Implementation of National Resuscitation Guidelines 2006

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ABSTRACT

The implementation of guidelines released by the National Resuscitation Council in 2006 involved all the main areas of resuscitation, especially basic life support and defibrillation. The emphasis was on community training, creation of simplified programmes, combining cardiopulmonary resuscitation (CPR) and defibrillation, and using simpler training devices. As a result, public access defibrillation programmes have been increasingly implemented together with the CPR + automated external defibrillator programmes. A large number of instructors have also been trained.

Keywords: bystander training, CPR+AED, guidelines implementation, instructor, resuscitation

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INTRODUCTION

The Singapore Resuscitation Guidelines 2006[1] were released five years ago in March 2006, after an extensive review of the science of resuscitation as was then available and addressing what was then perceived to be, reasonably, the need for cardiac arrest management. Following the release of the guidelines, they were promptly incorporated into the local training structures, with briefings given to instructors from various training centres over the ensuing two months. Following these, the guidelines were placed on the website of the National Resuscitation Council (NRC).[2] This paper outlines the programmes established for implementation of the guidelines and the issues that have arisen therefrom.

DEFINITION OF THE HEALTHCARE WORKER

The 2006 guidelines stated clearly that pulse check would not be taught to non-healthcare workers (HCWs). Thus began a controversy as to the definition of a HCW. Frequently, many lay uniformed organisations took the position that since their members learnt cardiopulmonary resuscitation (CPR) or its many combinations, sometimes with management of upper airway obstruction or the use of an automated external defibrillator (AED), they would naturally be regarded as HCWs. In addition, some viewed that any person undergoing a formal training programme in First Aid should be regarded as a HCW. Therefore, they would only recognise any CPR or First Aid course that included the teaching of the pulse check as worthy of their organisations. The NRC had stated clearly in 2006 and subsequently, that the use of the term 'HCW' by the council was solely confined to those who worked regularly at healthcare establishments in a direct patient care role. This would generally refer to doctors and nurses who have direct patient care responsibilities as their regular professional role. All others who may have occasional patient contact would not be regarded as HCWs for the purpose of the NRC guidelines, and would not need to learn the pulse check or use it in their practice of CPR. The use of the pulse check by non-HCWs would not, in any way, confer any superior ability on their part in diagnosing cardiac arrest, especially if they are not intimately familiar with the procedure; they may instead, be likely to delay implementation of CPR procedures that are critical to life saving. This definition of the HCW holds true to this day and is applicable in Singapore when used in reference to interpretation of guidelines in the light of implementation of life support training and practice.

NUMBERS TRAINED

Efforts to implement a system of determining the number of people who have been trained in the variety of life support programmes over the years are underway. It is estimated that over the last one year, at least 40,000 people have been trained in CPR. The bystander CPR rate for out-of-hospital cardiac arrest continues to remain at about 20%, based on regular reviews of such patients managed by the Emergency Ambulance Service of the Singapore Civil Defence Force. Data on the numbers trained per annum would be important in planning future directions for training. The NRC is moving toward online declaration of the numbers trained by all accredited training centres as one of the basic post-course administrative procedures. This will also help training centres to identify those whose certification would be expiring and take steps to inform them about the need for refresher training and recertification.

TWO-PERSON CPR

In 2006, two-person CPR was removed as a separate

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teaching module from the Basic Cardiac Life Support (BCLS) and related programmes owing to previous rigid adherence to a protocol that was problematic for learners to master. The NRC recognises that two-person CPR is likely to be more efficient than one-person CPR due to the lower likelihood of long interruptions to chest compressions. Also, in two-person CPR, each rescuer can take turns to perform chest compressions, which will partially address the concern regarding rescuer fatigue and its adverse consequences on the quality of CPR. The NRC continues to emphasise that instructors must explain that if two rescuers are present, one should focus on chest compression and the other on ventilation, and that if one feels tired or more than a few minutes have passed (whichever is the earlier), they should automatically switch positions with the least interruption to compression.

INTRODUCTION OF THE CITIZEN CPR PROGRAMME

Local data over the years has indicated that about 67%[3] of all out-of-hospital cardiac arrests occur in the home environment. The rest occur in the work place and public area. Since adult one-person CPR is the most frequent skill used by layperson bystanders, the teaching of 4–6 modules, as was commonly done in BCLS programmes, cannot be promoted as a must for members of the public. In an attempt to make it easier for laypersons to learn the skills, a single-module programme focusing only on one-person CPR, the Citizen CPR programme, was launched. The duration of this programme was a minimum of two hours, as opposed to eight hours for BCLS or four hours for the Heartsaver (one-man CPR + Airway Obstruction) programme.

The programme begins with a motivational pledge to commit oneself to take action and be a rescuer when an emergency situation requiring the skill presents itself. It continues with a few public education topics such as the cardiac arrest statistics in Singapore, risk factors, primary prevention and the principles of the chain of survival; all these take about 15–20 minutes before the practical training begins. The basic steps of CPR, i.e. recognising cardiac arrest, opening the airway, checking for breathing and locating hand position are then practiced by participants on fellow learners rather than on a manikin. This makes training more realistic, as the participants experience the feel of these basic diagnostic steps being performed on normal humans, which should, hopefully, allow them to better recognise the absence of responsiveness or normal breathing in human victims of cardiac arrest. Central demonstrations, usually carried out in BCLS and Heartsaver programmes, are dispensed with, and participants get down to hands-on practice early. This is intended to maximise practice time for the individual participant. All subsequent steps are practised on the manikin, viz chest compressions and mouth-to-mouth ventilation. These steps are initially taught one at a time, and the basis for each step explained. Once the participants have mastered each step, they are instructed on how to combine the steps. Much emphasis is given to the components of quality CPR, i.e. locating the correct hand position, extending the arms and locking the elbows, getting vertically above the patient's chest, using body weight and counting aloud the compressions so as not to deviate significantly from the recommended 100 compressions per minute and allowing full chest recoil after each compression. The instructors use three different scenarios (an arrest occurring at home, at the workplace and at a public place) to illustrate that the skill learnt is relevant in all these situations. Instructors are also asked to utilise the time to address fears that potential rescuers may have of causing more harm to the patient, acquiring dangerous infections or of being subjected to litigation on account of adverse outcomes.

Instead of using electronic and expensive manikins, the Citizen CPR programme has focused on the use of low-cost, simple, half-body manikins such as the Little-Anne and the Mini-Anne manikins. Due to the non-availability of electronics in these manikins, instructors need to pay close attention to all the steps of the CPR process practised by the participants. This automatically increases learner-tutor interaction and is a positive outcome of using these devices. Additional teaching aids that have been used for these programmes have included large A2- and A3-size flip charts for small team training and DVDs, especially with the Mini-Anne.

The Mini-Anne 3A kit was originally created purely as a self-learning tool for the family on an any-rate, any-time and any-place basis. The NRC has been able to create an assessment template for instructors to conduct evaluations of skills performance on this manikin by careful observation and by using prepared checklists. This has been successfully tried out on two occasions; one during a large mass CPR training and evaluation session where 7,909 persons participated in the CPR training at the same venue in a single day, and the other in a classroom situation at a small group training session.

The testing component of this programme includes ten simple multiple-choice questions on CPR, with each question addressing an important take-home message for the learner. The instructor revises the questions and answers with the participants at the end of the test. The theory test requires an 80% pass. Practical testing is based

on checklists. The participants have to obtain effective compressions at least 80% of the time for five cycles and effective ventilations at least 50% of the time, in keeping with the national CPR testing guidelines.

Over the last two years, Citizen CPR and Citizen CPR+AED programmes have also been implemented in two constituencies in Singapore (Jalan Kayu and Tanglin-Cairnhill, respectively). To date, a few hundred residents from these constituencies have been trained in these modes. These programmes have demonstrated the potential to conduct low-cost, simplified, interactive and highly skills-based CPR and CPR+AED training sessions in the community for laypersons. The setting up of programmes in the constituencies has involved working together with grassroot organisations so as to facilitate long-term maintenance of these programmes. The NRC has provided the organisational and professional leadership needed to set up these constituency-based centres and also acted as advisors to the grassroot organisations on implementation issues.

All instructors previously trained in BCLS or Heartsaver programmes are also automatically Citizen CPR instructors. Instructors trained only in the Citizen CPR mode are, however, solely to instruct in this programme, as they have not been trained to instruct the adult airway obstruction or infant modules.

ACCREDITATION OF TRAINING AND INSTRUCTORS

The number of accredited BCLS training centres have increased from 24 to nearly 40 within a five-year period. Training programmes based in the constituencies will also be vying for accreditation. This is inevitable and is crucial so as to give the members of the public the assurance that the training they undergo is nationally recognised. It is thus very important that training standards are taken very seriously. The NRC audits all training centres once every two years. The first audit is carried out on initial membership, and the date and time of the visit would be provided to the centre. Subsequent audits are held at random and aim to evaluate the average training course conducted by the centre.

The audit process is impartial and based on checklists drawn up by the various subcommittees within the NRC. The auditors are senior instructors who have, over the years, demonstrated a commitment to quality training, are respected members of the training cadre in the country and generally regarded as persons of high integrity. Every audit exercise is overseen by the subcommittee chair, and the report is perused by them before being accepted. Training centres that have serious issues in terms of training environment, standards or content are not approved. Some centres have had their accreditation status withdrawn and reinstated only after lapses are rectified to the satisfaction of the audit teams.

The NRC has been concerned about the general shortage of instructors in the country and has thus encouraged the setting up of multiple instructor training centres for the various life support programmes. A lack of good trainers slows down our ability to train large numbers of the public to confidently learn and perform CPR. The NRC has met with current instructor training centres in the country to consider increasing the number of instructor training courses and to allow current chief instructors to help oversee the transition of provider centres to instructor training status. In an effort to build up the trainers pool in the country, the NRC has conducted a number of special instructor training courses or clinics that have resulted in the addition of about 200 CPR+AED instructors and about 500 Citizen CPR instructors in the last two years. Each instructor-trainee, after having gone through an instructor training course, would need to complete two training sessions under the supervision of a senior instructor and achieve satisfactory conduct of the training before being eligible to be certified as an instructor in that programme. Certification may be made by any accredited training centre. Continued certification as an instructor requires the certified person to teach at least two courses per annum in an NRC-accredited training centre.

Similar standards of performance have also been applied to chief instructors. A person may be nominated as chief instructor of a programme by a training centre if the person has been a regular instructor for at least two years and has performed very well in that role. Chief instructor appointments have to be approved by the NRC, and certification of these persons are issued by the Council. In order to ensure transparency and better control and coordination of instructors in the various life support programmes, the NRC has produced an Instructors' Handbook. This is provided to each instructor by the accredited training centre. The instructor documents all courses that he/she has conducted in the handbook, which is also used as a basis of continuing certification and for appointment as chief instructor or instructor trainer.

PROFESSIONAL GUIDELINES

In addition to the five-yearly guidelines, the NRC had, for the first time, produced an advisory on compression-only CPR in May 2008, after similar efforts by the American Heart Association (AHA), the European Resuscitation Council (ERC) and the Australasian Resuscitation Council (ARC). While the AHA broadly encouraged the

use of compression-only CPR in the hope that this would increase bystander rates, the NRC has adopted a similar stance as those of the ERC and ARC in advising caution over the use of the procedure owing to the relatively weak evidence for its benefit. Other considerations included the long pre-hospital ambulance times in the country, the impact of rescuer fatigue on CPR quality with continuous chest compressions and the need to ensure that advice given was in the best interests of the general public in the country. The NRC had also produced an advisory document on training guidelines during episodes of infectious disease outbreak during the initial days of concern over the H1N1 pandemic.

RESCUER FATIGUE

The NRC has been concerned with rescuer fatigue compromising the ability of rescuers to provide quality CPR, with adverse consequences to the patient. Local observations on quality during resuscitations have demonstrated that inefficiencies in CPR occurred approximately 70 seconds after the start of chest compressions and increased subsequently, especially among freshly trained providers. With these observations, the 2006 guidelines recommended a period of 1–2 minutes CPR after delivery of shock before the next rhythm analysis (as opposed to two minutes recommended by both AHA and ERC). Since then, studies conducted[4-7] in other countries have verified these observations and demonstrated that poor quality of chest compressions often occurs at two minutes into the procedure. The problem of rescuer fatigue may occur when CPR is being performed in hospitals and in the out-of-hospital environment, even by trained ambulance personnel. A greater level of inefficiency has been demonstrated during continuous chest compressions.To address this, the NRC has recommended the following procedures during the conduct of CPR:

- Count loudly so as to maintain a consistent rate of 100 chest compressions per minute and to ensure that the rescuer does not tire rapidly due to too rapid chest compressions.
- Get participants to perform at least 5–10 cycles continuously so as to develop CPR stamina, to get used to performing longer cycles and yet maintaining consistency of performance during these procedures.
- Close observation by the instructor to ensure that a click is heard at the end of each compression and that full recoil is achieved every time, especially when using non-electronic training manikins.
- Ensure good positioning technique.
- Become an active proponent of two-person CPR.

DEFIBRILLATION PROGRAMMES

In the last five years, the NRC has pushed ahead with a programme to integrate the teaching of AEDs with almost uninterrupted performance of CPR. When AED training was first introduced into Singapore in 1989, it was taught as a separate course of at least four hours duration. This had persisted over the years. For many years, there had been a criterion that those wanting to learn the use of AEDs required prior certification in CPR. In 2005, the NRC introduced the combined CPR+AED programme to emphasise the need to have both skills performed simultaneously on the same patient. It was only with the introduction of the 2006 guidelines and the need to minimise interruption of chest compression that the combined programme really took off. After five years, there are hardly any standalone AED training programmes. In a bid to hasten the integration process, the NRC proposed to all AED distributors in the country that they should not simply teach the operation of any particular AED device. Instead, the need to interface its teaching with good quality CPR was emphasised. The NRC also laid out the guidelines for designation of training centres as CPR+AED training centres and drew up audit checklists for such centres.

In 2009, the first community-based CPR+AED programme (Henderson Heartbeat) was launched at the Henderson Estates, Tanglin-Cairnhill constituency as part of a pilot programme to implement an active public access defibrillation programme in a residential neighbourhood. This was achieved through close collaboration with grassroot organisations in the constituency. This estate constituted 21 blocks of high-rise residential apartments, a market and a community club. It had a population of about 11,000 people, with a large proportion of elderly residents compared to the general population. It also had one of the highest cardiac arrest rates in the country (approximately 150 cardiac arrests per 100,000 population per annum) compared to the national average of 28 per 100,000 population per annum. A total of 21 AEDs were installed in the elevator lobbies of 19 blocks, the market place and community club. The Henderson Heartbeat project would evaluate the impact of such an installation on survival rates. The installation of AEDs was done with the introduction of the first residential-based CPR+AED training programme using flip charts and team-based interactive training. To date, nearly 200 residents in the estate have been trained in the skills of CPR skills and the use of an AED. The NRC had also assisted in the introduction of AEDs into the Toa Payoh East constituency. The lessons learnt from these will be useful in expanding residential-based public access defibrillation programmes in the country.

In addition to residential buildings, the NRC was involved in the implementation of AED programmes in hotels (2006) in close cooperation with the Singapore Hotels Association, with Suntec Singapore in setting up an AED programme at their mega convention centre (2007) as well as with the National Fire and Emergency Preparedness Council and Singapore Civil Defence Force in launching such programmes in three commercial establishments, viz the Ngee Ann City complex, Wisma Atria and Vivo City (January 2008). This collaboration also brought together 107 other commercial establishments, which pledged to work toward implementing similar programmes in their facilities. To aid these establishments in implementing the programmes, the NRC drew up operational guidelines on "A Facility CPR+AED Management Programme" which has become a reference document for commercial establishments here wanting to be part of such public access defibrillation efforts.

ADVANCED CARDIAC LIFE SUPPORT PROGRAMME (ACLS)

The number of accredited ACLS training centres has increased from two to three with the National University Health System coming on board a few years ago. All three training centres follow the same content and training materials, and have together ensured that all medical officers and registrars of government restructured hospitals and all senior doctors from the disciplines of Emergency Medicine, Cardiology, Anaesthesiology and Critical Care are currently certified in ACLS. This has been institutionalised with the hospital accreditation process conducted by the Joint Commission International.

In addition, a common local manual incorporating the national ACLS protocols developed by NRC has been produced. This is the progenitor of the coming National Textbook on ACLS, which will be released later in 2011 and will incorporate the changes made in 2011. The teaching of ACLS in private sector institutions is currently almost non-existent and is an area that needs to be addressed in the near future.

PAEDIATRIC LIFE SUPPORT

Courses in Basic Paediatric Life Support have been conducted by the KK Women's and Children's Hospital (KKH) for the last few years, with attendance by parents and childcare teachers. The number of such courses conducted are gradually increasing. Advanced Paediatric Life Support training for doctors and nurses is currently conducted by the Singapore Paediatric Society and KKH. Over the last two years, the Singapore General Hospital has initiated the Neonatal Life Support programme, and this has been recognised and accredited by the NRC. This programme recognises the special needs of neonates and the different requirements of these babies during resuscitation.

CONCLUSION

The last five years have been momentous for the resuscitation scene in Singapore. The need to work closely with community groups has been well understood. The relationships forged between the NRC and such groups have resulted in a variety of community programmes that aim to create trained first responders. The NRC has also attempted to simplify the programmes taught to laypersons so that there is better retention of the material taught, less fear of instituting the procedures, if needed and a keener interest in bystanders coming forward to learn these core skills. There is also a need to emphasise to laypersons that basic life support is safe, does not cause more harm and gives the patient a chance at life. In attempting to simplify life-saving procedures, care must be taken not to lower training and performance standards. Doing so will lower the impact of life support in the community. The most important medium for spreading the message of life saving is our instructors. It is crucial that we develop the instructor cadre and ensure that they are imbued with the passion, knowledge and skills to push forward the cause of life support in the community.

REFERENCES

1. Teo WS, Anantharaman V, Lim SH. Update on Resuscitation 2006. Singapore Med J 2007; 48:100-5.
2. National Resuscitation Council Singapore. Updates in CPR Training Guidelines 2006. In: National Heart Centre Singapore, Singhealth. [online]. Available at: www.nhcs.com.sg/educationandtraining/cprtrainingaccreditationguidelines/accreditation/Pages/Home.aspx. Accessed March 13, 2011.
3. Ong MEH, Tan EH, Yan XY, et al. An observational study describing the geographic-time distribution of cardiac arrests in Singapore: What is the utility of geographic information systems for planning public access defibrillation? (PADS Phase I). Resuscitation 2008; 76:388-96.
4. Ochoa FJ, Ramalle-Gómara E, Lisa V, Saralegui I. The effect of rescuer fatigue on the quality of chest compressions. Resuscitation 1998; 37:149-52.
5. Hightower D, Thomas SH, Stone CK, Dunn K, March JA. Decay in quality of closed-chest compressions over time. Ann Emerg Medicine 1995; 26:300-3.
6. Ashton A, McCluskey A, Gwinnutt CL, Keenan AM. Effect of rescuer fatigue on performance of continuous external chest compressions over 3 min. Resuscitation 2002; 55:151-5.
7. Olasveengen TM, Wik L, Steen PA. Quality of cardiopulmonary resuscitation before and during transport in out-of-hospital cardiac arrest. Resuscitation 2008; 76:185-90.