

A Systematic Review for Uniform Survey tool on Willingness to Perform Cardiopulmonary Resuscitation of Layperson

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ABSTRACT

Data related to the willingness to perform cardiopulmonary resuscitation (CPR) have been collected using different questionnaires or various hypothetical scenarios for cardiac arrest. Our aim is to propose a uniform survey tool that could reasonably investigate the willingness to perform CPR. Five databases and other sources were systematically searched from February to April 2021 for articles that included willingness or barrier to perform CPR by layperson. Of the 492 papers obtained, 50 papers were summarized. Then, further selection process brought the number down to 33 after eliminating papers. Each researcher collected data using a different questionnaire and scenario. Training Achievement Inquiry (TAI) as a tool that investigates the willingness to perform CPR was proposed. TAI consisted of the following sections: A. demographic characteristics; B. willingness assessment; C. training tools; and D. outcomes. Research or reporting using TAI would contribute to strengthening CPR attitude education. TAI could be used in research that examines the change in the willingness to perform CPR before and after training and for improving lectures. However, due to the nature of willingness, which belongs to the affective domain, its objective measurement is limited and requires partial revisions of TAI according to research.

Keywords: Questionnaire, Training Achievement Inquiry (TAI), willingness assessment, attitude education, objective measurement

1. INTRODUCTION

For layperson cardiopulmonary resuscitation (CPR), skills are more important than knowledge; attitude education that increases willingness to perform CPR is even more important. Efforts to help the general public with CPR techniques, willingness, and the use of an automated external defibrillator (AED) have improved resuscitation outcomes in a local community (Riggs, M., Franklin, R., & Saylany, L., 2019). However, there was a lack of attitude education that encourages laypersons to voluntarily CPR to out-of-hospital cardiac arrest (OHCA) patients. While the Emergency Cardiovascular Care Educational Concepts of American Heart Association (AHA) emphasize on practical training, skills can increase the willingness to perform CPR only so much. Of all the OHCA for the past 30 years, 53% have been witnessed by a bystander, whereas only 32% have received bystander CPR, which clearly shows the lack of immediate bystander CPR (Sasson, C., Rogers, M. A., Dahl, J., & Kellermann, A. L., 2010).

The willingness to perform CPR refers to a state in which there is a few or no barriers in performing CPR. Hence, it is necessary to develop specific attitude education to reduce barriers. Since the willingness to perform CPR has a positive effect on the implementation rate, education to reduce barrier factors is required. For this, it is necessary to clarify the factors that affect the willingness to perform layperson CPR. Previous studies

analysed the attitude of performing layperson CPR and found the following factors with negative effects: a lack of understanding about brain death, fear of inaccurate implementation, concerns about causing damages to a patient, unfamiliar appearance of cardiac arrest patients, concerns about legal liability, physical limitations of the CPR performer, and fear of infection (Hubble, M. W., et al., 2003; Johnston, T. C. et al., 2003; Dwyer T., 2008; Winkelman, J. L. et al., 2009; Coons, S. J., & Guy, M. C., 2009; Cho, G. C. et al., 2010; Savastano, S., & Vanni, V., 2011; Kanstad, B. K. et al., 2011; Huang, Q., Hu, C., & Mao, J., 2016; Nishiyama, C. et al., 2019; Liaw, S. Y., et al., 2020). There is also a review study that has identified three categories of barrier factors: procedural barriers (time lost due to language barriers and communication issues; telephone problems), CPR knowledge (skill deficits; perceived benefit) and personal factors (physical frailty or disability; patient position; emotional factors). The standardized reporting outcome lists for CPR psychomotor skills proposed in a review study are manikin-assessed scores, with which objectivity can be ensured (Case, R. et al., 2018).

In fact, every researcher has used different surveys to measure the willingness to perform CPR, as it belongs to affective domain. It has been difficult to compare results because data related to the willingness to perform CPR have been collected using different questionnaires or various hypothetical scenarios for cardiac arrest. It was difficult to combine the factors influencing the willingness to perform CPR. Neither the relationship between the willingness to perform CPR and the demographic characteristics of respondents nor the relationship between the willingness to perform CPR and educational methods could be understood. Preparing guidelines for a uniform survey on the willingness to perform layperson CPR can objectively identify the factors that strengthen the willingness to perform CPR, apply training methods tailored to the characteristics of trainees and OHCA situations, and effectively increase the willingness to perform layperson CPR. Ultimately, it could contribute to improving the survival of patients with cardiac arrest. The purpose of this study was to propose a uniform survey tool that could reasonably investigate the willingness to perform layperson CPR based on a review.

2. LITERATURE REVIEW

Education should be done in the proper harmony of knowledge, skill, and attitude domains. In basic cardiopulmonary resuscitation(CPR) training, skill education is more important than knowledge education, and attitude education that instills the willingness to perform basic CPR to cardiac arrest patients is more important (Chew K. S., et al., 2019; Riggs M., et al., 2019). The emergency cardiovascular care educational core concepts by the American Heart Association(AHA) emphasizes hands-on practice, however there is a limit to increasing the willingness to perform basic CPR (F. Bhanji, et al., 2010). Although the willingness may affect the implementation rate, the core concept of the AHA mainly lists ways to improve CPR skill (M.E. Kleinman, M. E. et al., 2015; Ashish, R. P. et al., 2020).

The willingness to perform basic CPR is a state in which there are few or no obstacles. Attitude education can be expected to reduce barrier factors and ultimately increase the implementation rate. Barrier factors include a lack of understanding of brain death, fear of inaccurate implementation, concern about patient damage, fear of cardiac arrest, concern about legal responsibility, physical limitations of CPR providers, and fear of infection (Coons, S. J. & Guy M. C., 2009; Cho, G. C. et al., 2010; Huang, Q., Hu, C. & Kang, K. H., 2016; Nishiyama, C. et al., 2019).

There were studies that strengthened the willingness factors by reducing the barrier factors by adding 30 minutes of attitude education (Uhm, T. H., Kim, J.-H. & Lee, G.-Y., 2017), and there were studies that maintained knowledge and skills for a considerable period of time through attitude education (T. H. Uhm et al., 2019).

Training that strengthens the willingness to perform basic CPR can improve the implementation rate to positively affect return of spontaneous circulation(ROSC), survival, and good neurological condition (CPC, OPC 1 or 2). The degree of willingness improvement before and after education using Likert scale can be easily verified, however the implementation rate, ROSC rate, survival rate, and good neurological status are confirmed through prospective studies at cost for a long time.

Concepts include directly identifiable observational terms such as height or weight, indirectly instructable hypothetical constructs such as knowledge or skill, and unobservable theoretical constructs such as attitude or will. Since construct is not a generalized concept, each researcher defined and measured it differently. Research

related to theoretical construct that cannot be observed has limited reliability and validity. Uniform scales for willingness to perform basic CPR & quality CPR can be applied to identify the degree of willingness after basic CPR training, use it for educational evaluation and lecture improvement, and contribute to the survival of cardiac arrest patients.

3. RESEARCH METHODOLOGY

3.1. Protocol And Registration

The research protocol for this review was registered with PROSPERO 2021 CRD42021232624 (Available at: https://www.crd.york.ac.uk/prospero/display_record.php?ID=CRD42021232624).

3.2. Searches

We searched Education Source, PubMed, ScienceDirect, Scopus, and Wiley Online Library from February to April 2021 through Eulji University e-Library. The search terms were “CPR”, “willingness”, “barrier”, and “obstacle”. We did not limit the search based on language, country or year of publication. We screened reference lists of all relevant articles. After obtained the search results, we did hand-search the journal which contributed to most publications to our results for additional papers that may have been missed by the search. The two researchers conducted this search process respectively and then checked if the articles found match at each stage of the search. If there was any discrepancy in the selected articles, it was selected for our research after discussion.

3.3. Types of Study to be Included

Any original study (including randomized controlled trials, cohort and cross-sectional studies) which included willingness or barrier to perform CPR by layperson (excluding related students). We excluded any non-primary studies such as reviews, and publications without an original empirical research aspect such as opinion pieces, letters to the editor, and poster which had no detailed methodology. Furthermore, we excluded all studies which did not contain the intent to perform adult & child CPR (AED) or layperson CPR (AED).

3.4. Domain Being Studied

Laypersons' willingness or barrier to provide CPR in papers obtained.

3.5. Respondents

Laypersons of any age (not emergency medical technicians, nurses, medical doctors or related students).

3.6. Main Outcome

Studies which included willingness or barrier to perform CPR by layperson. Primary outcome was a uniform survey tool on willingness to perform CPR by layperson.

3.7. Data Extraction

Narrative information regarding research design and CPR willingness & barrier was extracted or obtained, and the information was summarized and tabulated. Who were helping on the review but who were not listed as researchers adjusted discrepancies of the authors.

3.8. Strategy for Data Synthesis

We synthesized CPR willingness & barrier from statistically significant or descriptively presented factors in the subject articles. We also summarized the demographic characteristics such as the number of respondents, age, and occupation, as well as the research design. Therefore, meta-analysis, which incorporates numerical data from the targeted papers, was not implemented in this work.

4. RESULT AND DISCUSSION

4.1. Study Selection

Of the 492 papers obtained through search and hand-search, 50 papers were summarized after excluding papers that were redundant or out of the scope of this review. Then, further selection process brought the number down to 33 after eliminating papers that did not conduct survey on layperson respondents, were not original, or studied infant CPR instead of adult & child CPR that had similar CPR procedures. A PRISMA flow diagram of our study selection process is presented (Fig. 1).

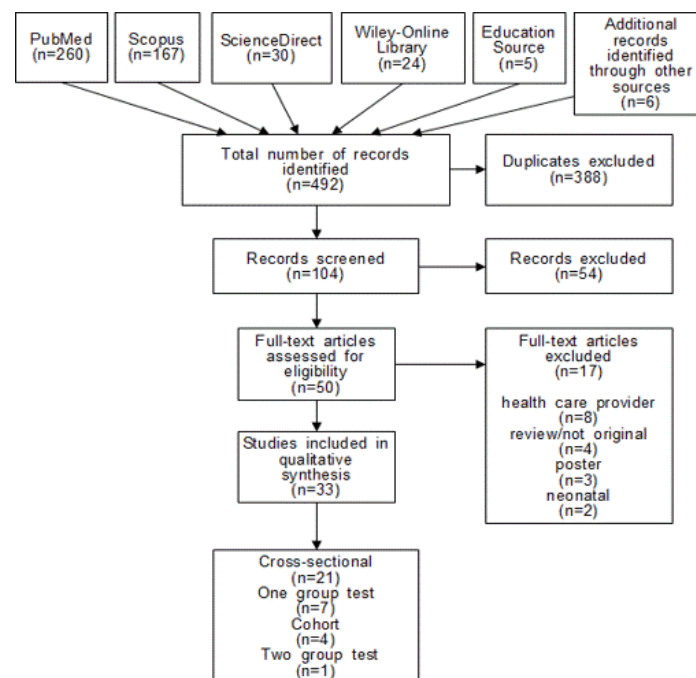


Fig. 1: PRISMA flow diagram

4.2. Respondents

In the selected papers, respondents included 17 citizens, four university students, four high school students, and eight mixed & others. 15 papers presented the mean ages of respondents, and the mean ages ranged from 16 to 66. The number of respondents ranged from 22,692 to 73. Each researcher collected demographic data with different questionnaires (Table 1).

Table 1: Characteristics of the included studies

| Study | Respondents (y/o, mean or %) | Design | Barrier & willingness | |
|-------------------------|--|--|-----------------------|---|
| Lester et al. 2000 | 416; 368 Citizens(30-39, 28%; 34%) | Cohort, 12 questions including scenarios, mail survey | CPR | Facial blood, gay man |
| Shibata et al. 2000 | 479 High school students; 147 teachers(17; 41) | Cross- sectional, 5 scenarios, telephone survey | CPR | Lack of confidence |
| Axelsson et al. 2000 | 1012 Citizens(37) | Cross- sectional, 18 questions including scenarios, mail survey | CPR | Relatives, known person |
| Hubble et al. 2003 | 683 High school students (15, 50%) | Cross- sectional, 35 questions including 6 | CPR & AED | Child or family member Blood, vomitus, IV drug user No prior experience of the |

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|-----------------------|---|---|-----------|--|
| | | scenario video clips, survey | | interventions Fear of infection, legal consequences, fear of harming the patient |
| Johnston et al. 2003 | 4490 Citizens (40-49, 23%) | Cross-sectional, questions including 1 scenario plus health information, telephone survey | CPR | Fear of disease, visible blood and perceived danger Known victim, salvable victim by CPR, CPR skills Male, married or de facto, employment, smoker, recently trained in CPR, prospective organ donor |
| Chu et al. 2003 | 550 Citizens (59; 66) | Cross-sectional, 38 questions including health information, survey | CPR | Unknown victim, fear of infection |
| Taniguchi et al. 2007 | 3125 High school students; 319 high school teachers(17; 42) | Cross-sectional, 6 scenarios, survey | CO-CPR | Strangers, trauma, child, elderly, relatives |
| Dwyer. 2008 | 1208 Citizens (47) | Cross-sectional, 8 questions including 2 scenarios, telephone survey | CPR | Male, learnt CPR, more than 11 years of education, older than 65 Fear of failing and performing CPR correctly, afraid of failing |
| Kuramoto et al. 2008 | 1132 Citizens (40-59, 36%) | Cross-sectional, 24 questions, survey | CPR & AED | For families, friends, strangers Less than 60 y/o Men Annual income: more than 4 million yen Higher than high school graduation Office worker/skilled worker Employed Have friends with heart diseases Have a drivers' license Experience of actual bystander CPR Awareness of AED |

| | | | | |
|-----------------------|--|--|-----|---|
| | | | | placement at public space Trained in CPR Know the meaning of heart massage Know the most critical skills for CPR Know importance of immediate CPR Know how to use AED Know administrator's permission of layperson to use AED Can use AED without hesitation |
| Winkelman et al. 2009 | 582 Teacher credential candidates (20-30, 64%) | One group posttest-only design, 19 questions, survey | CPR | Order of frequency |
| | | | | Concerned about incorrectly performing CPR Risk of contracting infectious disease Concerned about legal repercussions Would be too panicked to act Have physical limitations |
| Coons et al. 2009 | 370 Urban; 385 rural citizens (52) | Cross-sectional, bi-regional, 8 questions, mail survey | CPR | Order of frequency(family) |
| | | | | Harming person Physically unable to perform CPR Performing CPR improperly MMV Legal consequences |
| | | | | Order of frequency(strangers) |
| | | | | Harming person Physically unable to perform CPR Performing CPR improperly Legal consequences MMV |
| | | | | Age, female, had CPR training |
| Hamasu et al. 2009 | 259 University students (21) | One group pre & posttest design, questions | CPR | Before training |
| | | | | Anxiety for a bad outcome Poor knowledge of AED |
| | | | | After training |

| | | | | |
|-----------------------|---|---|-----------|---|
| | | including 15 scenarios, survey | | Anxiety for being sued Anxiety for infection |
| Cho et al. 2010 | 890 Citizens (20-29, 58%) | One group pre & posttest design, 6 questions, survey | CPR | Order of frequency(before training) |
| | | | | Fear of legal liability Poor knowledge/fear of imperfect performance of CPR Reluctance to MMV Fear of disease transmission |
| | | | | Order of frequency(after training) |
| | | | | Fear of legal liability Fear of disease transmission Poor knowledge/fear of imperfect performance of CPR Reluctance to MMV |
| Savastano et al. 2011 | 1000 Citizens (26-35, 41%) | Cross-sectional, 14 questions, telephone survey | CPR | Fear Infection Being incapable Legal implications and causing damage |
| Sipsma et al. 2011 | 1001 Citizens (50-69, 41%) | Cross-sectional, bi-temporal, 10 questions, telephone survey | CPR | Male, younger age Trained in last 5 years Trained 3 or more times |
| Enami et al. 2011 | 6122 Young (17-29); 827 middle-aged (30-59); 15,743 elderly (>59) | Cross-sectional, 12 questions including scenarios, interview survey | CPR | Elderly group were willing to follow the telephone-assisted instruction rather than performing CPR under their own initiative |
| Kanstad et al. 2011 | 376 High school students (17, 64%) | Cross-sectional, bi-temporal, 28 questions including scenarios, | BLS & MMV | Order of frequency |
| | | | | Too little knowledge in BLS Fear of harming the victim Fear of disease transmission |

| | | | | |
|-----------------------|---------------------------------------|---|-------------|--|
| | | interview survey | | Fear of disease transmission It's repulsive to perform Fear of performing it wrong because of lack of competence |
| Bohn et al. 2012 | 182; 251 Pupils(not presented) | Cohort, 11 questions including scenarios, survey | CPR | Early training |
| Leem. 2013 | 517 Citizens (43) | Cross-sectional, 44 questions including scenarios, mail survey | S-CPR & AED | Male, older age, CPR Knowledge, religion |
| Urban et al. 2013 | 532 Citizens (44) | Cohort, 33 closed questions, interview survey | CO-CPR | Cardiac related event in the family Previous CPR training |
| Lee et al. 2013 | 1000; 1029 Citizens (30-39, 28%; 34%) | Cross-sectional, bi-temporal, 20 questions, telephone survey | CPR | Male, younger age, CPR awareness, recent CPR training, qualified CPR learning DA/CO-CPR |
| Ong et al. 2013 | 4192 Citizens (36-49, 35%) | Cross-sectional, 6 questions, interview survey | CPR | Order of frequency |
| | | | | Lack of knowledge Fear of doing harm Lack of confidence |
| | | | | Family, relatives, friends and colleagues, complete strangers |
| Matsubara et al. 2014 | 4176; 4835 Citizens(17-29, 95%) | One group pre & posttest design, 11 questions including scenarios, survey | CPR & AED | Prior BLS training within 3 years Employed, no steady job |
| Uhm et al. 2016 | 73 University students(22) | Two group pre & posttest design, 14 questions, | S-CPR | Conventional face-to-face training |

| | | | | |
|------------------------------|--|---|--------------|---|
| | | survey | | |
| Huang et al. 2016 | 1407 High school students (18) | Cross- sectional, 24 questions, interview survey | CPR | Order of frequency(family) |
| | | | | Lack of confidence, worry to cause more harm to patient The procedure of CPR is too complicated to perform Fear of legal liability if failing to rescue the person Fear of disease transmission by MMV |
| | | | | Order of frequency(strangers) |
| | | | | Fear of legal liability if failing to rescue the person Lack of confidence, worry to cause more harm to patient The procedure of CPR is too complicated to perform Fear of disease transmission by MMV |
| Cartledge et al. 2019[31] | 78; 326 Citizens (55-74, 36%; 39%) | Cross- sectional, 12 questions, telephone survey | CPR | Heart disease in their household |
| Chew et al. 2019[32] | 4770 Students; 1467 citizens(below 20, 51%) | One group pretest-only design, 13 questions including scenarios, survey | CO/S -CPR | Male Previous experience of administering CPR Previous training |
| Nishiyama et al. 2019 | 2215; 1773; 1561 University students (20) | Cohort, 9 questions, survey | CO- CPR | Order of frequency |
| | | | | Panic Difficulties in judging cardiac arrest Lack of confidence Fear of CC Burden of responsibility for CC Performed resuscitation actions other than CC Sex differences between students and patient |
| | | | AED | Order of frequency |

| | | | | |
|------------------------|--------------------------------------|---|-----------|--|
| | | | | Difficulties in finding AED Performed other resuscitation actions other than AED use Difficulties in judging applicability of AED Lack of confidence in AED use Panic Fear of AED use Burden of responsibility for AED use |
| Karuthan et al. 2019 | 393 College students (above 20, 70%) | Cross-sectional, 22 questions including scenarios, online survey | CO-CPR | Previous training(strangers, trauma victim, child, elderly person, family) |
| Tang et al. 2020 | 430 High school students (16) | Cross-sectional, 13 questions, interview survey | S-CPR | Not up to professional standard Training interval <6 months |
| Jiang et al. 2020 | 1888 Students (18-25, 65%) | One group posttest-only design, 54 questions including scenarios, online survey | CO/S-CPR | Family, relatives, friends |
| Liaw et al. 2020 | 184 University employees (37) | One group pre & posttest design, 21 questions, survey | CPR & AED | Infection Injuring victim Injuring own self Getting sued |
| Anto-Ocrah et al. 2020 | 277 Citizens (32) | Cross-sectional, 21 questions including scenarios, online survey | CPR | Insufficient CPR skills Concern for harming the person MMV |

CPR: cardiopulmonary resuscitation; **AED:** automated external defibrillator; **CO-CPR:** compression-only cardiopulmonary resuscitation; **MMV:** mouth-to-mouth ventilation; **BLS:** basic life support; **DA-CPR:** dispatcher-assisted cardiopulmonary resuscitation; **S-CPR:** standard cardiopulmonary resuscitation; **CC:** chest compression.

4.3. Research Design

The research designs of the selected papers were cross-sectional studies (21), one group test (7), cohort studies (4), and two group tests (1). There were many more observational studies evaluating the degree of willingness to

perform CPR at a specific time point than observational studies evaluating the effect of layperson CPR education on the willingness to perform CPR. The method of data collection included surveys (13), telephone surveys (7), interview surveys (6), mail surveys (4), and online surveys (3). However, most papers simply reported their method as 'survey' without specifying the exact method. The willingness to perform CPR or barriers were examined using questionnaires as a survey tool. There were 17 papers, which used a scenarios-only survey tool or a survey tool that included a scenario. Each researcher collected data using a different questionnaire and scenario. The terms used in the questionnaire and the sentences used in the scenario varied (Table 1).

4.4. Barrier and Willingness

While 19 papers simply used the term 'CPR,' the rest of the selected papers employed specified the terms such as standard CPR (S-CPR), compression-only CPR (CO-CPR), and CPR & AED to identify barriers and willingness that may vary according to CPR methods. Each investigator used a different survey tool to present the demographic characteristics, the difference in CPR training & experience, and the condition of the cardiac arrest patient in a scenario to the respondents and measured the barrier & willingness using different criteria. The difference in vocabulary related to barrier & willingness across papers was summarized, based on which CPR education for willingness was proposed (Table 1 & 2).

Table 2: Education for overcome of barriers to performing cardiopulmonary resuscitation

| Barrier | Education for willingness |
|------------------------------------|--|
| Misunderstanding brain death | Prevention of brain damage progression |
| Fear of performing CPR incorrectly | Confidence in ability to perform correct compression |
| Concern for injuring the victim | Understanding sequelae of compression |
| Physical limitations | Confidence in provider's own physical ability |
| Fear of infection | Low probability of infection |
| Victim characteristics | Ability to overcome patient's appearance |
| Fear of legal liability | Awareness of exemption from legal liability |
| Demographic characteristics | Sex, age, academic background, job, previous training, experience of actual CPR, experience of heart disease, family, etc. |

CPR: cardiopulmonary resuscitation

4.5. Training Achievement Inquiry (TAI)

This review proposed Training Achievement Inquiry (TAI) as a tool that investigates the willingness to perform CPR. TAI consisted of the following sections: A. demographic characteristics; B. willingness assessment; C. training tools; and D. outcomes. Section A included questions about demographic data and CPR-related experiences. Section B contained simple questions about the willingness to perform CPR under various conditions. Section C included questions designed to understand the on-line & off-line educational tools (input), some of which can be answered by the researcher to determine the optimal educational conditions. Section D included measures such as proportions to examine the effectiveness of education for trainees or evaluate educational outcomes at the level of a specific group or local community. Since TAI proposed in this study contains only essential elements, subsequent researchers should develop revised-TAI that suits the scope or conditions of their research. It is presented in TAI.

Training Achievement Inquiry (TAI)

(*Multiple responses)

A. Demographic Characteristics

Age () y/o

Sex (1) male (2) female

Conjugal condition (1) marriage (2) cohabiting couple (3) divorced (4) separated (5) unmarried (6) other

()

Residential area (1) urban (2) suburban (3) rural

Academic background (1) elementary school (2) middle school (3) high school (4) associate degree (5) bachelor's degree (6) other ()

Employment (1) working full-time (2) working part-time (3) self-employed (4) unemployed (5) retired (6) full-time education (7) other ()

Annual income ()

Previous CPR training (1) yes (2) no

If (1), Time passed since training () months

Experience of actual bystander CPR (1) yes (2) no

If (1), Time passed since experience () months

*Experience of heart disease (1) personal (2) family (3) friends (4) colleagues (5) other ()

B. Willingness Assessment

* I will perform S-CPR to (1) infant (2) child (3) adult (4) elderly (5) none

* I will perform CO-CPR to (1) infant (2) child (3) adult (4) elderly (5) none

* I will perform DA-CPR to (1) infant (2) child (3) adult (4) elderly (5) none

* I will use AED for (1) infant (2) child (3) adult (4) elderly (5) none

* I will use DA-AED for (1) infant (2) child (3) adult (4) elderly (5) none

* I will perform S-CPR to (1) family (2) relatives (3) friends (4) colleagues (5) strangers (6) none

* I will perform CO-CPR to (1) family (2) relatives (3) friends (4) colleagues (5) strangers (6) none

* I will perform DA-CPR to (1) family (2) relatives (3) friends (4) colleagues (5) strangers (6) none

* I will use AED for (1) family (2) relatives (3) friends (4) colleagues (5) strangers (6) none

* I will use DA-AED for (1) family (2) relatives (3) friends (4) colleagues (5) strangers (6) none

If chose one or more above ask the following questions respectively (for family; relatives; friends; colleagues; strangers):

* I will perform S-CPR to (1) bloody patient (2) vomiting patient (3) infectious disease patient (4) drug addict (5) homosexual (6) none

* I will perform CO-CPR to (1) bloody patient (2) vomiting patient (3) infectious disease patient (4) drug addict (5) homosexual (6) none

* I will perform DA-CPR to (1) bloody patient (2) vomiting patient (3) infectious disease patient (4) drug addict (5) homosexual (6) none

* I will use AED for (1) bloody patient (2) vomiting patient (3) infectious disease patient (4) drug addict (5) homosexual (6) none

* I will use DA-AED for (1) bloody patient (2) vomiting patient (3) infectious disease patient (4) drug addict (5) homosexual (6) none

* I will perform CPR due to/for (1) prevention of brain damage progression (2) confidence in ability to perform correct compression (3) understanding sequelae of compression (4) confidence my own physical ability (5) low probability of infection (6) ability to overcome patient's appearance (7) awareness of exemption from legal liability (8) other ()

I will perform CPR. (1) not at all (2) not really (3) undecided (4) somewhat (5) very much

I will use AED. (1) not at all (2) not really (3) undecided (4) somewhat (5) very much

or

I will perform CPR. (1) yes (2) no

I will use AED. (1) yes (2) no

I have enough skills to perform CPR. (1) yes (2) no

Or manikin-assessed skills proposed by Riggs et. al including compression rate (bpm) & depth (mm); interruptions to chest compressions (s); complete chest recoil (%); correct hand placement (%); tidal volume (ml).

C. Training tools

*On-line (1) video (2) metronome (3) song (4) PPT (5) other ()

Length () min

Views ()

*Off-line (1) practice (2) feedback (3) skill test (4) scenario (5) other ()

*Manikin (1) no feedback (2) audio feedback (3) visual feedback (4) other ()

Length () min

() Trainee/trainer

() Trainee/manikin

() Trainee/AED

D. Outcomes

Researchers may be able to obtain results by applying various statistical techniques based on data collected as listed above and can use self-assessed scores of pre and/or post training as listed above for the outcomes.

CPR or AED-Skilled trainee proportion = Trainee skilled in CPR or AED / Trainee

CPR or AED-Willing trainee proportion = Trainee willingness to CPR or AED / Trainee

Researchers can analyse data of CPR/AED training collected at one given point in time across a sample population or a pre-defined subset.

CPR or AED Training proportion = Laypersons trained in CPR or AED / Specific group or community

CPR or AED Proficiency proportion = Laypersons skilled in CPR or AED / Specific group or community

CPR or AED Willingness proportion = Laypersons willing to CPR or AED / Specific group or community

CPR or AED Implementation proportion = CPR or AED by laypersons / OHCA's

4.6. DISCUSSION

Since the selected papers used different survey tools, it was difficult to evaluate the impact of layperson CPR education on the willingness with consistency, and there were limitations in improving education by evaluating changes in the willingness according to the teaching method or target. The knowledge and skills of CPR have been objectively evaluated through written and practical tests, whereas there is no uniform survey tool to investigate the willingness to perform CPR. Previous review studies also suggested using manikin-assessed score for assessing CPR psychomotor skill but did not suggest a survey method for assessing CPR willingness (Riggs, M. et al., 2019). Once sufficient data is accumulated using TAI, a uniform tool that evaluates the willingness to perform CPR, reviews as well as meta-analysis can be easily conducted, based on which educational guidelines to improve the willingness to perform CPR can be established.

Up to date, there has been a lack of attitude education for laypersons to voluntarily perform CPR to OHCA patients. Since the willingness to perform CPR refers to a state in which there is little or no barrier to perform CPR, attitude education that reduces barriers can encourage laypersons to actively engage in CPR. A study claimed that performing CPR immediately by a layperson bystander would improve the hospital discharge, which remains at 7.6% overall, and that it can be achieved by training layperson trainees to actively engage themselves in CPR (Sasson, C. et al., 2010). Among the laypersons who received CPR training, only few had experience of performing CPR to OHCA patients, the main reason for which was panic (Swor, R. et al., 2006). In order to overcome the panic, the willingness to perform CPR should be included in training programs. It has also been suggested that barriers to CPR can be reduced by providing sufficient information about cardiac arrest, which can be included in attitude education (Case, R. et al., 2018). The development and implementation of an evidence-based protocol could elevate BLS skill and confidence (Birkun A., 2020). Similarly, applying the willingness derived in this study to attitude education can identify factors that improve the willingness according to the OHCA situation and trainees and reflect them in education, thereby increasing the rate of CPR implementation.

Concerns about infection was one of the barrier factors against performing CPR, which has become more prominent with the recent COVID-19 pandemic. As a result of massive open online CPR training for voluntary trainees, the COVID-19 pandemic showed no effect on the willingness to perform CPR. In fact, the willingness to perform CPR increased compared to the pre-COVID-19 times (Birkun A., 2020). This seems to be the result of education that worked on motivating the trainees. The paper does not include the educational content used to motivate trainees per se, but it still shows that attitude education is effective in increasing the willingness despite being provided in an on-line format. While attitude education poses great implications as an effective way to respond to the pandemic, it is necessary to emphasize CO-CPR.

The fact that the attitude towards CPR was superior in the group that watched a five-minute CPR video clip three times compared to the group that watched it once or twice suggests that confidence about CPR knowledge had a positive effect on the attitude (Uhm T. H. & Kim J. H., 2018). The fact that adding barrier-reducing attitude education allowed trainees to maintain CPR knowledge and skills for at least nine months suggests that attitude had a positive effect on knowledge and skills (Uhm, T. H. et al., 2019). That is, since knowledge, skills, and attitude have mutual influences, it is important for CPR education to include knowledge and skills as well as program for overcoming barriers to performing CPR, which can help improve CPR retention.

4.7. LIMITATIONS

Since resuscitation, survival, and good neurological condition need to be followed up studies, it is difficult to rule out the effects of other variables. Therefore, TAI can be used in research that examines the change in the willingness to perform CPR before and after training and for improving lectures. Due to the nature of willingness, which belongs to the affective domain, its objective measurement is limited and requires partial revisions of TAI according to research.

5. CONCLUSION

Research or reporting using TAI, a uniform tool for assessing willingness to perform CPR, would contribute to strengthening CPR attitude education. Attitude education could increase the willingness to perform layperson CPR to have positive effects on return of spontaneous circulation (ROSC), survival, and good neurological conditions (CPC, OPC 1 or 2).

6. CONFLICT OF INTEREST

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