

## PREHOSPITAL CARE

# Is the public equipped to act in out of hospital cardiac emergencies?

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**Study objective:** This study aimed to determine whether the people in Australia are informed about and prepared to intervene in a cardiac emergency.

**Methods:** A cross sectional telephone survey, which contained sections regarding participant demographics, cardiopulmonary resuscitation (CPR) training, knowledge of CPR, and the emergency contact number and potential barriers to performing chest compressions and mouth to mouth.

**Results:** A total of 1489 people completed the questionnaire. Only 11% of the population had recently (<12 months) trained in CPR. When presented with a cardiac arrest scenario most participants stated that they would telephone 000. Significantly more respondents believed that they would give mouth to mouth to a family member compared with a stranger. A bleeding victim and fear of not having the skills were the most common barriers that reduced the participants perceived willingness to perform chest compressions and mouth to mouth.

**Conclusion:** This study suggests that a low percentage of the public is currently trained in CPR and also that they are unprepared to act in a cardiac emergency.

Unless emergency medical services (EMS) response is consistently very rapid, survival from out of hospital cardiac arrest is dependent on the provision of cardiopulmonary resuscitation (CPR) by bystanders (including healthcare professionals) and family members. CPR initiated by a bystander helps maintain ventricular fibrillation (the most common presenting rhythm of out of hospital cardiac arrest) and increases the chance of surviving.<sup>1,2</sup> Investigators have suggested a beneficial effect of the quality of bystander CPR and of the time taken to initiate CPR, on survival.<sup>2–5</sup>

Despite the proved benefits of CPR in an arrest situation, as little as 22% of out of hospital cardiac arrests in Melbourne receive CPR from a bystander before the arrival of the EMS.<sup>6–8</sup> This study was conducted to determine whether people in Victoria, are informed about and prepared to intervene in a cardiac emergency.

## METHODS

### Study design

Ethical approval was obtained from the Alfred Hospital Ethics Committee. The study was a cross sectional survey of Melbourne (population about 3.5 million) and the rest of state of Victoria, which have a central emergency phone number of 000.

The survey was administered over the telephone through a random selection of telephone numbers from a CD-ROM containing all listed phone numbers for the State. According to the Australian Bureau of Statistics there is a high percentage (98%) of telephone coverage in Victorian Households.<sup>9</sup>

### Survey instrument

The questionnaire contained sections regarding participant demographics, CPR training, knowledge of CPR, and the emergency number and potential barriers to performing chest compressions and mouth to mouth. A split sample technique was used for one question on the survey, which involved a scenario where a person collapses and participants were asked unprompted to describe step by step what they think they would do. In half of the questionnaires administered, the person described in the scenario was a stranger in the street and

in the other half a family member. The survey instrument has not been validated, however the general content was similar to a survey used to investigate public knowledge in Canada.<sup>10</sup>

### Data analysis

The sampling frame was designed so that the final sample would consist of 750 participants from within metropolitan Melbourne and 750 from other areas of Victoria. A total sample of 1500 people allowed for a sampling error of  $\pm 2.6\%$  in 95 of 100 samples.

Survey responses were weighted to adjust for the specific sampling design.<sup>11</sup> All data were analysed using the statistical package STATA.<sup>12</sup> Categorical data were expressed as percentages and odds ratios with 95% confidence intervals. Statistical significance was analysed by a design based  $\chi^2$  statistic. Continuous data were described as a mean and 95% confidence intervals and analysed by an unpaired two tailed Student *t* test. Because multiple comparisons were made from a single dataset the level for statistical significance was set at  $<0.01$ .

## RESULTS

A total of 2889 households were contacted between September 2000 and August 2001. Participants were excluded if the phone number was invalid ( $n=590$ ), there was no answer after six telephone calls ( $n=174$ ), or the participants had insufficient English or competency to participate ( $n=254$ ). Of the 1871 households with eligible respondents at home at the time of telephone contact, the questionnaire was completed in full by 1489 (79%) of respondents. This did not change the power of the study as originally calculated.

When asked if they knew the emergency number 98% of participants correctly responded "000". The majority (86%) of people stated that they knew what CPR involved. When asked to then describe CPR most (65%) respondents correctly described it as "pushing down on the chest and breathing into the mouth".

**Abbreviations:** CPR, cardiopulmonary resuscitation; EMS, emergency medical services

**Table 1** Responses to the cardiac arrest scenario

Option	Total %	Scenario: Family member collapses at home (%) (n=736)	Scenario: Stranger collapses in street (%) (n=753)	Adjusted OR (95% CI)*	Female (%) (n=892)	Male (%) (n=597)	Adjusted OR (95% CI)*	Previous CPR training (%) (n=720)	No previous CPR training (%) (n=769)	Adjusted OR (95% CI)*
Call 000	68.7	77.6	60.2	<b>2.3 (1.8 to 3.0)</b>	69.7	67.7	1.1 (0.8 to 1.4)	66.4	71.2	0.7 (0.5 to 1.0)
Give mouth to mouth	60.5	65.3	55.9	<b>1.5 (1.2 to 2.0)</b>	57.6	63.4	0.8 (0.6 to 1.0)	78.5	41.0	<b>4.7 (3.5 to 6.2)</b>
Give chest compressions	50.5	54.0	47.1	1.4 (1.0 to 1.8)	46.2	54.8	<b>0.7 (0.5 to 0.9)</b>	71.7	27.4	<b>5.9 (4.4 to 7.8)</b>
Get help/ look for help/ call for help	28.2	9.4	46.1	<b>0.1 (0.1 to 0.2)</b>	29.8	26.5	1.1 (0.8 to 1.5)	30.1	26.1	1.3 (1.0 to 1.9)
Clear air passage	22.7	24.3	21.2	1.2 (0.9 to 1.6)	24.0	21.3	1.2 (0.9 to 1.6)	26.5	18.6	1.4 (1.0 to 1.9)
DRABC	17.3	16.9	17.7	0.9 (0.6 to 1.3)	13.8	20.8	<b>0.5 (0.3 to 0.7)</b>	28.9	4.7	<b>6.1 (2.0 to 4.9)</b>
Roll onto side	11.4	10.9	11.9	0.9 (0.6 to 1.3)	13.4	9.4	1.5 (1.0 to 2.3)	11.1	11.7	0.9 (0.6 to 1.3)
Cover/make comfortable	5.7	5.3	6.1	0.8 (0.6 to 1.3)	6.8	4.6	1.5 (1.0 to 2.4)	3.4	8.2	<b>0.4 (0.3 to 0.6)</b>

\*Odds ratio calculated by multiple logistic regression adjusting for variables in table plus place of residence, previous health training, education and age. Percentages and odds ratios are weighted for over sampling of non-metropolitan Melbourne participants and by the Victorian population (age and gender). Bold type indicates a p value of <0.01.

Only 52% of the study sample, were trained in CPR and only 11% within the past 12 months. Of those CPR trained, 55% said they still felt confident about their CPR skills. Respondents were significantly more likely to have received CPR training if they were younger than 56 years of age (OR 3.3, 95% CI 2.6 to 4.3,  $p < 0.001$ ) and if they had training in a trade (OR 2.1, 95% CI 1.5 to 3.0,  $p < 0.001$ ) or a tertiary education (OR 1.9, 95% CI 1.4 to 2.5,  $p < 0.001$ ) compared with high school only.

Respondents were asked unprompted to name actions they believed they would take if faced with a collapse situation at home or in the street. Most participants stated that they would telephone 000. Significantly more respondents believed that they would give mouth to mouth to a family member compared with a stranger. Women were less likely than men to say that they would give chest compressions (regardless of the scenario) (table 1).

Respondents who had received CPR training were more likely to say that they would give chest compressions, mouth to mouth, and check for "Danger, Response, Airway, Breathing and Circulation" than non-trained respondents ( $p < 0.01$ ) (table 1).

A bleeding victim and fear of not having the skills were the most common barriers that reduced the participants perceived willingness to perform chest compressions and mouth to mouth (table 2).

## DISCUSSION

A significant finding from this study is the low level of people who have current CPR training. Only 11% of participants had trained in CPR within the previous 12 months. The American Heart Association has suggested that to reduce morbidity and mortality rates from out of hospital cardiac arrest at least 20% of adults need to be currently trained in CPR.<sup>13</sup>

Respondents were more likely to have received training if they were younger than 56 years of age. The association between age and likelihood of being trained in CPR has been reported in previous studies.<sup>14-15</sup> CPR courses attract a predominance of young, healthy adults.<sup>14-16</sup> This contrasts strongly with the type of person most likely to witness a cardiac arrest.<sup>7</sup>

Participants who had CPR training were no more likely to say that they would call 000. This response is disappointing as the concept of "phoning first" in a cardiac emergency (where the victim is aged over 8 years) is part of the current Australian Resuscitation Basic Life Support Guidelines.<sup>17</sup> It seems that the public would waste valuable time before activating the EMS.

The fear of incorrectly performing CPR and fear of catching a disease, seen in this study have been reported previously.<sup>10-18</sup> Disease transmission in particular has been proposed as a reason that CPR is not more commonly started.<sup>18-19</sup> In Sweden 94% of trained lay rescuers interviewed believed that there was a small to large risk of disease transmission from performing CPR.<sup>20</sup> This fear seems to be unfounded as the risk of acquiring an infection from CPR is extremely low.<sup>21</sup> Rowe *et al* suggest that barriers identified in studies such as this, need to be tackled by CPR instructors to allay fears regarding basic life support.<sup>10</sup>

This study has several limitations. The possibility of a volunteer sampling effect means that the data presented may overestimate the public's knowledge of the appropriate actions in a cardiac arrest situation. Also, the respondents were not tested on their actual performance or behaviour, which again may cause an overestimation of preparedness.

This lack of knowledge observed in the public, may contribute to the poor survival rates that have been reported for Melbourne (<5%) and in other areas of Australia.<sup>7, 22-24</sup> Innovative CPR training delivery methods (such as video training) and public awareness campaigns require exploration.<sup>25-28</sup> It may also mean that awareness programmes should target specific

**Table 2** Barriers to performing chest compressions and/or mouth to mouth

Characteristic	Chest compressions			Mouth to mouth		
	Willing	Unwilling	Unsure	Willing	Unwilling	Unsure
Person was the same sex	90.4	8.0	1.6	86.8	9.4	3.8
Person was elderly	84.0	8.8	7.2	81.3	10.5	8.2
Other witnesses	83.5	9.4	7.1	81.1	11.0	7.9
Complete stranger	79.7	9.5	10.8	60.5	18.2	21.3
Person looked dirty	75.4	12.9	11.7	51.8	26.4	21.8
Fear of disease	73.7	13.9	12.5	44.5	28.8	26.8
Person had vomited	72.8	14.2	13.1	41.5	35.6	23.0
Fear of legal consequences	70.2	13.8	16.0	71.5	14.4	14.1
Fear of not having the skills	56.2	19.8	24.0	59.4	19.4	21.2
Person was bleeding	55.0	19.0	26.0	38.8	27.2	34.0

components of the full CPR training courses such as, recognising an arrest, dialling 000, and providing chest compressions alone.

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### Contributors

Karen Smith initiated and coordinated the formulation of the research idea, sought project funding and ethical approval, participated in the initial design of the questionnaire, piloted and refined the questionnaire, discussed core ideas, designed the study database, coordinated data collection, performed the statistical analysis and participated in the writing of the paper. Peter Cameron initiated and coordinated the formulation of the research idea, participated in the initial design of the questionnaire, discussed core ideas and the data analysis and participated in the writing of the paper. Alastair Meyer participated in the formulation of the research idea and in the initial design of the questionnaire and contributed to an initial grant application. John McNeil initiated and coordinated the formulation of the research idea, participated in the initial design of the questionnaire, discussed core ideas and the data analysis and participated in the writing of the paper.

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### REFERENCES

- Weston CFM, Wilson RJ, Jones DS. Predicting survival from out-of-hospital cardiac arrest: A multivariate analysis. *Resuscitation* 1995;**34**:27–34.
- Valenzuela TD, Roe DJ, Cretin S, et al. Estimating effectiveness of cardiac arrest interventions. A logistic regression survival model. *Circulation* 1997;**96**:3308–13.
- Van Hoeyweghen RJ, Bossaert LL, Mullie A, et al. Quality and efficiency of bystander CPR. Belgian Cerebral Resuscitation Study Group. *Resuscitation* 1993;**26**:47–52.
- Gallagher EJ, Lombardi G, Gennis P. Effectiveness of bystander cardiopulmonary resuscitation and survival following out-of-hospital cardiac arrest. *JAMA* 1995;**274**:1922–5.
- Wik L, Steen PA, Bircher NG. Quality of bystander cardiopulmonary resuscitation influences outcome after prehospital cardiac arrest. *Resuscitation* 1994;**28**:195–203.
- Bernard S. Outcome from prehospital cardiac arrest in Melbourne, Australia. *Emerg Med* 1998;**10**:25–9.
- Smith KL, Peeters A, McNeil JJ. Results from the first twelve months of a fire first-responder program in Australia. *Resuscitation* 2001;**49**:143–50.
- Meyer ADM, Bernard S, Smith KL, et al. Asystolic cardiac arrest in Melbourne, Australia. *Emerg Med* 2001;**13**:186–9.
- ABS. *Household use of information technology*. Report no 8146.0. Canberra: Australian Bureau of Statistics, 1999.
- Rowe BH, Shuster M, Zambon S, et al. Preparation, attitudes and behaviour in nonhospital cardiac emergencies: Evaluating a community's readiness to act. *Can J Cardiol* 1998;**14**:371–7.
- ABS. *Population by age and sex*. Report no 3235.2. Victoria. Canberra: Australian Bureau of Statistics, 2001.
- StataCorp. *Stata statistical software. Release 7*. College Station: Stata Corporation, 2000.
- Weaver WD, Cobb LA, Hallstrom AP, et al. Considerations for improving survival from out-of-hospital cardiac arrest. *Ann Emerg Med* 1986;**15**:1181–6.
- Bahr J. CPR education in the community. *Eur J Emerg Med* 1994;**1**:190–2.
- Brennan RT, Braslow A. Are we training the right people yet? A survey of participants in public cardiopulmonary resuscitation classes. *Resuscitation* 1998;**37**:21–5.
- Goldberg RJ, Gore JM, Love DG, et al. Layperson CPR— are we training the right people? *Ann Emerg Med* 1984;**13**:701–4.
- ARC. Policy Statement. *Heart attack*. Report no 8.2. Canberra: Australian Resuscitation Council, 1997.
- Locke CJ, Berg RA, Sanders AB, et al. Bystander cardiopulmonary resuscitation: concerns about mouth-to-mouth contact. *Arch Intern Med* 1995;**155**:938–43.
- Shibata K, Taniguchi T, Yoshida M, et al. Obstacles to bystander cardiopulmonary resuscitation in Japan. *Resuscitation* 2000;**44**:187–93.
- Axelsson A, Thoren A, Holmberg S, et al. Attitudes of trained Swedish lay rescuers toward CPR performance in an emergency. A survey of 1012 recently trained CPR rescuers. *Resuscitation* 2000;**44**:27–36.
- Mejicano GC, Maki DG. Infections acquired during cardiopulmonary resuscitation: estimating the risk and defining strategies for prevention. *Ann Intern Med* 1998;**129**:813–28.
- Bett JHN. Experience with a mobile coronary care unit in Brisbane. *Ann Emerg Med* 1989;**18**:969–74.
- Scott IA, Fitzgerald GJ. Early defibrillation in out-of-hospital sudden cardiac death: an Australian experience. *Arch Emerg Med* 1993;**10**:1–7.
- Meyer ADM, Cameron PA, Smith KL, et al. Out-of-hospital cardiac arrest. *Med J Aust* 2000;**172**:73–6.
- Amith G. Revising educational requirements: challenging four hours for both basic life support and automated external defibrillators. *New Horizons* 1997;**5**:167–72.
- Braslow A, Brennan RT, Newman MM, et al. CPR training without an instructor: development and evaluation of a video self-instructional system for effective performance of cardiopulmonary resuscitation. *Resuscitation* 1997;**34**:207–20.
- Todd KH, Heron SL, Thompson M, et al. Simple CPR: a randomized, controlled trial of video self-instructional cardiopulmonary resuscitation training in an African American church congregation. *Ann Emerg Med* 1999;**34**:730–7.
- Todd KH, Braslow A, Brennan RT, et al. A randomized, controlled trial of video self-instruction versus traditional CPR training. *Ann Emerg Med* 1998;**31**:364–9.