Effect of Severe Acute Respiratory Syndrome on Bystander Willingness to Perform Cardiopulmonary Resuscitation (CPR)—Is Compression–Only Preferred to Standard CPR?

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Abbreviations:
CCPR = compression-only cardiopulmonary resuscitation
CPR = cardiopulmonary resuscitation
HIV = human immunodeficiency virus
SARS = severe acute respiratory syndrome
SCPR = standard cardiopulmonary resuscitation

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Abstract

Objective: The effect of the severe acute respiratory syndrome (SARS) outbreak on the willingness of laypersons to provide bystander cardiopulmonary resuscitation (CPR) using standard CPR (SCPR) or compression-only CPR (CCPR) was evaluated. The preferred type of SCPR in the post-SARS era was assessed.
Methods: A descriptive study was conducted through telephone interviews. Persons who attended a CPR course from January 2000 through February 2003 answered a structured questionnaire. The respondents' willingness to perform SCPR or CCPR during a witnessed cardiac arrest of an average adult stranger or that of a family member in the pre-SARS and the post-SARS era was surveyed.
Results: Data for 305 respondents were processed. For the scenario of cardiac arrest of an average stranger, more respondents would perform CCPR than SCPR in the pre-SARS era (83.6% vs. 61.3%, p <0.001) and in the post-SARS era (77.4% vs. 28.9%, p <0.001). In the scenario of the cardiac arrest of a family member, more would perform CCPR than SCPR in the pre-SARS era (92.8% vs. 87.2%, p <0.001) and in the post-SARS era (92.8% vs. 84.9%, p <0.001). After SARS, more respondents were unwilling to perform SCPR (p <0.001) and CCPR (p <0.001) on strangers. After SARS, more respondents were unwilling to perform SCPR on a family member (p = 0.039), but there was no difference in the preference to perform CCPR (p = 1.000).
Conclusions: Concerns about SARS adversely affected the willingness of respondents to perform SCPR or CCPR on strangers and to perform SCPR on family members. Compression-only CPR was preferred to SCPR to resuscitate strangers experiencing cardiac arrest after the emergence of SARS.

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Introduction

Bystander cardiopulmonary resuscitation (CPR) is a critical link in the "chain of survival" after out-of-hospital cardiac arrest.[1–3] However, due to the fear of disease transmission through mouth-to-mouth ventilation, there is an extremely low bystander CPR rate worldwide.[4–7] The most feared disease is the human immunodeficiency virus.[8–9] However, since the outbreak of severe acute respiratory syndrome (SARS) in early 2003, the public concern about the risk of SARS transmission, especially through mouth-to-mouth ventilation during standard CPR (SCPR), is likely to exist.[10–11] This may decrease the willingness to perform CPR, and may further lower the bystander rate of CPR.

The objective of this study was to document the effects of the emergence of SARS on bystander willingness to perform standard CPR (SCPR) and compression-only CPR (CCPR) on an average adult stranger or a family member. The preferred type of CPR in the post-SARS era was assessed.

Methods

A descriptive survey was conducted from January 2004 through April 2004 using telephone interviews. Volunteers from Community Involvement and

Scenario	Do CCPR n (%)		Do SCPR n (%)		p-value
	Yes	No	Yes	No	
Resuscitate a stranger pre-SARS	225 (83.6)	50 (16.4)	187 (61.3)	118 (38.7)	<0.001
Resuscitate a stranger post-SARS	236 (77.4)	69 (22.6)	27 (28.9)	217 (71.1)	<0.001
Resuscitate a family member pre-SARS	283 (92.8)	21 (7.2)	226 (87.2)	39 (12.8)	<0.001
Resuscitate a family member post-SARS	283 (92.2)	21 (7.2)	259 (84.9)	46 (15.1)	<0.001

Table 1—The preference of compressions-only cardiopulmonary resuscitation (CCPR) vs. standard cardiopulmonary resuscitation (SCPR) (SARS = severe acute respiratory syndrome)

the Volunteer Service Department of the United Christian Hospital were briefed on the telephone techniques and called the subjects. In this study, *standard CPR* was defined as CPR with mouth-to-mouth ventilation, while *CCPR* was defined as CPR by chest compression alone. The pre-SARS era and the post-SARS era were demarcated by the March 2003 SARS outbreak in Hong Kong.[11] A *family member* was defined as an immediate family relative. The *willingness to do* CPR was defined as the willingness to perform chest compressions and/or mouth-to-mouth resuscitation.

The research was approved by the Research Ethics Committee (KC/KE) of the Hong Kong Hospital Authority. It did not require any extra funding because volunteers of the CPR program handled the interviews. Persons who attended the CPR course organized by the HeartSaver program of the United Christian Hospital, from January 2000 through February 2003 answered a structured questionnaire.[12] They were laypersons living around the hospital. The February 2003 course was the last course held before the SARS outbreak.

After explaining the objective of the interview to the participants, consent was obtained. The theme was: "Will you change your attitude towards performing CPR after the emergence of SARS?" The respondents' willingness to perform SCPR or CCPR during a witnessed cardiac arrest of an average adult stranger or of a family member in both the pre-SARS and the post-SARS era was investigated during the same telephone call. The questionnaire used is in Appendix 1.

Results from previously performed surveys indicate that the general willingness of an average layperson to perform CPR was around 70%.[6] A sample size calculation showed that a sample size of 172 was required to demonstrate a change of 70% to 60% at a 95% confidence level and 80% power.

All analyses were performed using SPSS version 12.0 (SPSS Inc., Chicago, IL) statistical package. A chi-square test was used to compare the willingness to perform CCPR versus the willingness to do SCPR in the pre-SARS era and post-SARS era. The McNemar test was used to measure the change in attitude toward providing CCPR or SCPR after the SARS outbreak.

Results

A total of 316 calls were made, and 305 individuals were interviewed successfully. Data processed for 305 respondents (male:female = 34:66; mean age = 40.7 years; range 7–71 years).

In the scenario of the cardiac arrest of a stranger, more respondents would perform CCPR than SCPR in the pre-SARS era (83.6% vs. 61.3%, p <0.001) and in the post-SARS era (77.4% vs 28.9%, p <0.001). In the scenario of the cardiac arrest of a family member, more would perform CCPR than SCPR in the pre-SARS era (92.8% vs. 87.2%, p <0.001) and in the post-SARS era (92.8% vs. 84.9%, p <0.001) (Table 1).

To resuscitate a stranger after SARS, more respondents became unwilling to do SCPR (p <0.001) and CCPR (p <0.001) (Table 2). To resuscitate a family member after SARS, more respondents became unwilling to do SCPR (p = 0.039), but there was no difference in the preference to do CCPR (p = 1.000) (Table 2).

Discussion

In the International Guidelines, SCPR is the ideal CPR method with Class-1 recommendation.[13] It also is useful for cardiac arrests due to primary respiratory arrest. Although most people are trained in SCPR, there is an extremely low rate of bystander-initiated CPR.[5,14] The likelihood of acquiring HIV as a result of mouth-to-mouth ventilation is one of the major concerns, and people often are not willing to do SCPR on strangers.[7,8,15]

Compressions-only CPR only is recommended as Class IIa.[13] In a study involving 520 cases, CCPR had an outcome similar to that of SCPR, and CCPR may be the preferred approach for bystanders inexperienced in CPR.[14] Animal and pathophysiological studies showed that chest compressions were more important than ventilation in the early minutes following arrest.[16,17] In a survey involving 975 laypersons, 68% of them said that they would definitely perform CPR if only chest compressions were required to resuscitate a stranger in cardiac arrest, but only 15% of them would do CPR requiring mouth-to-mouth ventilation.[6]

After reviewing these internationally recommended CPR methods, the effects of the emergence of SARS on respondents' willingness to do CCPR and SCPR were evaluated.

Results of this survey suggest that worries about acquiring SARS significantly affected the attitudes of the laypersons who attended the United Christian Hospital CPR course. They said they were less willing to perform SCPR or CCPR on strangers in the post-SARS era. They also were less willing to perform SCPR on family members, but their willingness to do CCPR on family members did not change. Therefore, CCPR is the preferred method in the post-SARS era. This has implications on future education and performance of basic CPR.

Respondents became much less willing to perform SCPR on strangers in the post-SARS era. This drop was of concern because the study population was a group with a high willingness to perform SCPR. Thus, if SCPR is used

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	Pre-SARS n (%)		Post-SARS n (%)		*p*-value
Scenario	*Yes*	*No*	*Yes*	*No*	
Do SCPR on a stranger	187 (61.3)	118 (38.7)	87 (28.9)	217 (71.1)	<0.001
Do CCPR on a stranger	225 (83.6)	50 (16.4)	236 (77.4)	69 (22.6)	<0.001
Do SCPR on a family member	266 (87.2)	39 (12.8)	259 (84.9)	46 (15.1)	0.039
Do CCPR on a family member	283 (92.8)	21 (7.2)	283 (92.8)	21 (7.2)	1.000

Table 2—The change in attitude (CCPR = compressions-only cardiopulmonary resuscitation; SARS = severe acute respiratory syndrome; SCPR = standard cardiopulmonary resuscitation)

alone after SARS, bystander CPR rate will be affected seriously. The concerns about acquiring SARS as a result of mouth-to-mouth ventilation adversely affected the willingness of respondents to perform SCPR on strangers.

Standard CPR might remain the best method to resuscitate a family member in cardiac arrest in the post-SARS era, even though there was a statistically significant drop in the number of respondents willing to perform SCPR. This echoed previous studies that indicated bystanders were more willing to perform SCPR on a relative than on a stranger.[7,15] The reasons may include the fact that respondents know the health status of family members, and as a result, are more willing to save them.

This telephone survey had a high response rate (97.2%), possibly because the CPR course is hospital-based and the respondents had confidence in the sponsoring hospital.[12,18] Volunteers from the CPR program made the calls, and most of respondents finished the interviews. Only nine of 305 (2.8%) were not successful. Four people were busy at the time, and five refused. Hypothetical scenarios that may reflect the intention of respondents and their behavior in the real situation were used.[7] Forced-choice questions were asked to determine whether they would perform CPR.

One of the limitations of this study was that the population was comprised of attendees of the hospital CPR course. They were trained in CPR, but may not represent the CPR providers trained by other organizations in Hong Kong or persons with no prior CPR training. They also may not represent those who have prior training in CPR, but have not yet updated their certification. Since the SARS outbreak was serious in Hong Kong in 2003, the effect of SARS on the attitudes of Hong Kong residents may be more serious than that on people living in other parts of the world not directly affected by SARS.

In retrospect, it would have been ideal if the attitudes of these laypersons could have been surveyed before and after SARS emerged. However, it was not possible in this study because SARS was only known to the world in early 2003. Thus, the respondents were asked to recall their perceived willingness to perform CPR before the SARS epidemic, even though it may introduce some bias.

Despite these limitations, the survey is the first study that clearly documents the effect of SARS on the willingness of laypersons to perform SCPR and CCPR. The chain of survival in the SARS era must be improved by increasing the bystander CPR rate. The quickest way to do this is to urgently and widely publicize the international consensus that CCPR is a useful and acceptable alternative to SCPR for primary cardiac arrests.[13] Rescuers have the right to choose between CCPR or SCPR, and they should promptly perform CCPR if they do not want to perform SCPR. This may increase the CPR rate on strangers.

Second, the general public can be educated in the use of devices like pocket masks with viral filters or bag-valve-masks with viral filters for ventilation. Most corporate institutions in Hong Kong can afford to install these devices in their first-aid kits. By avoiding direct mouth-to-mouth contact, some of the fear of rescuers may be reduced, and the SCPR rate on strangers in the post-SARS era may be increased.

Third, immediate expert opinions from international resuscitation specialists are needed to establish guidelines on how CPR can be performed safely and effectively on cardiac arrest victims potentially infected with SARS.

Fourth, research is needed in order to determine the safest and most effective method for laypersons used in an effort to resuscitate cardiac arrest victims who potentially are highly infective. Hopefully, these measures will raise the bystander CPR rate in the post-SARS era.

Conclusions

This study documented the adverse effect of the SARS outbreak on bystander willingness to perform SCPR and CCPR. Concerns about SARS adversely affected the willingness of respondents to perform SCPR or CCPR on strangers and to perform SCPR on family members. Compression-only CPR was preferred to SCPR to resuscitate strangers in cardiac arrest. In order to increase the bystander CPR rate, international consensus about CCPR should be publicized widely to the general public and be included in the CPR training.

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Appendix—The questionnaire (CCPR = compressions-only cardiopulmonary resuscitation; SARS = severe acute respiratory syndrome; SCPR = standard cardiopulmonary resuscitation)

The scenario was as follows: "I want you to think about an emergent situation. You witness an average adult stranger collapse on the street, find that the person is unresponsive, and has no breathing or pulse."

1. If you were the only bystander, would you do SCPR, which includes opening the airway, doing mouth-to-mouth ventilation and chest compression, to rescue this person?
   After the outbreak of SARS: Yes/No
   Before the outbreak of SARS: Yes/No
2. If you could do an alternative method of CPR, in which you would not perform mouth-to-mouth ventilation, but only open the airway and do chest compression, would you perform CPR on this person?
   After the outbreak of SARS: Yes/No
   Before the outbreak of SARS: Yes/No
3. If this patient was your family member, would you do SCPR, which includes opening the airway, doing mouth-to-mouth ventilation and chest compression, to rescue this family member?
   After the outbreak of SARS: Yes/No
   Before the outbreak of SARS: Yes/No
4. If you could use an alternative method of CPR, in which you would not perform mouth-to-mouth ventilation, but only open the airway and do chest compression, would you perform CPR on this family member?
   After the outbreak of SARS: Yes/No
   Before the outbreak of SARS: Yes/No

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