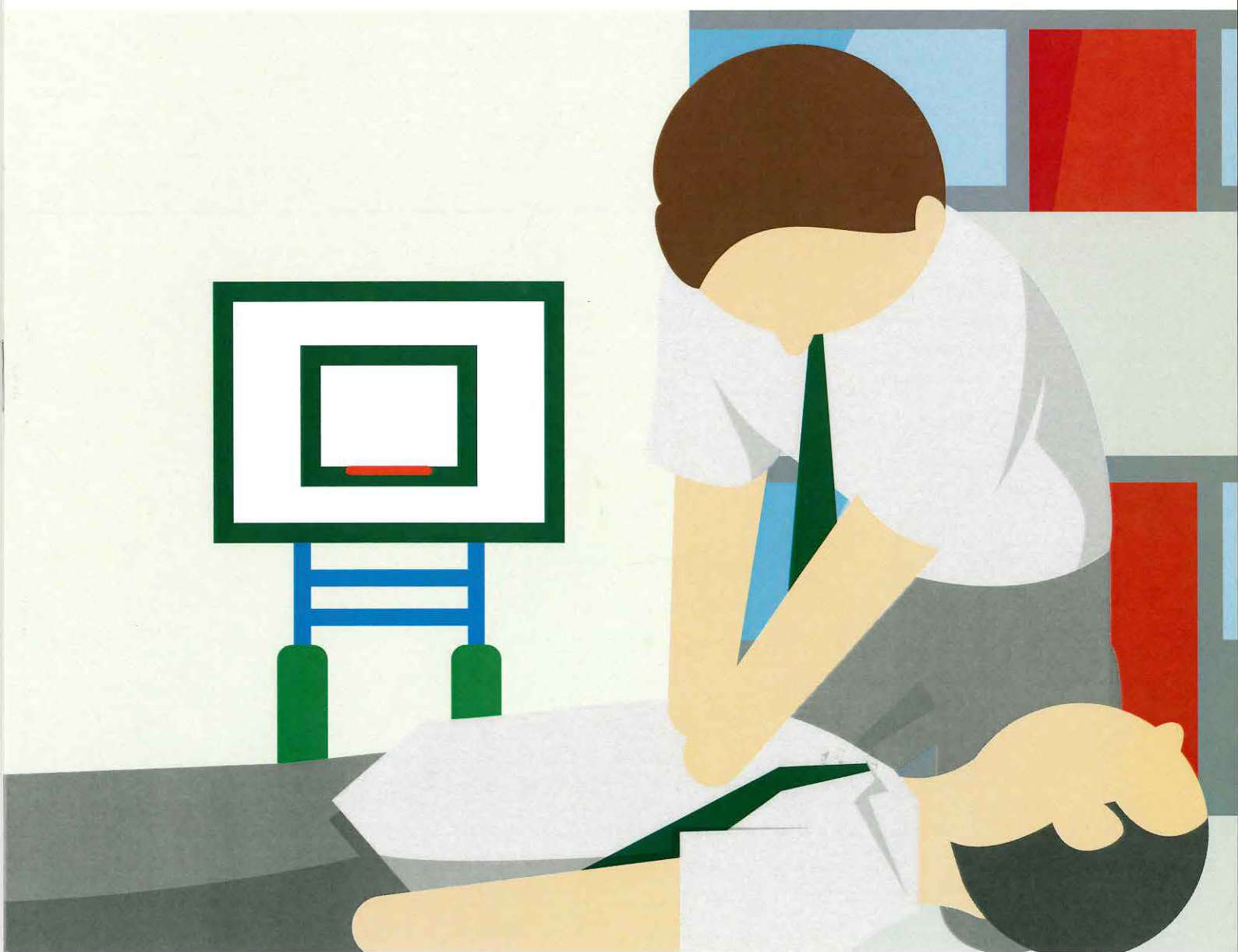


**COMPRESSION-ONLY CPR
(COCPR) TRAINING PROGRAM
FOR SECONDARY SCHOOL STUDENTS**



Contents

This information package serves to provide a program description to a list of potential secondary schools within the territory of Hong Kong. It is intended for reference by school management who may desire to base their decisions on an official set of materials. In the following sections, details of the compression-only cardiopulmonary resuscitation training program will be outlined and introduced in an ordered fashion. It is hoped that the materials will enhance transparency of this program, and align participating schools in terms of their understanding to the various implementation arrangements. There are four sections in total.

Section 1: Funding source and the development of a COCPR curriculum

Section 2: Basic concepts and key terminologies

- (a) Sudden cardiac arrest (SCA): What is it?
- (b) An overview on the prevalence of SCA, and the significances
- (c) CPR education at secondary schools: Local and global perspectives
- (d) Cardiopulmonary resuscitation and its types
- (e) Reasons for promoting compression-only cardiopulmonary resuscitation (COCPR)

Section 3: Outlines for the “COCPR Training Program for Secondary School Students”

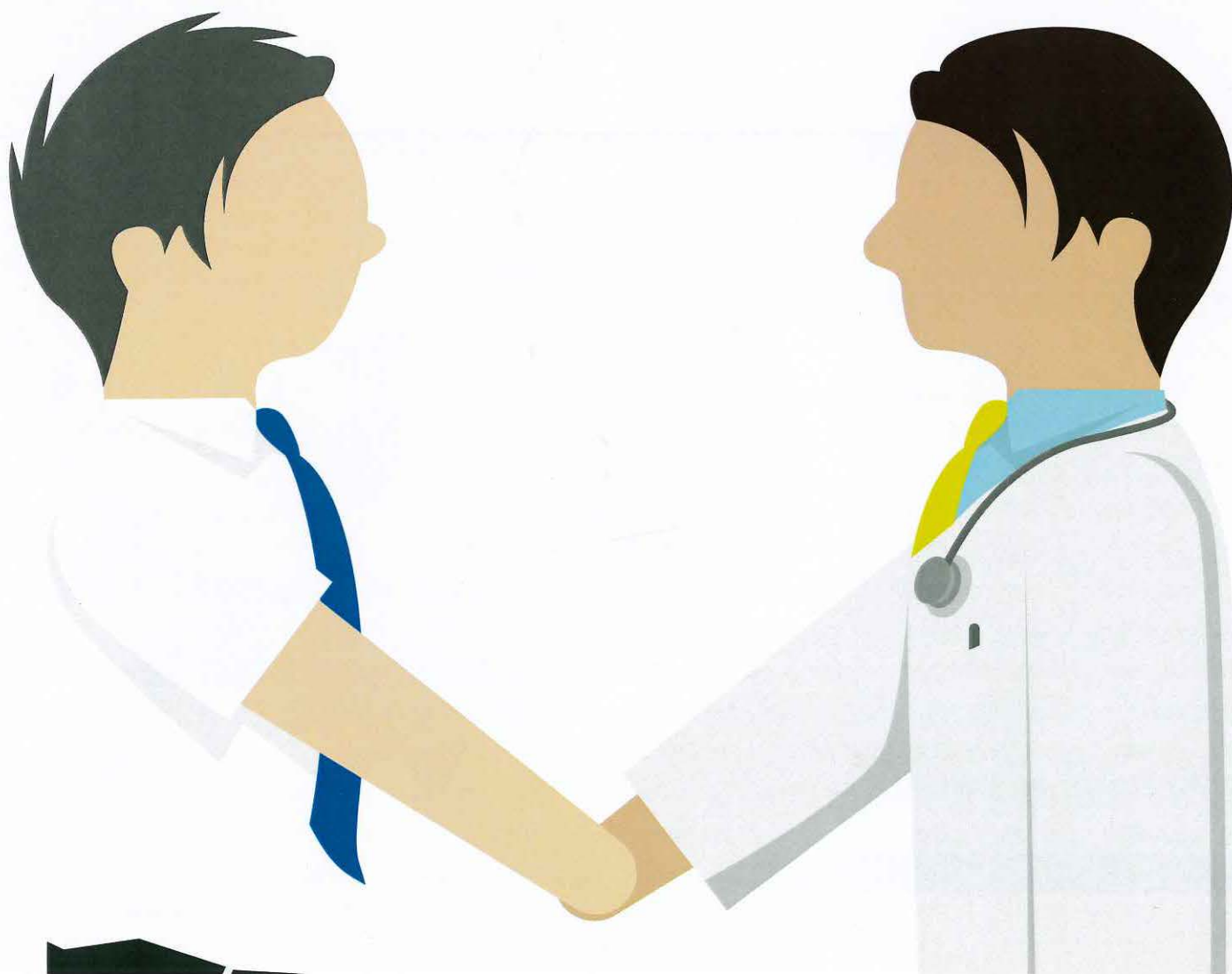
- (a) Program background
- (b) Objectives of this training program
- (c) Core content of this program and its delivery
- (d) Pedagogical strategies
- (e) Program schedule
- (f) Provision of teaching tools and support
- (g) Complementary supply of instructors and additional manikins
- (h) Implementation timeline for partner schools
- (i) Educational roles of trained teachers
- (j) CPR marathon

Section 4: Key references

Funding source and the development of a COCPR curriculum

With a generous grant from the **Quality Education Fund**, this curriculum was developed by the Emergency Medicine Unit (EMU), in collaboration with the Technology-Enriched Learning Initiative (TELI) of the University of Hong Kong.

To ensure validity of this curriculum, **Dr Ling-Pong Leung** (Clinical Associate Professor), **Dr Karen Kit-Ling Fan** (Honorary Clinical Assistant Professor) and **Mr Jeffrey Yuk-Chiu Yip** (Registered Nurse) contribute their professional knowledge to the formulation and implementation of this territory-wide training program. A team-based involvement of healthcare professionals also facilitate the curriculum development process which includes the design of program specifics, identification and integration of evidence-based pedagogical methodologies, construction of teaching and learning materials and, last but not least, devising metrics and refining algorithms for the “CPR App”. In addition, **Professor Ricky Yu-Kwong Kwok**, Associate Vice-President (Teaching and Learning), and his team member (**Dr Tyrone Kwok**, e-learning technologist) have made immense contribution in addressing a variety of technological challenges all along.



Basic concepts and key terminologies

Sudden cardiac arrest (SCA): What is it?

Sudden cardiac arrest refers to a sudden and unexpected malfunction of the heart. Often caused by arrhythmia (electrical conduction abnormalities), SCA results in no or ineffective contractile activities of the heart. It should be, however, noted that SCA is different from heart attacks (which, by nature, is caused by blocked blood flow).

Area	Survival rate (%)
Hong Kong	2.3
South Korea	8.5
Japan	5.2
Taiwan	4.6
Singapore	2.5
Vancouver	16
Sydney	10

Table 1. Survival rate of SCA victims

An overview on the prevalence of SCA, and its significances

Hong Kong has 5,000 to 6,000 SCA cases per year, and the survival rate is about 2.3% in the year 2012-2013. Approximately 1 out of 44 victims can survive to hospital discharge. The survival rate in Hong Kong, however, was the lowest when compared to other researched figures around the globe (**Table 1**). Although it has been repeatedly emphasised in international guidelines that early intervention by any form of cardiopulmonary resuscitation (CPR) will significantly increase the survival rate by 2 to 4 times. Unfortunately, a territory-wide retrospective study indicates that the bystander CPR rate in Hong Kong reached as low as 28.8%. This rate contrasts sharply with Japan where the bystander CPR rate nearly doubles (at 47.3%). These figures implicate that school-based CPR education may represent a solution to enhance the local survival rate of SCA victims.

Annual Public High School Graduates			
AL	42,920	ND	6,980
AR	28,540	NJ	92,220
AZ	59,850	NM	18,480
CA	35,540	NY	193,480
DE	8,120	OH	101,000
GA	92,010	OK	37,300
IA	32,310	OR	34,490
ID	17,170	RI	9,460
IL	130,340	SC	39,450
IN	65,940	TN	58,600
KY	38,490	TX	291,830
LA	35,720	UT	31,860
MD	56,990	VA	79,900
MN	56,320	VT	6,070
MO	60,340	WA	65,310
MS	25,720	WI	60,460
NC	88,040	WV	16,740
Total	2,017,990		

CPR in United States Schools

34 states | 66.5% of public high school graduates

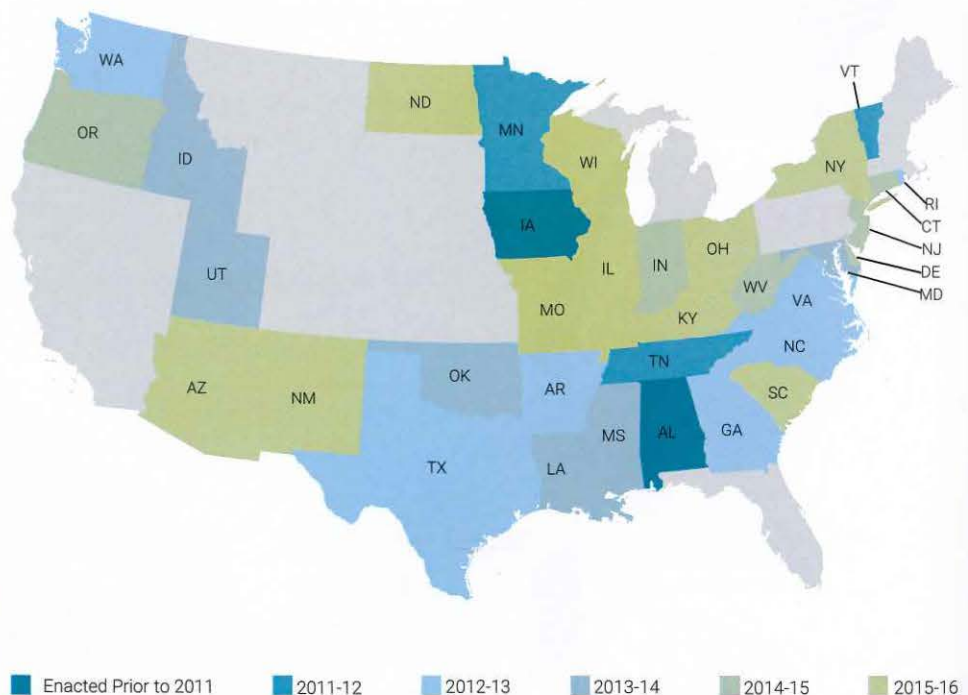


Figure 1. Statistics on school-based CPR training by formal education in United States

CPR education at secondary schools: Local and global perspectives

Hong Kong lags behind other regions of the world in terms of the prevalence of CPR education at secondary schools. In other sophisticated regions of the world, teaching CPR in schools has gained widespread support. Various professional organisations like the American Academy of Paediatrics, the American Heart Association and the European Resuscitation Council, have endorsed the teaching of resuscitation skills and knowledge to school children. In many Western countries, CPR training has been part of the school

curriculum. Norway is probably the first country that has made CPR a mandatory part of the school curriculum back in 1961. In Ishikawa prefecture, Japan, CPR training has been included in high school curricula since 1994. More recently, for instance, in more than 30 states in the United States, CPR training is a prerequisite for graduation from high school and annually more than two million high school students are trained (Figure 1). However, in Hong Kong, CPR training is not included in the secondary school curricula.

Compression-only CPR (COCPR)

Chest compression **WITHOUT** mouth-to-mouth rescue breathing



Conventional CPR (CPR)

Combination of mouth-to-mouth rescue breathing and chest compression



Figure 2. A key difference between two types of CPR

Cardiopulmonary resuscitation and its types

Cardiopulmonary resuscitation (CPR) is one of the first-aid techniques that involves a series of actions to support circulation. CPR helps maintain blood perfusion to vital organs, hence buying time for advanced treatment. There are two types of CPR. For compression-only CPR (COCPR), chest compression is continually administered without the provision of mouth-to-mouth rescue breaths. On the contrary, conventional CPR involves a combination of mouth-to-mouth rescue breathing and chest compression. Figure 2 illustrates the difference.

Reasons for promoting compression-only cardiopulmonary resuscitation (COCPR)

For three major reasons, COCPR is widely promoted among the general public. Firstly, it is as efficacious as the conventional CPR for adults with sudden cardiac arrest. Secondly, it is more acceptable to the public, because some may worry about the transmission of infectious diseases through mouth-to-mouth contact. Thirdly, the technique is relatively easy to learn. In essence, one only needs to compress the chest centre at a specific rate. It is expected that laypersons will be less hesitant to perform COCPR in case of emergencies.

Outlines for the COCPR Training Program for Secondary School Students

Program background

In Hong Kong, the CPR knowledge level of the general public remains poor. It is also common that many of them showed certain level of reluctance to perform CPR in emergencies. What's worse, there has been no improvement in the past 10 years. For local high school students in particular, their CPR knowledge was also found to be low in a study published in 2015. This is not surprising as nearly 90% of the students in the study have had no CPR training before. On the contrary, of the 383 high school students included in the study, most held a positive attitude towards CPR. Those who were trained in CPR held a significantly more positive attitude than the non-trained group. One encouraging finding revealed by the study is over 80% of the students were willing to perform CPR in a cardiac arrest situation, even if they were not trained. This suggests that providing CPR training to secondary school students may be a potentially practical way to increase the local bystander CPR rate.

Objectives of this training program

1. To implement bystander CPR training to students within the local secondary school curricula.
2. To facilitate cost-effective bystander CPR training by adopting an innovative training method using a newly developed set of training kits.



**Intergrated
Curriculum**

E-Learning

Values Education

CO



Figure 3. Screenshot for a simulated scenario on the e-learning system



Figure 4. Screenshot for the values education module

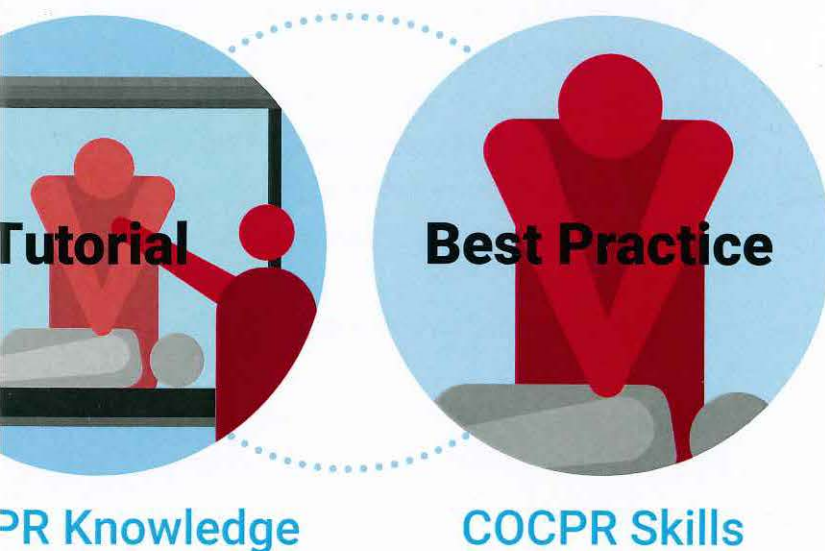


Figure 5. Structure of the COCPR program

Core content of this program and its delivery

This is an integrated curriculum that adopts a technology-enhanced learning approach to complement traditional face-to-face training sessions. Of note, it embraces the use of a series of well-developed e-learning modules and a novel “CPR App”. E-learning modules serve to deliver values education in an interactive environment where students will be virtually relieved from the cognitive constraints in realities and guided to reflect upon their values system. In addition, the essential concepts of COCPR will be discussed in a systematic fashion. The well-established e-learning platform facilitates the understanding, assimilation and application of core concepts through a combined use of animations, originally developed video clips, recomposed upbeat CPR pop-songs (the first of its kind in Hong Kong), scenario-based simulations and so forth (**Figure 3 and 4**).

Trained teachers will take up a leadership role in the conduction of face-to-face student training sessions, in which COCPR skills are practised in a repeated manner with guidance. A team of professionals (with practising physicians, nurses and paramedics) will partner with school teachers in the delivery of face-to-face training, by which the perceived workload on the part of school teachers will be substantially minimised. Principles and theories of pedagogy were extensively applied in the development of core content materials, course delivery methods, and training methodologies. **Figure 5** summarises the structure of the COCPR training program.

Pedagogical strategies

This training program adopts the following mix of pedagogical methods to maximise teaching and learning effectiveness, (1) web-based interactive learning modules; (2) scenario-based practical skill training (face-to-face); and (3) technology-enhanced learning through an innovative CPR app.

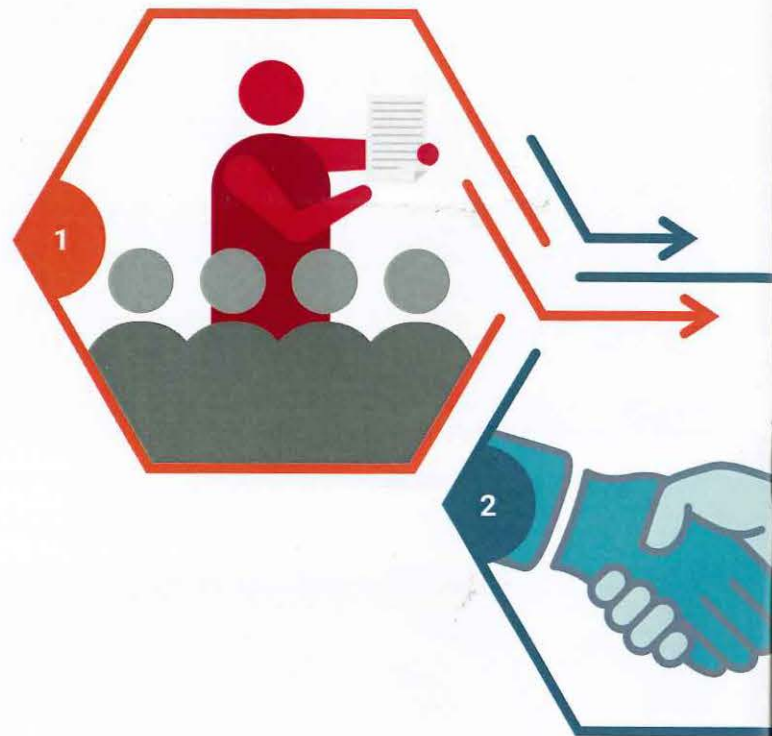
Program schedule

The training program will be conducted from December 2016 to December 2017. At least 30 local secondary schools will be recruited as partner schools, of which nominated teachers will undertake an intensive training session empowering them as COCPR program instructors. As COCPR program instructors, they in turn will be actively involved in the face-to-face training sessions for enrolled students. Target students may range from S.3. to S.6. It is expected that the total number of beneficiaries from this COCPR training program will be 15,750 students. The impact, therefore, would be revolutionary.

Provision of teaching tools and support

To assist program instructors with their teaching, our Unit will provide each partner school with the following support :

1. Teaching kits, which include eight(8) sets of resuscitation training manikins, eight(8) pieces of CPR kneeling mats, and a couple of comprehensive instructor manuals.
2. Bystander COCPR e-learning modules, which cover values education in relation to the practice of COCPR and the technical aspects of COCPR.
3. A bystander CPR app that is designed and validated by our team of healthcare professionals. Not only can the app provide instant feedback on the users' COCPR performance in an educational setting, but also in real-life emergencies. The app is unique in its functional features for which there is no other comparable products in the market.



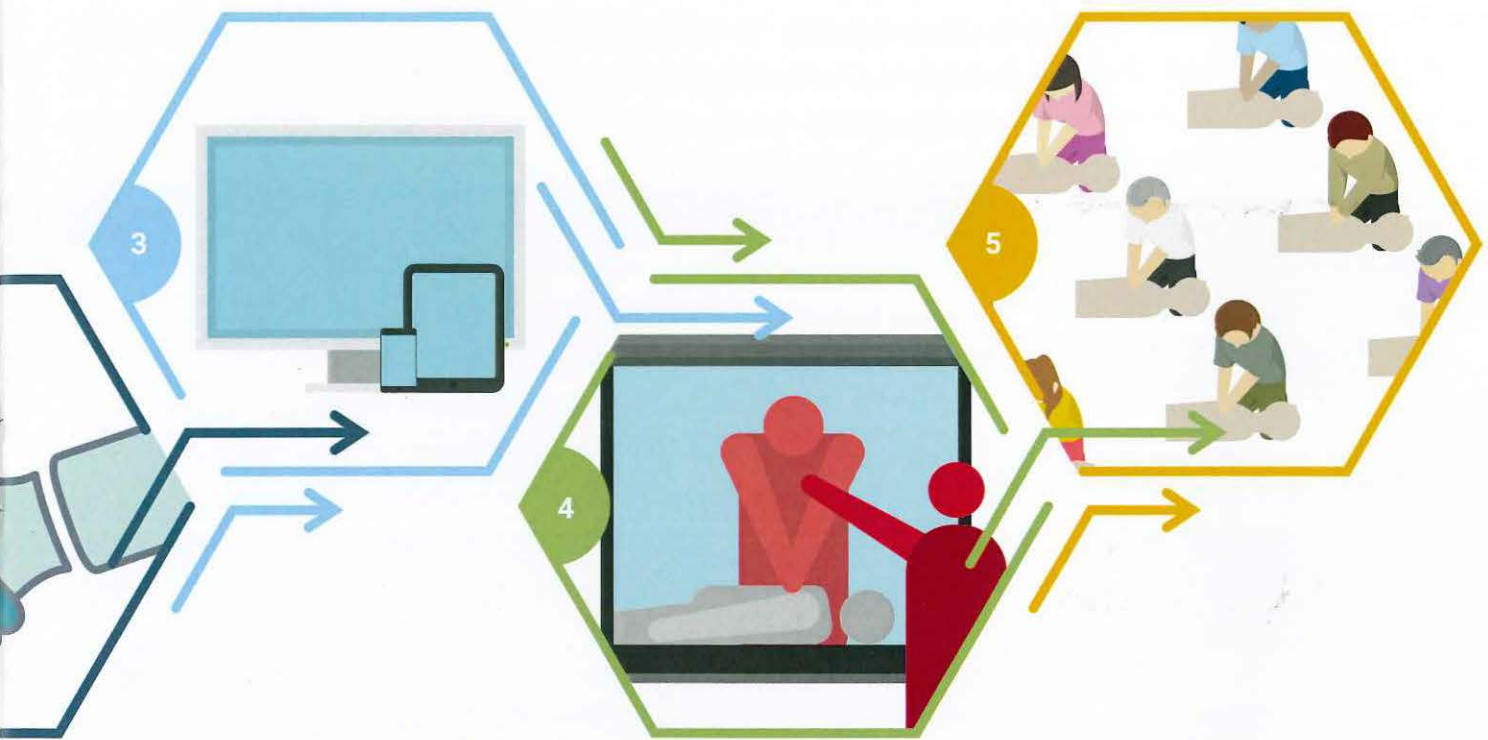
Most importantly, the app is made available to all COCPR learners and educators for free. It can now be downloaded from both Apple store and Android market. The keyword for searching is "CPR App" and the publisher is named "HKU TELI".

Complementary supply of instructors and additional manikins

Upon request, our Unit may provide complementary supply of instructors and additional resuscitation training manikins to facilitate the implementation of planned classes within partner schools. Partner schools are encouraged to provide their training schedules to our Unit as early as possible for liaison and coordination.

Implementation timeline for partner schools

COCPR training at our partner schools will be conducted in a flexible school-oriented manner. The following timeline may be referenced.



1. December 2016

- **Briefings** to the project-in-charge of partner schools
- **Within-school discussion** on the implementation plan of this training program (such as the number of required teachers, classroom availability, feasibility to arrange classes in line with the formal curriculum, etc.)

2. January 2017

- **Liaison work** with the project-in-charge of partner schools on matters such as planned class schedules, requests for complementary supply of instructors, etc.
- **Enrollment exercise** within partner schools for interested students from S.3 to S.6
- Release of a **post-briefing information package** to partner schools
- **Within-school promotional campaigns**

3. February 2017

- **Pre-training surveys for research purposes**
- **Instructor training workshops** for teachers
- Opening of access to the **e-learning modules and bystander CPR app**
- **Preparation work** for teaching COCPR classes (for example, arranging teaching venues, reviewing instructor manuals, grouping enrolled students, obtaining parental consent, etc.)
- Release of **account codes** to teachers and enrolled students for logging on to the e-learning modules and the bystander CPR app

4. March - September 2017

- **COCPR training classes** for students
- Continual **review of students' learning progress**
- **Post-training surveys for research purposes**
- **Liaison for inter-school competition**
- **Liaison for COCPR marathon**

5. October - December 2017

- An **inter-school competition** for all partner schools
- **COCPR marathon**

Educational roles of trained teachers

Trained teachers (in particular the primary and secondary project-in-charge) will be actively involved in the program implementation at their serving schools. Their commitments are illustrated in **Table 2**.



Figure 6.
Snapshots for a ground-breaking innovation -
"CPR App"

Nature of commitment	Description
To participate in COCPR program instructor training sessions	Teachers will master the principles and practical skills of compression-only CPR. They will be taught to utilise the following teaching resources, including instructor manuals, resuscitation training manikins, e-learning modules, a learning management system, and the bystander CPR app (Figure 6).
To serve as instructors in their schools for the teaching duties of this training program	Trained teachers would lead and conduct within-school student training sessions on COCPR. Each student will receive a total of approximately 90-minute long training. Teachers will evaluate students' performance by using standardised assessment instruments. Training session typically include time for scenario-based COCPR practice and an evaluation of students' achievements of learning. Teachers will also need to monitor students' completion rates of e-learning modules and attendance in training classes.
To monitor students' overall learning progress	Teachers are encouraged to make use of the learning management system to monitor students' actions and identify their learning strengths/weaknesses. Students' performance in assessments will be evaluated.
To share feedback on the teaching kits	Teachers are expected to keep in close contact with EMU to share both students' and teachers' feedback on the teaching tools (such as the e-learning modules and CPR app).

Table 2. Roles and responsibilities of trained program instructors

CPR marathon

From September 2017 onwards, our Unit will kick off the coordination work for a record-breaking event, tentatively called "HK CPR marathon" among all partner schools. According to the most updated Guinness world records, two teams of two consisting of Ray Edensor and Emma Parker and Paul Gauntlett and Mark Brookes, from the Staffordshire Ambulance Service, completed a CPR marathon (cardiopulmonary resuscitation— 15

compressions alternating with two breaths) of 151 hours at Asda Superstore, Stafford, UK from 19–25 January 2004. It is hoped that with our school alliances, trained students, teachers, as well as representatives from the University of Hong Kong (for example, medical students) may work shoulder to shoulder, breaking the existing record. We, together, shall make our learning endeavors a new world record.



Key references

1. Colquhorna M. Learning CPR at school - everyone should do it. *Resuscitation* 2012; 83:543-4.
2. American Academy of Pediatrics Committee on school health. Basic life support training school. *Pediatrics* 1993; 91:158-9.
3. Eisenburger P, Safar P. Life supporting first aid training of the public - review and recommendations. *Resuscitation* 1999; 41:3-18.
4. European Resuscitation Council. Part 1; Introduction to the international guidelines 2000 for CPR and ECC. *Resuscitation* 2000; 46:3-15.
5. Berkebile P, Benson D, Ersoz C et al. Public education in heart-lung resuscitation. Evaluation of three self-training methods in teenagers. In: Proceedings of the national conference on standards for cardiopulmonary resuscitation and emergency cardiac care. 1975.p.13-23.
6. Berdowski J, Berg RA, Tijssen JG et al. Global incidence of out-of-hospital cardiac arrest and survival rates: systematic review of 67 prospective studies. *Resuscitation* 2010; 81(11):1479-87.
7. Chair SY, Hung SY, Lui CZ et al. Public knowledge and attitudes towards cardiopulmonary resuscitation in Hong Kong: telephone survey. *Hong Kong Med J* 2014; 20:126-33.
8. Ma AWW, Wong KL, Tou AYL et al. CPR knowledge and attitudes among high school students aged 15-16 in Hong Kong. *Hong Kong J Emerg Med* 2015; 22:3-13.

Should you be interested to join this program, school management are most welcomed to contact Dr Ling-Pong Leung (Clinical Associate Professor) by email at leunglp@hku.hk or by phone at 3917-9343 for inquiries.

Organised by:

Emergency Medicine Unit,
Li Ka Shing Faculty of Medicine,
The University of Hong Kong

Collaborated with:

Technology-enriched Learning Initiative,
The University of Hong Kong

Funded by:

Quality Education Fund



LI KA SHING FACULTY OF MEDICINE
THE UNIVERSITY OF HONG KONG
香港大學李嘉誠醫學院



優質教育基金
Quality Education Fund