



## Simulation and education

Dissemination of CPR video self-instruction materials to secondary trainees: Results from a hospital-based CPR education trial<sup>☆</sup>

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## ABSTRACT

**Background:** Cardiopulmonary resuscitation (CPR) video self-instruction (VSI) materials have been promoted as a scalable approach to increase the prevalence of CPR skills among the lay public, in part due to the opportunity for secondary training (i.e., sharing of training materials). However, the motivations for, and barriers to, disseminating VSI materials to secondary trainees is poorly understood.

**Methods:** This work represents an ancillary investigation of a prospective hospital-based CPR education trial in which family members of cardiac patients were trained using VSI. Mixed-methods surveys were administered to primary trainees six months after initial enrollment. Surveys were designed to capture motivations for, and barriers to, sharing VSI materials, the number of secondary trainees with whom materials were shared, and the settings, timing, and recipients of trainings.

**Results:** Between 07/2012 and 05/2015, 653 study participants completed a six-month follow-up interview. Of those, 345 reported sharing VSI materials with 1455 secondary trainees. Materials were shared most commonly with family members. In a logistic regression analysis, participants in the oldest quartile (age >63 years) were less likely to share materials compared to those in the youngest quartile (age ≤44 years, OR 0.58, CI 0.37–0.90,  $p=0.02$ ). Among the 308 participants who did not share their materials, time constraints was the most commonly cited barrier for not sharing.

**Conclusions:** VSI materials represent a strategy for secondary dissemination of CPR training, yet older individuals have a lower likelihood of sharing relative to younger individuals. Further work is warranted to remedy perceived barriers to CPR dissemination among the lay public using VSI approaches.

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## Introduction

The provision of bystander cardiopulmonary resuscitation (CPR) has been associated with greater odds of survival from out-of-hospital cardiac arrest (OHCA),<sup>1</sup> yet rates of bystander CPR remain low, with less than one-third of victims of OHCA receiving bystander CPR prior to EMS arrival in some communities.<sup>2</sup>

Studies suggest that previous receipt of CPR training may increase a bystander's likelihood of initiating CPR.<sup>3–5</sup> For example, in one study that interviewed witnesses of cardiac arrest events, investigators found that previously trained bystanders were more likely to initiate CPR compared to their untrained counterparts.<sup>5</sup> To broaden the reach of CPR training – and thereby increase rates of bystander CPR provision – emerging research has underscored the need to employ innovative strategies to maximize dissemination of CPR training, especially among populations at high risk of witnessing a cardiac arrest.<sup>6–8</sup>

Despite efforts to increase CPR training rates among the lay public, barriers to learning CPR persist. One commonly cited obstacle is the perceived complexity of training materials; another is the high monetary and time costs associated with formal certification.<sup>9</sup> In an attempt to mitigate these barriers, researchers have promoted

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the use of CPR video self-instruction (VSI) materials: low-cost, validated alternatives to traditional classroom instruction that increase the ease and retention of CPR training,<sup>10–12</sup> and allow trainees to disseminate materials among their personal networks, a phenomenon known as “secondary training.”<sup>13,14</sup> While numerous studies have examined the utility of these materials in terms of cost, ease of instruction, and degree of skills retention, relatively little research has explored secondary training after CPR training using the VSI approach, and – specifically – the motivations and barriers associated with secondary training activity among the lay public.

To address this knowledge gap, the objectives of the current study were twofold: (1) to identify the characteristics of the individuals most likely to share VSI materials; and (2) to characterize the motivations for, and barriers to, sharing VSI materials among individuals receiving primary CPR VSI training.

## Methods

### Study context

As an ancillary investigation associated with a multicenter, hospital-based CPR education trial, participants were surveyed regarding their use and dissemination of CPR VSI materials. The parent randomized prospective trial, formally known as the CPR Hospital-Initiated Project (CHIP) Study, trained adult family members of hospitalized patients with known cardiac disease or significant risk factors in hands-only CPR using a validated VSI kit (Family & Friends CPR Anytime, Laerdal Medical, Wappinger Falls, NY). Preliminary details of this trial are described elsewhere.<sup>13,14</sup> In the trial protocol, participants were enrolled by student volunteers and hospital nursing staff on cardiac care units across eight hospitals in Southeastern Pennsylvania, and received VSI training before hospital discharge. Subsequent to this training, participants were encouraged to share their VSI materials with others. Six months after the initial training, participants were contacted to complete a short survey to solicit their perspectives on the study. Collection of these data and subsequent analyses were approved by the institutional review boards of the participating institutions in the multicenter trial (University of Pennsylvania, Albert Einstein Health Network, Temple University, Crozer-Keystone Health System, and the Chester County Hospital and Health System).

### Data collection

Participants that completed a six-month follow-up survey between 07/2012 and 05/2015 as part of the parent trial were eligible for inclusion in this ancillary investigation. Of the 653 participants successfully completing this follow-up survey, 345 reported sharing their VSI materials, while 308 reported not sharing (Fig. 1). Demographics of those eligible for inclusion in this ancillary study were statistically indistinguishable from those of participants who were initially enrolled in the parent trial (data not shown). Following completion of the six-month survey, participants who reported sharing their materials were re-contacted by research assistants to complete a second survey over the telephone; of these, non-English speaking participants ( $n = 2$ ), and subjects with invalid or defunct contact information ( $n = 29$ ) were excluded. Among the 314 participants meeting these inclusion criteria, 173 (55%) successfully completed a second survey. The survey instrument used Likert-scale, multiple-choice, and open-response questions to capture participants' motivations for, and perceived barriers to, sharing their VSI materials, the locations in which trainings were held, and the timing of trainings. Survey questions also queried

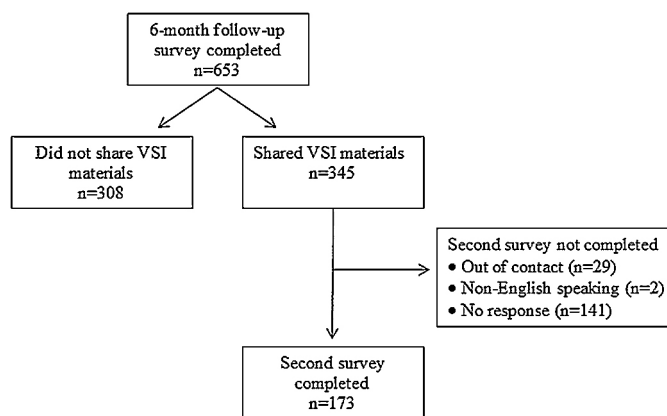


Fig. 1. Diagram of the subject inclusion criteria and survey completion.

the total number of individuals trained, and questions commonly received by participants from secondary trainees. Once collected, all data were stored and managed using a secure, internet-based application (REDCap Software Version 5.2.1, Vanderbilt University, Nashville, TN).

### Statistical approach and analysis

All Likert-scale and multiple-choice survey data were reported as proportions. Open-response data were independently coded in a computer spreadsheet program (Microsoft Excel 2010, Microsoft Corporation, Redmond, WA) by two members of the research team (DJI and DGB) using a grounded-theory approach,<sup>15</sup> and presented according to underlying theme. Descriptive statistics of demographic covariates were tabulated and reported as number and frequency. Age was summarized as a mean with standard deviation (SD) and grouped into quartiles in subsequent regression analysis. The secondary training multiplier factor, defined as the number of secondary trainees instructed per VSI kit distributed, was calculated by dividing the total number of secondary trainees by the number of initial trainees, and reported as a cohort-wide ( $n = 653$ ) mean with SD. This approach is consistent with previous work on secondary training after CPR education.<sup>13,14,16–18</sup> Student's *t* and Pearson's chi-squared tests were used to compare the prevalence of secondary training according to demographic covariates. Logistic regression analysis was then used to identify and quantify predictors of sharing, and results were reported as odds ratios (OR) with 95% confidence intervals (95% CI). All tests for significance were two-tailed, and an alpha level of 0.05 was used. All analyses were performed using Stata 12 (StataCorp, College Station, TX).

## Results

### Multiplier factor and likelihood of sharing

In our sample, 345 participants shared their materials with 1455 secondary trainees, corresponding to a cohort-wide average multiplier rate of  $2.1 \pm 4.9$  (Table 1). The prevalence of secondary training did not vary significantly according to participants' gender, race, level of education, previous CPR training, or relationship to the hospitalized patient. The average age of participants who shared, however, was significantly lower than those that did not share ( $51 \pm 14$  vs.  $54 \pm 14$  years,  $p < 0.01$ ). In logistic regression analysis (Table 2), age quartile was a significant predictor of sharing, with participants in the oldest quartile (age  $> 63$  years) having a

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