TO:  
CHAIR AND MEMBERS -  
COMMUNITY AND PROTECTIVE SERVICES COMMITTEE

FROM:  
J. KOBARDA  
FIRE CHIEF & DIRECTOR OF PARAMEDIC SERVICES

SUBJECT:  
PUBLIC ACCESS DEFIBRILLATION PROGRAMS  
MEETING ON  
FEBRUARY 28, 2005

RECOMMENDATION

That, on the recommendation of the Fire Chief & Director of Paramedic Services, this report BE RECEIVED for information purposes.

BACKGROUND

At its session held on July 7, 2003, Municipal Council requested that the former Fire Chief and Director of Paramedic Services report on the status of the findings of the National Institute of Health’s (NIH) public access defibrillation (PAD) pilot program. It was further requested that if no findings were available from the NIH that direct contact be made with other municipalities to report back on the success of public access defibrillation programs in other communities and the costs associated therewith.

The National Institute of Health (NIH) is an Agency of the U.S. Department of Health and Human Service, which coordinates medical and behavioral research within the United States. In a cooperative venture with the National Heart, Lung and Blood Institute (NHLBI) and the American Heart Association (AHA), the organizations implemented a large multi-center study designed “to test the life-saving potential and cost effectiveness of public access defibrillation (PAD)”.

Studies demonstrate the effectiveness of defibrillation delivered by trained public safety and emergency responders; however, it was unknown if placing fully automatic defibrillators in the community and training lay personnel would prove equally as effective.

Coordinated by the University of Washington, the 2½-year trial study, which encompassed 24 North American cities, commenced in July 2000. Participating Canadian municipalities included Vancouver, British Columbia, Calgary, Alberta, and Edmonton, Alberta. The study primarily focused on occupancies such as residential apartments, shopping centers, senior centres, gated communities, office buildings, and sports venues. In all, 993 public facilities participated in the study.

Seeking to quantify the benefit of defibrillators, researchers utilized two methods of intervention. Staff at selected facilities received only CPR training, whereas at the balance of the sites volunteers received training in both defibrillation and CPR. Training sessions varied in duration between 2 to 4 hours. During the pilot period, some individuals required a retraining session. In all, approximately 20,000 volunteers (average of 20 per facility; range 10 to 36) received training and 1500 defibrillators were deployed (average of 3 per facility; range 1 to 16).

For the duration of the pilot period, 1805 facility-years of experience were accumulated. Of the 292 attempted resuscitations, 44 individuals survived. Twenty-nine patients received both CPR and defibrillator shocks, whereas 15 received only CPR. As noted in the study, this equates to one (1) treatable cardiac arrest per facility every 6.7 years; however, it is interesting to note, as reported in the previous paragraph, that on average each facility was equipped with three (3) defibrillators. Another key finding was that an increased survival rate was found primarily in
“public” versus “residential” occupancies. This finding is important when correlated to the findings of the Ontario Pre-hospital Advanced Life Support Study (OPALS) discussed later in this document.

In consideration of his role within the community, as well as expertise in the area of cardiac care, Dr. Jon Dreyer, Director of the London Base Hospital, was also consulted on the matter. Dr. Dreyer was involved with the OPALS study, the largest global pre-hospital study undertaken to date, which “examined more than 25,000 cardiac arrest, trauma, and critically ill patients over an 8-year period”. The OPALS study evaluated the benefits of not only rapid defibrillation but also pre-hospital Advanced Cardiac Life Support.

While the outcomes of the potential impact of PAD from the OPALS study have yet to be formally published, the main report of OPALS, on outcome of cardiac arrest relating to introduction of Advanced Life Support, was published in the New England Journal of Medicine (N Engl J med. 2004 Aug. 12, 351 (7):647-56). Dr. Dreyer shared some of the preliminary findings. Most cardiac arrests occur in small residential occupancies (56%), followed by large residential (29%), large public (7%), small public (5%) and outdoor venues (3%). Specifically, only 15% occur in some type of “public” venue. Further analyzed was the frequency by which cardiac arrests occur at certain categories of occupancies. It is difficult to predict when and where a cardiac arrest will occur; however, the study identified occupancies where a PAD program might be most beneficial. At the top of the list were casinos, non-acute hospitals, and nursing homes, where it is estimated that a PAD might be used once every five (5) years or less. In order of highest to lowest probable use, penal institutions, shopping malls, hotels, golf courses, recreation/assembly/community centres, airports/heliports/railway stations/bus stations, restaurants/bars were the next most likely to experience a cardiac arrest. Probability of use ranged from one (1) use in every 18 to 147 years. The study showed even a less likelihood of use in 15 other categories of occupancies.

A number of factors must be considered prior to implementing a PAD program, including but not limited to:

- **Training**
  - Who is responsible for organizing and delivering the training?
  - Which agency, private or public, will ensure there are a proper number of trained individuals per site?
  - What are the requirements of the site to ensure:
    - there are a sufficient number of trained staff?
    - there are a sufficient number of trained staff available during the site’s hours of operation?
  - Which agency, private or public, will monitor the need for retraining, and arrange for the same?
  - Who will finance the training?

- **Equipment**
  - Who will finance the capital costs?
    - It is assumed that if the City wishes to establish a PAD program, it will be responsible for the initial purchase, as well as the ongoing replacement costs.

- **Accessories**
  - Consumable items such as batteries and leads may require replacement during the life of the unit (approximately 5 years).
  - Pads must be replaced when used, or on the expiration date, as recommended by the manufacturer (shelf life is either every 2 or 5 years, depending on pad quality).
• Maintenance and Testing
  o Who will be responsible for the ongoing monitoring to ensure the unit is functional?
    ▪ The LFD and Thames EMS test their units at the start of each shift.
  o Who will be responsible for ensuring the units are in place and functional, as well as maintaining a record of the same?
  o In cases where the device requires repair, who will bear these costs?

• Medical Oversight
  o Because defibrillation is a medical act, a medical professional should oversee the PAD program.
    ▪ Dr. Jon Dreyer currently does not charge the Fire Department, albeit it is common for Medical Directors to receive remuneration in the range of $30,000 to $50,000 per year.
  o Issues such as liability insurance must be addressed as well.

Several options for the acquisition of training and equipment exist. The City can elect to fund the project in whole or in partnership with other entities. Seeking donations from local companies, service clubs, organizations, and/or agencies is another means by which to finance the program, albeit the challenge may be to sustain the program in future years. Finally, some defibrillator vendors offer financial assistance by assisting with fund raising programs.

Predicting the cost of a PAD program is difficult because many variables influence the final cost. First, a needs assessment would be required to identify strategic locations. Then, each facility would need to be assessed to determine the number of defibrillators required to effectively deliver the service (goal is a three-minute response time), and so on. It should be noted that the London Base Hospital conducted a preliminary analysis of the location of cardiac arrests in the city 3 years ago. There was no pattern to these occurrences, and no one location where more than one cardiac arrest had occurred.

The chart below provides a rough estimate of the costs; however, they exclude some of the requirements identified above that would need a more in-depth analysis.

<table>
<thead>
<tr>
<th>Resources Required</th>
<th>Potential Cost</th>
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<tbody>
<tr>
<td>Automated External Defibrillator</td>
<td>$3,000 X number of defibrillators required (depends on needs assessment)</td>
</tr>
<tr>
<td>Device Mounting &amp; Case</td>
<td>$100 X number of defibrillators required</td>
</tr>
<tr>
<td>Accessories/Unit</td>
<td>$300 X number of defibrillators required</td>
</tr>
<tr>
<td>Maintenance/Unit/Yr</td>
<td>Negligible/unit</td>
</tr>
<tr>
<td>Training/person/Yr</td>
<td>$125.00 X number of operators required (min. 10/also according to study)</td>
</tr>
<tr>
<td>Medical Oversight</td>
<td>$0 - $30,000 Total program cost</td>
</tr>
</tbody>
</table>

In summary, the studies noted above demonstrate that quick pre-hospital intervention using CPR and defibrillation can result in positive outcomes. That said, both studies suggest that a successful PAD program is reliant upon strategic implementation (e.g., the likelihood of use is far higher in some locations than in others). Recognizing this fact, as well as the financial challenges confronting the City, should Council wish to pursue a PAD program it is important to identify locations where the risk and benefit is the greatest.
Should Council wish to further examine the viability of a PAD program it is essential to strike a committee to study the same and undertake a complete cost/benefit analysis, including a repeat analysis of the location of cardiac arrest in the City over the last 5 years. Such study would need to be funded, and would require the Base Hospital to take a lead role. Furthermore, Council should consider asking Dr. Jon Dreyer to sit on this committee because of his involvement in the OPALS study, knowledge of cardiac care issues related to London, and his position as Base Hospital Medical Director. PAD programs can improve survival from out of hospital cardiac arrest, however, other methods of improving survival, such as improving the percentage of patients who receive citizen CPR, optimizing emergency response, targeted responder programs, and educating the public about the options of home defibrillation should not be ignored.

SUBMITTED BY:

J. Kobarda
Fire Chief & Director of Paramedic Services

c. J. Fielding, Chief Administrative Officer
   J. Dryer, Doctor, Emergency Medicine Office