<td>9 (11.7)</td>
<td>9 (8.7)</td>
<td>0.05</td>
</tr>
<tr>
<td>Community home</td>
<td>6 (7.8)</td>
<td>6 (5.8)</td>
<td>0</td>
</tr>
<tr>
<td>Community center</td>
<td>4 (5.2)</td>
<td>6 (5.8)</td>
<td>0.03</td>
</tr>
<tr>
<td>Primary school</td>
<td>4 (5.2)</td>
<td>4 (3.8)</td>
<td>0</td>
</tr>
<tr>
<td>Outpatient clinic</td>
<td>5 (6.5)</td>
<td>5 (4.8)</td>
<td>0.09</td>
</tr>
<tr>
<td>Minor sports center</td>
<td>2 (2.6)</td>
<td>2 (1.9)</td>
<td>0</td>
</tr>
<tr>
<td>Shelter</td>
<td>1 (1.3)</td>
<td>1 (1.0)</td>
<td>0.09</td>
</tr>
<tr>
<td>Total</td>
<td>77 (100)</td>
<td>104 (100)</td>
<td>...</td>
</tr>
</tbody>
</table>

*All the 104 AEDs were placed throughout 2005.
†Denotes the annual cardiac arrest incidence per AED during 1994 to 2005 occurring within a 100×100-m grid cell containing the given location.

Table 3. Absolute Number and Rate Ratio of Out-of-Hospital Cardiac Arrests From 1994 Through 2005 in Relation to the Geographic Characteristics of the Area*

<table>
<thead>
<tr>
<th>Grid Cell Characteristics†</th>
<th>Grid Cells, n</th>
<th>Cumulative Grid Cells, n (% of study area)</th>
<th>Cardiac Arrests, n‡</th>
<th>Cumulative Cardiac Arrests, n (% of All arrests)§</th>
<th>Average Cardiac Arrests Every 2/5 Years, n</th>
<th>Univariable Rate Ratio of Cardiac Arrest (95% CI)</th>
<th>Multivariable Rate Ratio of Cardiac Arrest (95% CI)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Major train station</td>
<td>19</td>
<td>19 (0.2)</td>
<td>73</td>
<td>73 (5.7)</td>
<td>0.70/1.75</td>
<td>32.42 (15.49–67.92)</td>
<td>7.79 (3.12–19.47)</td>
</tr>
<tr>
<td>High-density public area</td>
<td>143</td>
<td>156 (1.5)</td>
<td>175</td>
<td>199 (15.6)</td>
<td>0.22/0.56</td>
<td>11.20 (7.52–16.70)</td>
<td>5.02 (3.44–7.31)</td>
</tr>
<tr>
<td>Large shopping mall</td>
<td>10</td>
<td>164 (1.6)</td>
<td>12</td>
<td>209 (16.4)</td>
<td>0.22/0.55</td>
<td>9.66 (3.63–27.79)</td>
<td>3.35 (0.86–13.14)</td>
</tr>
<tr>
<td>Central bus terminal</td>
<td>11</td>
<td>172 (1.7)</td>
<td>12</td>
<td>213 (16.7)</td>
<td>0.20/0.50</td>
<td>8.78 (3.00–25.68)</td>
<td>3.95 (1.90–8.22)</td>
</tr>
<tr>
<td>Sports center</td>
<td>42</td>
<td>210 (2.0)</td>
<td>42</td>
<td>243 (19.1)</td>
<td>0.18/0.46</td>
<td>8.42 (5.18–13.68)</td>
<td>1.66 (0.40–6.85)</td>
</tr>
<tr>
<td>Supermarket</td>
<td>201</td>
<td>381 (3.7)</td>
<td>118</td>
<td>321 (25.2)</td>
<td>0.11/0.27</td>
<td>5.05 (3.79–6.73)</td>
<td>2.23 (1.44–3.47)</td>
</tr>
<tr>
<td>Small train station</td>
<td>29</td>
<td>408 (3.9)</td>
<td>17</td>
<td>329 (25.8)</td>
<td>0.16/0.41</td>
<td>4.73 (2.21–10.12)</td>
<td>4.88 (2.77–8.59)</td>
</tr>
<tr>
<td>Ferry terminal</td>
<td>20</td>
<td>428 (4.1)</td>
<td>11</td>
<td>340 (26.7)</td>
<td>0.10/0.25</td>
<td>4.42 (1.03–19.04)</td>
<td>5.60 (1.30–24.10)</td>
</tr>
<tr>
<td>Public swimming pool</td>
<td>12</td>
<td>435 (4.2)</td>
<td>6</td>
<td>343 (26.9)</td>
<td>0.09/0.23</td>
<td>4.01 (1.92–8.35)</td>
<td>2.37 (0.67–8.46)</td>
</tr>
<tr>
<td>Large industrial business</td>
<td>365</td>
<td>743 (7.1)</td>
<td>164</td>
<td>413 (32.4)</td>
<td>0.07/0.18</td>
<td>3.99 (2.64–6.01)</td>
<td>2.07 (1.47–2.93)</td>
</tr>
<tr>
<td>High school</td>
<td>62</td>
<td>783 (7.5)</td>
<td>24</td>
<td>424 (33.3)</td>
<td>0.07/0.18</td>
<td>3.13 (1.80–5.50)</td>
<td>1.86 (0.96–3.58)</td>
</tr>
<tr>
<td>Primary school</td>
<td>154</td>
<td>915 (8.8)</td>
<td>30</td>
<td>447 (35.1)</td>
<td>0.04/0.09</td>
<td>1.57 (1.07–2.29)</td>
<td>1.48 (0.99–2.23)</td>
</tr>
</tbody>
</table>

CI denotes confidence interval.
*The presented rate ratios denote rates of cardiac arrest for a grid cell containing a given geographic location compared with grid cells without such characteristics.
†Grid cells are defined as 100×100-m areas with uniform and standardized geographic locations.
‡Denotes the total number of cardiac arrests within a grid cell containing a given characteristic. The number of cardiac arrests can overlap between the different locations because different locations can occur within a 100-m radius.
§The cumulative number of arrests represents unique arrests without overlap.

High-density public areas are defined as grid cells containing a major public square, pedestrianized areas, or an amusement park.
current AED deployment in Copenhagen, the estimated incremental cost was $63,500 per QALY, whereas following an unguided strategy of AED placement in every 100×100-m area in the entire city (which would obviously cover all the cardiac arrests), the estimated cost would be $108,700 per QALY. As the probability of AED use fell from 100% to 80% to 60%, the cost per QALY increased from $33,100 to $41,400 to $55,200 using the ERC guidelines. Similar costs following the AHA guidelines increased from $41,000 to $51,200 to $68,300, respectively.

**Discussion**

This study demonstrates the consequences for public-access defibrillation according to which guidelines of AED placement are followed. Using the ERC guidelines, we identified 1.2% of the city area as a high-incidence area of cardiac arrest accounting for 19.5% (n=249) of all the cardiac arrests in public. Using the AHA guidelines, we identified 10.6% of the city area as a high-incidence cardiac arrest area accounting for 66.8% (n=851) of all the cardiac arrests in public. Assuming that placement of 1 AED in all these 100×100-m high-incidence areas is sufficient for public-access defibrillation, 125 AEDs would be required if the ERC guidelines were followed. Following the AHA guidelines would require placement of 1104 AEDs in public areas with the potential of reaching 602 additional cardiac arrests during the 11-year study period. If public-access defibrillation programs are to improve survival in the community, the AEDs must cover the greatest possible number of cardiac arrests occurring in public. These findings challenge the ERC guidelines of AED placements, which, at best, cover ~20% of cardiac arrests in public places.

Studies have identified specific public locations at greatest risk for cardiac arrest in their local community and have recommended placement of AEDs at these locations to maximize cost-effectiveness and survival. With few exceptions, identification of high-incidence sites was based on retrospective analysis of the frequency and location of cardiac arrests. Unless the incidence of cardiac arrest is very high at a specific site, the occurrence of previous cardiac arrests at this site does not imply that another will occur in the following years. Consequently, if a cardiac arrest previously occurred in supermarket A, the next arrest may occur in supermarket B, C, or D, requiring all similar sites to be equipped with AEDs. Although this and other studies have identified high-incidence sites of cardiac arrest in the local community, it seems practically and economically difficult to obtain comprehensive location-specific cardiac arrest rates on a nationwide level. However, recurrent incidents of cardiac...
arrest are not merely random events; they are related to the movement patterns and underlying geographic epidemiology of the population. Our study adds to this notion. Thus, our findings of highest rates of cardiac arrest in areas containing major train stations, high-density public areas, large shopping centers, central bus terminals, and sports centers can be valuable as guidance on where AED deployment should be considered. Placing AEDs at these sites would require 210 AEDs (representing 2.2% of the city area) with the potential of reaching 243 cardiac arrests (19.1% of all arrests in public) during the study period (Table 3). Other studies have found airports and golf courses to be among high-incidence sites of cardiac arrest; such locations were outside the district boundary of this study.

The finding that none of the 104 AEDs placed by local or political initiatives was ever used could be due to several causes. The AEDs were deployed throughout 2005, the last year of our study period. But even if the AEDs had been available during the entire study period, the likelihood of AED use would have been minimal because nearly all the AEDs were deployed in areas with a very low annual incidence of cardiac arrest (Table 2) and hence a low likelihood of AED use. The tendency to place AEDs outside high-incidence areas of cardiac arrest (Figures 2 and 3) is

![Figure 3. American Heart Association Guidelines for placement of AEDs. Copenhagen city map illustrates areas with at least 1 out-of-hospital cardiac arrest every 5 years in public and the actual placement of AEDs in municipal settings.](image)

### Table 4. Estimated Cost-Effectiveness of Public Access Defibrillation Programs According to Different AED Guidelines

<table>
<thead>
<tr>
<th>AEDs needed, n</th>
<th>ERC Guidelines</th>
<th>AHA Guidelines</th>
<th>Actual AED Placement in Copenhagen</th>
<th>Unguided AED Coverage for the Entire City</th>
</tr>
</thead>
<tbody>
<tr>
<td>AEDs needed, n</td>
<td>125</td>
<td>1104</td>
<td>104</td>
<td>10 394</td>
</tr>
<tr>
<td>Cardiac arrests covered, n</td>
<td>249</td>
<td>851</td>
<td>29</td>
<td>1274</td>
</tr>
<tr>
<td>Estimated cost per QALY gained, $</td>
<td>33 100</td>
<td>40 900</td>
<td>63 500</td>
<td>108 700</td>
</tr>
<tr>
<td>If probability of AED use=80%, $</td>
<td>41 400</td>
<td>51 100</td>
<td>79 400</td>
<td>135 900</td>
</tr>
<tr>
<td>If probability of AED use=60%, $</td>
<td>55 200</td>
<td>68 200</td>
<td>105 900</td>
<td>181 700</td>
</tr>
</tbody>
</table>

All costs are 2008 US dollars rounded to nearest hundred.
unlikely to be a problem confined to Copenhagen because little is known about the distribution and localization of AEDs in settings without predefined high-incidence sites. Finally, increased AED use requires a coordinated effort guided by the emergency dispatch center. Establishment of an updated AED registry at the emergency dispatch center enables the center to direct the rescuer to the nearest AED available and offer the possibility of instructing the rescuer in both cardiopulmonary resuscitation and AED use. Such a setup was not established in Copenhagen in 2005, further decreasing the chance of AED use in the event of a nearby cardiac arrest. Our cost-effectiveness calculations of AED deployment according to the ERC and AHA recommendations showed both these strategies to be economically acceptable (Table 4). The contrary was found for local or unguided AED deployment, with an estimated cost per QALY gained of $63 500 and $108 700, respectively. Consistent with previous cost-effectiveness studies, it is important to note that the costs of AED deployment increased considerably with any failure to use a publicly available AED on a nearby cardiac arrest victim. Although our calculated costs required a number of assumptions, our results are comparable with previous reports. The most important result of these calculations is that both the ERC and AHA guidelines are associated with acceptable costs, a fact that adds to the strength of the AHA guideline, which provided AED coverage for the majority of cardiac arrests in public. As expected, the costs of AED placement in low-risk areas were excessive. Nevertheless, these costs should be used cautiously because they are sensitive to changes in several parameters. Second, the cost data were derived from several sources and may not represent the exact costs in our population. In this study, ≈25% of out-of-hospital cardiac arrests occurred in public areas, which is in agreement with other studies. Likewise, the baseline characteristics of patients with cardiac arrest (Table 1) are comparable with previous reports. Although Copenhagen is a large city with a heterogeneous population, the results may not be generalizable to other communities with different demographics and infrastructure. Because appropriate AED locations are likely to vary between communities, accumulation of region-specific data of cardiac arrest locations should be encouraged to plan for rational AED placements.

This study has several limitations. First, only information on AEDs placed in municipal settings in Copenhagen was obtained; the number and locations of AEDs placed in private settings are unknown. Second, this study does not address out-of-hospital cardiac arrests in rural communities, which have a lower incidence of cardiac arrest and a longer EMS response time. Third, although the minimum number of AEDs necessary to provide adequate coverage of all the high-risk areas of cardiac arrest could be calculated, it is unlikely that deployment of AEDs at all these sites would be carried out unless it is mandated by law or the expenses are subsidized by a third party. Unlike several states in the United States, there are currently no such mandatory laws in Denmark. Fourth, using well-defined grid cells coupled with cardiac arrest occurrence provides a systematic and scientific method to identify optimal locations for AED placement but introduces issues of geographic boundaries when each arrest is confined to the grid cell in which it occurred. Thus, an arrest occurring in a grid cell without an AED could potentially benefit from an AED in a neighbor grid cell. The main strengths of this study are that registration was performed by a single EMS covering the entire city, ensuring complete and uniform registration of cardiac arrests. The 11-year study period minimized the natural variability in the number of cardiac arrests occurring at a given site and thus represents long-term trends of out-of-hospital cardiac arrests.

Conclusions
The main conclusion of this study is that a high proportion of cardiac arrests in public can be covered by strategic placement of AEDs within a limited area of a city center and with acceptable costs. If public-access defibrillation programs should provide coverage for the majority of cardiac arrest in public, AEDs need to be more widely distributed than recommended by the ERC but consistent with the recommendations from the AHA. Furthermore, if AED placement is driven by local or political initiatives, this study reveals a risk of paradoxical AED placement in the community, with placement being primarily in low-incidence areas of cardiac arrest. Consequently, strategic initiatives focusing on high-incidence areas of cardiac arrest should be a necessary part of a public-access defibrillation program.

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Disclosures
None.

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2: adult basic life support and use of automated external defibrillators. 


14. Andersen TF, Madsen M, Jorgensen J, Mellemkjoer L, Olsen JH. The Copenhagen experience indicates that AED deployment according to the European Resuscitation Council guidelines (1 cardiac arrest every 2 years) requires AED coverage of 1% of the city area and coverage of 20% of all the cardiac arrests in public areas. A much greater impact can be achieved with the American Heart Association guidelines (1 cardiac arrest every 5 years), in which AED coverage of ~10% of the city covers nearly 70% of the cardiac arrests. If there is no local knowledge of the high-incidence cardiac arrest areas in a particular city, then placement should be focused on major transportation sites and public areas where the population density is very high. AED placement based on local or political initiatives cannot be discouraged; however, if used alone, this study revealed a risk of inconsistent AED placement in the community, with placement being primarily in low-incidence areas of cardiac arrest. To avoid this situation, strategic initiatives focusing on high-incidence areas of cardiac arrest should be a necessary part of any public-access defibrillation program.


CLINICAL PERSPECTIVE

The optimal treatment of out-of-hospital cardiac arrests caused by ventricular fibrillation is defibrillation, and the chance of survival is strongly dependent on early defibrillation. This finding has inspired the placement of automated external defibrillators (AEDs) in public locations for use by lay responders, the principle behind public-access defibrillation. To save lives, AEDs should be placed where the risk of cardiac arrest is high. The Copenhagen experience indicates that AED deployment according to the European Resuscitation Council guidelines (1 cardiac arrest every 2 years) requires AED coverage of 1% of the city area and coverage of 20% of all the cardiac arrests in public areas. A much greater impact can be achieved with the American Heart Association guidelines (1 cardiac arrest every 5 years), in which AED coverage of ~10% of the city covers nearly 70% of the cardiac arrests. If there is no local knowledge of the high-incidence cardiac arrest areas in a particular city, then placement should be focused on major transportation sites and public areas where the population density is very high. AED placement based on local or political initiatives cannot be discouraged; however, if used alone, this study revealed a risk of inconsistent AED placement in the community, with placement being primarily in low-incidence areas of cardiac arrest. To avoid this situation, strategic initiatives focusing on high-incidence areas of cardiac arrest should be a necessary part of any public-access defibrillation program.
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