

Measurement of Life-saving Training Impacts on Health Care Professionals Retention and Competence: and Patients' Outcomes

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Abstract

This review focused on exploring the significance of CPR impacts on health care professionals' retention abilities and the possibilities of transferring the learning to boost their competency while applying CPR. Considering life-saving training as the most prioritized healthcare professional needs signifies the need to evaluate the actual training impacts on the patients' outcomes. The life-saving training impacts evaluation relies on knowledge retention and the ability to show an adequate competency level while practicing in the clinical field. However, the training specialists' and education experts' failure to link the life-saving training to patients' outcomes would lead only to cyclical and traditional training attempts. The paper reviews the approaches for increasing the direct patients' impacts from CPR. It is an instrumental review to magnify the required training and instruction potentials to maximize learning transfer. Many sections in the review explored similar deficits that we would face in the life-saving modules due to focusing on delivery and instruction without aiming at the outcomes and learning transfer to the patients. This review paper provides an evidence-based approach to explore the specific gaps in training life-saving training programs and explore structured mechanisms for providing life-saving training in hospital settings.

Keywords: training impacts, training retention, competence, patients' outcomes

DOI: 10.7176/JEP/12-10-03

Publication date: April 30th 2021

Introduction

The health care field is a very complex area that requires continuous up-to-date and progressive development of knowledge and skills to ensure the provision of high-quality and efficient health care services (Broad, 1997). Thus, training and staff development are crucial in the health care system to develop and sustain safe and contemporary medical interventions in each society (Chachari et al., 2017). Indeed, Brand et al. (2012) found that training and other staff development activities improve patients' health status and eventually produce positive organizational changes. Thus, this could, in effect, improve the operational performance of the healthcare organization, impacting its bottom line in developing countries such as Oman.

High-quality training is instrumental in sustaining healthcare providers' competency and efficiency (Karliner et al., 2004). In today's rapid development in the medical field, training in the healthcare field must maintain the continuous development of knowledge and skills to meet the patients, organizations, and public healthcare needs (Kelly et al., 2020). Thus, such needs satisfaction could not be obtained without measuring the training impacts and effectiveness to link the training with the identified needs. Consequently, patients must be considered as the core focus for training needs in health care settings.

Patient safety and well-being are the optimum health care goals by ensuring safe measures and current practice to ensure the quality of care. Working with the vulnerable category of people who require immediate and practical interventions due to their health status, the health care institutions mandate that all healthcare professionals carry valid certification of life-saving programs. These training programs demand significant operational actions, a high budget for training master trainers, and ensuring comprehensive training laboratories or centers. Given this importance, it is surprising that minimal research has been carried out to explore the effects of life-saving training programs on improved retention within professionals, increased competence, and improvement in patients' outcomes.

Background and the Significance of the Problem

Training impacts measurement in health care is instrumental in reflecting on the patients' immediate training outcomes and provided medical interventions; and whether these training programs can be developed and updated continually to withstand the challenges and needs of quality standards in health care (Brand et al., 2012). However, Pareek et al. (2018) rationalized the training failure due to its narrow focus on performance management. Unfortunately, such an immature training focus would limit the measurement of training impacts on patients and the organization's quality indicators. Moreover, such limited training impacts measurement would lead to a traditional cycle of training every year and would hardly result in any improvement in health care services (Hopper & Zborowski, 2018). Life-saving training is considered one of the most complex types in terms

of the difficulty of measuring its impacts.

The study of a specific category of training such as life-saving is rationalized to considering such training as the most prioritized skill training programs, which is mandated to all health care professionals due to its significance while dealing with a high-risk category of the public in the hospital (Nambiar et al., 2016). Equally important, literature illustrated evidence for poor retention of knowledge and skills after life-saving training (Hamilton, 2005; Kaye et al., 1985). In the same context, Sahu and Latal (2010) identified an improper teaching approach as a reason for the poor training impacts of life-saving courses. Furthermore, Hunt et al. (2008) reported improper linking of individual's training objectives to the training contents as another rationale for reduced life-saving training impacts. Consequently, using a standardized training module that encompasses all learning domains of the participants, including cognitive, psychomotor, and affective domains, is instrumental in improving learners' retention and post-training competency (Hunt et al., 2008). In this context, according to Bloom's taxonomy, structured training programs such as CPR improves knowledge retention if the algorithm was introduced to the learners systematically (Khoo et al., (2019). In addition, they stated that applying and analyzing phases in Bloom's taxonomy could be achieved if learners were allowed to practice according to case scenarios to find medical emergency interventions to the simulated cases. For this purpose, this proposed study aims to explore the measurement of life-saving training impacts globally recognized institution affiliates to ensure the measures, processes, and training modules' validity and reliability.

Aim of the Study

The paper will illustrate the two research questions that would be directed to explore the researcher's intention to identify the presence of a relationship between the training programs and an increase in the level of knowledge and skills of health care professionals. In addition, it will illustrate the second research question about the strategies to improve the measurement of the training impacts in the health care field. The paper will review the background of the general training impacts measurements and then focus on measuring training impacts in the health care field as per the three identified domains.

The review will pinpoint the significance of the problem that would be expected to highlight the effects of weak mechanisms of measuring the training impacts on patient care quality. After that, the paper will explore the current challenges of life-saving training impacts and health care effects. Thus, the review will explore the expected advantages of standardized training models of life-saving training courses. Indeed, the paper will address the required strategies to measure and increase the training impacts of life-saving training courses based on findings of empirical studies in the field.

Research Methods

Search methods

The search for related literature was conducted during February and March 2020. The search processes were initiated using: CINAHL, MEDLINE, and ProQuest databases. The initial search of keywords was based on the three main sections that this literature review is based on, which focus on evaluating the impact of life-saving training courses on retention in terms of knowledge and skills, competence after the life-saving, and outcomes on patients.

The initial search approach was adopted using the keywords that were identified by the researcher for exploring the impacts of CPR as following: "retention and CPR or cardiopulmonary resuscitation", "competence and CPR or cardiopulmonary resuscitation", and "patients' outcomes and CPR or cardiopulmonary resuscitation." The initial results for this search mechanism were extensive and retrieved items that were not related. Then, the search keywords specified as following: "retention AND cpr OR cardiopulmonary resuscitation", "competence AND cpr OR cardiopulmonary resuscitation," and "patients' outcomes AND cpr OR cardiopulmonary resuscitation". Consequently, some significant results were obtained under each domain. The results of this search are shown in table 1.

Google Scholar was used to exploring trustful resources by using similar keywords and the same inclusion criteria identified for the database search. Furthermore, searches within the references list of the selected articles were performed to include articles that might be targeted in this search. This particular process was very useful in tracking the related resources that were missed due to the search method's expected limitations.

The search method used the identified keywords and some other limits to control the inclusion criteria: full articles from scholarly publications and journals between 2010 to 2020. Moreover, the search method targeted articles in the English language, along with some inclusion criteria such as articles that investigated the effects of CPR on inpatients, hospital settings, and doctors or nurses only. Furthermore, other inclusion criteria were utilized by including only results based on life-saving courses such as Cardiopulmonary Resuscitation (CPR).

On the other hand, this review is expected to have some limitations due to the exclusion criteria that were adopted to eliminate items that are not related to the inclusion criteria. Some of the search methods' potential limitations are: the search was only restricted to the only English language articles, which may have limited

further related and vital resources in other languages. The searches were also focused on excluding studies that targeted students (medical or nursing), other health care professionals, and community trainees. These exclusion criteria might eliminate significant results about the impact of life-saving training on retention, competence, and outcomes for other categories than nurses and doctors. Another potential limitation could be introduced because of excluding other life-saving training other than CPR, such as Advanced Cardiac Life Support (ACLS), Paediatric Advanced Cardiac Life Support (PALS), First-Aid training, and simulation-based training. In addition, many articles that explored the three domains but other settings rather than hospitals were excluded, such as training laboratories, schools, colleges, community settings, and health centers. This restriction might have excluded valuable resources that measured the effects of life-saving training in other professionals or disciplines.

Table 1. Search Results: Number of Hits and Final Included Articles in Each Database

Keywords	ProQuest Nursing and Allied Health	PubMed	CINAHL
Retention	326	171	142
CPR OR Cardiopulmonary Resuscitation	882	1211	1684
"retention AND cpr OR cardiopulmonary resuscitation"	4	6	8
Competence	24	13	58
"competence AND cpr OR cardiopulmonary resuscitation."	2	4	2
Patients' Outcomes	33	26	74
"patients' outcomes AND cpr OR cardiopulmonary resuscitation"	1	3	4

Note. This table demonstrates the search method in three related databases using identified keywords for search. It shows the initial hits and then the final sources according to the inclusion criteria.

Review of Literature

Overview about Training Impacts

The Effects of Training Impacts on Organizations' Outcomes

Organizations place a significant focus on developing employees' knowledge and skills due to their effects and value on their overall performance. Besides all other human resource development interventions offered, training was one of the most influential factors for increasing work quality and employee performance (Kelly et al., 2020). Thus, organizations spend a vast amount of money and time as an attempt to support a sustainable level of employees' training for the sake of developing their performance (Hopper & Zborowski, 2018). As a result of this substantial financial investment and immense organizational support, it is essential to explore the impacts of training at employees' level and the organizations' outcomes indicators. In the same context, Abolfotouh et al. (2017) found that training affects organizational performance positively if training is only demonstrated to have the proper design, training delivery, and on-job training opportunities. Consequently, the outcomes of training would significantly increase organizational performance (Meaney et al., 2012). Literature explored in different occasions the effects of training on enhancing organizational performance such as overall productivity, improvement in customer services, enhancement in productivity scales, and increase in financial performance (Choi & Yoon, 2015; Kim & Ployhart, 2014)

Training impact measurement in health care is instrumental in reflecting on the patients' immediate training outcome and provided services. The significance of training impact relies on whether these training programs can be developed and updated continually to withstand the challenges and needs of quality healthcare standards (Brand et al., 2012). However, Pareek et al. (2018) rationalized the training failure due to its narrow focus on performance management. Unfortunately, such an immature training focus would limit training impacts on patients and the organization's quality indicators. Such limited training impacts measurement would lead to a traditional cycle of training every year and would hardly improve health care services (Hopper & Zborowski, 2018).

Importance of Measuring Training Impacts

The study of a specific training category, such as life-saving, is rationalized to considering such training as the most prioritized skill training programs in health care. Life-saving training is mandated to all health care professionals due to its significance while dealing with a high-risk category of the public in the hospital (Nambiar et al., 2016). Equally important, literature illustrated evidence for poor retention of knowledge and skills after life-saving training (Hamilton, 2005; Kaye et al., 1985). In the same context, Sahu and Latal (2010) identified an improper teaching approach as a reason for the poor training impacts of life-saving courses. Furthermore, Hunt et al. (2008) reported improper linking of individual's training objectives to the training contents as another rationale for reduced life-saving training impacts. Consequently, the development of

comprehensive life-saving training that demonstrates the ability to include rich content, patient-based training goals, and evaluation measures is necessary to overcome the weaknesses in training impacts measurement.

On the other hand, Sodhi et al. (2011) argued that formal approaches to life-saving training programs would lead to qualifying competent practitioners who are expected to produce definitive improvements in CPR outcomes. Consequently, Hunt et al. (2008) recommended using a standardized training module that encompasses all participants' learning domains, such as knowledge, skills, and attitude. For this purpose, this proposed study would be aimed to explore the measurement of life-saving training impacts that are affiliated by a globally recognized institution such as American Heart Association (AHA) training to ensure the validity and reliability of the measures, processes, and training modules. This literature review is focused on exploring the related resources from literature about the effects of life-saving training on knowledge and skills retention, the competence of health care professionals, and patients' outcomes.

CPR Training Effects on Retention

Retention of knowledge and skill after life-saving training is a very demanding process that requires a systematic training scheme to ensure matching the training goals with the professionals' abilities. Thus, life-saving training is carried out to ensure furnishing health care professionals with adequate knowledge and skills. In this regard, Aqel and Ahmed (2014) found that cardiopulmonary resuscitation training resulted in improved health care professionals' performance while applying in simulated assessment structure. They justified that creating a simulated environment enabled the learners to practice according to the life-saving algorithm with high-fidelity training equipment. However, they concluded that the retention of skills and knowledge during cardiac arrest remains uncertain. Similarly relevant, the degree to yield improvement in patients outcomes after CPR training has been debatable in the studies for the last four decades (Odongkara et al., 2020; Pareek et al., 2018).

In the same context, Nambiar et al. (2016) found a significant loss of the health care professionals' knowledge and skills after the 6th month of training. This finding was followed by another critical result about the continuous decline of knowledge and skills after one year of the program (Abolfotouh et al., 2017). Furthermore, Sankar et al. (2013) found that preservice and in-service nurses' knowledge and skills levels were declined after six weeks. Similarly significant, Meaney et al. (2012) found a similar significant decrease in knowledge and retention between three to six months of CPR training. In other words, the literature showed a noticeable decline in the knowledge and skills level after the training programs within all categories of health care professionals, regardless of the duration after the training. However, the literature did not explore the underlying factors for the decline in the knowledge and skills after CPR training.

It is noticeable that regardless of the training comprehension, the duration after training affects the level of knowledge retention. Bukiran et al. (2014) found that the knowledge of 59 newly qualified nurses remained unchanged even after five months after CPR training. However, their skills significantly declined over the same time frame. This finding was supported by Govender et al. (2010), who found that the skills of health care professionals decline at a faster rate than knowledge. Surprisingly, CPR's skills level was found to set off to the "pretraining" phase one to two years later. Likely the same, Binkhorst et al. (2018) found an apparent decline in pediatricians and pediatric residents' level of skills after pediatric life support that was manifest in their results in an "unannounced" test after the training.

Improvement of Knowledge and Skills Retention in Life-saving Training

The need for a structured continuing education in life-saving training programs is highly essential to retain health care professionals' level of knowledge and skills. Thus, the consideration of internal and external factors that may facilitate or impede retention of knowledge and skills is a necessary step, which should be tackled by trainers (Pareek et al., 2018). Repetition of CPR training might increase the retention of professionals' knowledge and skills (Soo-Il & Sang-Sook, 2008). This could be achieved by the regular and frequent demonstration of skills and recalling of ratios, concepts, and techniques. The literature revealed the importance of previous training on increasing the retention of healthcare professionals' knowledge and skills (Hamilton, 2005). In addition, a regular interval of life-saving training is considered very beneficial to enhance knowledge and skills due to influencing the attitudes of health care providers toward the performance of CPR during an actual scene of cardiac arrest at the hospital (Abolfotouh et al., 2017). In a similar context in Botswana, Meaney et al. (2012) found that educational technology alongside innovation in training, such as self-directed learning, is crucial in enhancing and sustaining the training outcomes. In this study, self-directed goals were considered instrumental in improving learners' engagement and increased their interest level for learning and transferring learning outcomes. Odongkara et al., 2020 concluded their study about the significance of video-debriefing in improving knowledge retention over six months.

In summary, hospital educators must ensure specific measures to minimize external variables that may affect knowledge and skills retention. Some of these variables identified by (Saramma et al., 2016) are instructor variations, long duration between the training and actual practice, and ambiguity of the taught skill. In the same

context, other variables affect the level of knowledge and skills retention negatively, for instance, lack supervision and feedback while teaching and limiting practicing opportunities in the clinical area (Sodhi et al., 2011).

CPR Training Effects on Professional Competence

Competence is a positive indicator for improving practitioners' performance while performing previously learned knowledge and skill (Khan & Ramachandran, 2012). Thus, educators may assess performance by comparing the actual performance with the currently observed performance to evaluate the competency level. This could be ensured by evaluating the cognitive skills and other psychomotor and affective skills while performing an action or demonstrating a procedure. A crucial issue in measuring competence after life-saving training programs is the professionals' perception of their competence through the level of motivation to seek practice opportunities and look for recertification in the future (Dufourg et al., 2017). In this regard, it is vital to explore the triggering factors that may improve health care professionals' competency during and after the life-saving training.

Khan and Ramachandran (2012) found that nurses scored significantly better than physicians in CPR domain knowledge and skills. This may be rationalized to the possible effects of the level of interest and motivation in attending these mandatory life-saving training programs (Dufourg et al., 2017). In addition, self-efficacy may intervene in the post-training competence that may affect the overall readiness for performance and exerting the best capabilities and potentials. Abolfotouh et al. (2017) argued that one of the challenges of life-saving skills competence is the weakness of stimulus or motivation for critical skills. In the same context, Kallestedt et al. (2012) highlighted the effects of health care professionals' attitudes towards CPR in improving the survival rate after cardiac arrest. The awareness about the importance of CPR and introduction about humanistic and religious commitments in saving a life has positively impacted nurses' and doctors' attitudes to apply the cardiac resuscitation interventions (Nambiar et al., 2016). Hence, a feeling of security, confidence, and professionalism might help improve healthcare professionals' interventions during cardiac arrest (Papadimitriou et al., 2010).

Moreover, Nambiar et al. (2016) rationalized the competence level of the health care professionals after life-saving training courses due to high standards of skills teaching and practice. In other words, the highly demanding skills and techniques' teaching might not be matching with candidates' understanding level. This requires highly triggering and stimulating learning objectives that enable the learning process gradually and constantly. Such learning objectives are crucial to scaffold the learning in complex training with hands-on practice opportunities such as CPR. Indeed, clear learning objectives are essential to eliminate the status of uncertainty, and hesitantly that might demotivate and discourage practitioners from applying the resuscitation processes (Meaney et al., 2012).

In the same context, Khan and Ramachandran (2012) found an improvement in the coordination and adjustment in physicians' and nurses' behavior during the BLS and ACLS incidents. This behavior was improved than the previous observation of confusion and limited synchronization in nurses' practice during cardiac arrest. Meaney et al. (2012) found that physicians demonstrated noticeable improvement in intubation skills after ACLS training than anesthetists and respiratory therapists, who had no significant difference.

CPR Training Effects on Patients' Outcomes

CPR's positive effects on patients' outcomes depend mainly on the structured efforts and synchronized CPR procedure during cardiac arrest. The team approach is highly effective in cardiac arrest to ensure the necessary interventions to restore patients' vital signs and increase resuscitation (Sodhi et al., 2011). Similarly significant, the initial steps of non-medical interventions such as assessment and activation of the cardiac arrest team are instrumental in increasing the positive responses. Hence, a well-structured CPR course tends to provide trainees with all training opportunities to deal with the situation from cardiac arrest discovery to the post-cardiac arrest recovery stage. Interestingly, literature has identified some areas for exploration to underpin CPR's impact on patients' outcomes, such as the recovery of consciousness, duration, and quality of survival (Dufourg et al., 2017; Nambiar et al., 2016).

In general, CPR-related patients' outcomes were recognized in many studies that analyzed the training's direct outcomes. In this regard, Khan and Ramachandran (2012) found a 16% improvement in patients' survival rates due to ACLS courses than other community hospitals. In addition, Meaney et al. (2012) found that nurses' recognition of cardiac arrest increased from 60% to 67% after CPR training. On the other hand, less than 1% improvement was noted in physicians' cardiac arrest recognition rate. However, Pareek et al. (2018) found no significant difference between the hospital that conducts regular training programs and the other hospital that does not run CPR training programs in the processes of beginning CPR in 4 minutes after cardiac arrest.

Comprehensive training design would help change the health care professionals' attitudes that might improve CPR outcomes. Such training design increases the health care professional's self-efficacy by manipulating their feelings and leading them to ensure learning transfer. As a result, self-efficacy ensures

optimum efforts by the providers who believe in their abilities to perform standardized interventions based on their certification in one of the life-saving training programs (Kallestedt et al., 2012). A similar study aimed to explore the attitude difference toward CPR between trained and untrained groups, and there was a significant increase in the health care professionals who underwent the CPR training (Abolfotouh et al., 2017). The researchers rationalized such significant differences due to the trained professionals' awareness about the precautionary action in preventing any harm or infections to them while performing CPR. Dufourg et al. (2017) supported this justification that healthcare providers' reluctance in practicing CPR during cardiac arrest could be due to the fear of infection transmission while touching and caring for the patient.

The need for a structured continuing education in life-saving training programs is highly essential to retain health care professionals' level of knowledge and skills. Thus, the consideration of internal and external factors that may facilitate or impede retention of knowledge and skills is an essential step, which should be tackled by trainers (Pareek et al., 2018). Repetition CPR training might increase the retention of professionals' knowledge and skills (Soo-Il and Sang-Sook, 2008). This could be achieved by a regular and frequent demonstration of skills and recalling of rationales, concepts, and techniques. Literature showed the importance of previous training on increasing the retention of healthcare professionals' knowledge and skills (Hamilton, 2005). In addition, a regular interval of life-saving training is considered very beneficial to enhance knowledge and skills due to influencing the attitudes of health care providers toward the performance of CPR during an actual scene of cardiac arrest at the hospital (Abolfotouh et al., 2017).

In summary, life-saving training effects depend on the factors that might influence the retention of knowledge and skills and competency level while practicing and overall patient outcomes. Therefore, continuing education designers must assess the training needs and develop comprehensive training programs that fulfill the needs. This step should be evaluated frequently to ensure consistent and systematic processes to maximize the overall impacts on health care professionals, patients, and health care institutions' quality outcomes (Brand et al., 2012).

Discussion and Conclusion

Training Impacts in Health Care Field

Organizations adopt various quality measurement approaches to evaluate the efficiency of services provided by exploring the internal quality indicators such as patients' related outcomes in terms of improvement in health status. Moreover, the external quality of services assessment is performed by applying international standardized guidelines or protocols to compare the institutional services' level compared to the recognized quality measures. Indeed, the effects of globalization and technological advancement positively impacted the health care field by keeping health care professionals up-to-date in terms of knowledge and skills throughout their careers (Hopper & Zborowski, 2018). Such continuous professional development activities instrumental indicators for sustaining safe, efficient, and high-quality healthcare interventions for patients. Consequently, health care institutions strive to ensure systematic training and staff development programs that ensure a high level of employee knowledge and skills retention, competency, and productive outcomes for patients (Brand et al., 2012).

Training in health care institutions as non-profit organizations is significant in terms of its influence on organizational outcomes. Pareek et al. (2018) supported the value of investing in the training system by the health care institutions by improving the outcomes and advancing the health care interventions to the patients. Thus, the valid measure of ensuring comprehensive development in health care services is by ensuring that the training system is monitored closely for identifying the direct impacts on patients' health indicators (Meaney et al., 2012). This action requires hospital management's involvement in designing the training system and linking the contents of training to the healthcare institution's overall missions. As a result, such linkage facilitates the consideration of the specific training needs through systematic gaps analysis that is incorporated into the institution's developmental scheme.

Improvement of Training Impacts' Outcomes

Trainers in health care institutions strive to ensure the transfer of learning to the clinical setting. Thus, such action requires constant monitoring of the healthcare professional's competencies to identify the training impacts. Cardiopulmonary resuscitation (CPR) is mandatory training for all doctors and nurses in most hospitals. Such training is considered obligatory training due to its significance while dealing with high-risk patients in the hospital who are vulnerable to cardiac arrest. Those high-risk inpatients demand the presence of health care professionals who are adequately trained in performing cardiac resuscitation during any unexpected cardiac arrest. Consequently, trainers must ensure that all health care professionals who undertake the mandatory life-saving training must demonstrate the ability to demonstrate awareness about the CPR algorithm and an adequate demonstration of skills after the training (Nambiar et al., 2016).

CPR training improved patients' recovery rates during cardiac arrest; however, the level of impact, efficiency duration, and effects on health care professional attitudes were not explored in-depth (Hamilton, 2005;

Kaye et al., 1985). The evidence of inadequate training impacts of CPR on the medical and nursing interventions necessitates further interventions to consider evidence-based approaches and strategies for enabling the measurement of training impacts. Some of the identified needed interventions that may facilitate measuring the training impacts of life-saving training incorporate standardized training modules. Such validated training pieces contain reliable contents and training instructions designed to achieve the intended training impacts. In the same context, Choi and Yoon (2015) suggested linking training contents to the identified training gaps within the health care professionals. The need to comprehend the training objectives to include knowledge, skills, and attitude is instrumental in ensuring training that targets all learning domains (Hunt et al., 2008). Such a comprehensive training approach would only ensure healthcare professionals' ability to practice efficiently while dealing with life-saving situations with confidence.

Retention of Knowledge and Skills After Life-saving Training

The ability to sustain an adequate level of knowledge and skills retention is a significant challenge for trainers in the health care field. Such a challenge could be rationalized due to the complexity of the health care system and the immense strain on health care professionals in providing unlimited health care interventions. Different literature resources have found that retention of knowledge and skills is not related to the training's length or duration (Govender et al., 2010; Meaney et al., 2012). The impacts of CPR training are not linked to a specific category of health care professionals. As a result, the difference in knowledge and skills retention between the doctors and nurses raised many inquiries about possible underlying explanations for such disparity (Nambiar et al., 2016). The job characteristics of the two professional categories could be one reason for the known job task, commitments, and each category's rule during the actual onset of cardiac arrest. Similarly important, the initial level of interest, motivation, and readiness to learn before the CPR training might act as another rationale for the difference in post-training retention level Meaney et al. (2012).

The decline of health care professionals' knowledge and skills' retention after life-saving training over time was found in many studies that nurses and doctors demonstrated a remarkable decrease in their cognitive and psychomotor abilities. Such a decline in the retention level was found after three months (Meaney et al., 2012), six months (Nambiar et al., 2016), and one year (Abolfotouh et al., 2017), which conclude that the retention decline is not related to a specific time-frame. Thus, nurses' and doctors' ability to retrieve knowledge and demonstrate proficiency in their CPR skills depends on factors other than post-training timings (Sankar et al., 2013). The comprehensiveness of CPR training contents and training mechanism could be one factor that might improve the retention level. CPR training offers adequate skills demonstration opportunities by practicing based on simulation and case studies that are expected to incorporate additional learning domains such as skills and attitude (Kallestedt et al., 2012). Consequently, a well-structured training module and efficient instruction and training facilitation could improve retention level due to ensuring comprehensive training opportunities.

Life-saving Training Impacts on Health Care Professionals Competence

Interestingly, the structure of education and training in health care is instrumental in reducing training gaps by imposing Continuous Medical Education (CME). The CME system relies on providing frequent training and learning opportunities to keep health care professionals up-to-date due to the fast and continuous development in the medical field (Hopper & Zborowski, 2018). Thus, CME's structure should be conducive to CPR competence after training by offering other supportive forms of refreshing knowledge and skills such as cardiac arrest drills and bedside teaching. Sahu and Latal (2010) argued that such informally structured training opportunities frequently provide valuable skills demonstration skills without informal enrollment training. Furthermore, such training options allow health care professionals to practice in their clinical enrolment away from simulated environments, which might improve their competencies. The level of competency for practicing after training relies mainly on the competency training methods, particularly the program evaluation tools and the assessment mechanism used. To summarize, CPR training as internationally accredited training from the American Heart Association (AHA) ensures a comprehensive training module; however, the efficiency of trainers' capabilities and specific evaluation measures differs from a health care institution to another.

In addition, the development of a positive training habit between health care professionals is instrumental in improving post-training competence (Saramma et al., 2016). Such a definite training pattern is applied within the health care professionals by highlighting that life-saving training is mandatory training required by all of them and showing them the value of such training. Such a positive attitude leads the participants to be fully engaged in the training objectives and then develop an action plan for the continuous practice of CPR learned skills to enhance competency.

Effects of Life-saving Training on Patients' Outcomes

The literature revealed a significant disparity between CPR courses' positive and negative outcomes on patients' outcomes during cardiac arrest (Dufourg et al., 2017; Nambiar et al., 2016). Such differences in the findings

nature assume that training outcomes on patients during cardiac arrest rely on some other factors that were stated in the previous sections in this paper. In addition, the outcomes of cardiac arrest usually depend on the nature of the emergency interventions provided at the cardiac arrest, such as the availability of resources, training providers' competency, and the institutional cardiac arrest protocol (Meaney et al., 2012). Moreover, Saramma et al. (2016) emphasized trainers' and clinical supervisors' role in improving CPR training outcomes by linking the professionals' training needs with the organization and patients' need to ensure maximum positive outcomes on patients' health indicators. Thus, intensive training needs assessment would be instrumental in compelling doctors and nurses about the need for such training that warrants their compliance and keeps them motivated for such training (Dufourg et al., 2017). Patients' must be kept at the center of such training by considering their needs for care and the health care quality indicators such as the number and frequency of cardiac arrest and patients' survival rate in the institution's previous cardiac arrests.

Conclusion

The need for a structured continuing education in life-saving training programs is highly essential to retain health care professionals' level of knowledge and skills. Thus, the consideration of internal and external factors that may facilitate or impede retention, competence is an essential step, which should be considered by trainers (Pareek et al., 2018). Equally important, repeated CPR training might help increase the retention of knowledge and skills and improve professionals' competence (Soo-Il and Sang-Sook, 2008). This could be achieved by a regular and frequent demonstration of skills and recalling of ratios, concepts, and techniques. Literature showed the importance of previous training on increasing the retention of healthcare professionals' knowledge and skills (Hamilton, 2005). In addition, a regular interval of life-saving training is considered very beneficial to enhance knowledge and skills due to influencing the attitudes of health care providers toward the performance of CPR during an actual scene of cardiac arrest at the hospital (Abolfotouh et al., 2017).

In summary, life-saving training effects depend on the factors that might influence the retention of knowledge and skills and competency level while practicing and overall patient outcomes. Therefore, continuing education designers must assess the training needs and develop comprehensive training programs that fulfill the needs. This step should be evaluated frequently to ensure consistent and systematic processes to maximize the overall impacts on health care professionals, patients, and health care institutions' quality outcomes.

Implications

One of this review paper's main goals was to highlight the importance of measuring the training impacts of a life-saving training program such as CPR. Thus, the review processes revealed the value of assessing and measuring the training impact in identifying the practitioners' specific training needs and then matching those needs with the overall development needs of the health care institution (Brand et al., 2012). Thus, such an intensive and goal-directed training process impacts measurement, reflecting the impact and beneficence of the training on the stakeholders, for instance, the patients. Interestingly, patients are the core subject, and the overall outcome from the training system in each hospital is that all training outcomes affect the patients' health status either positively or negatively. Kallestedt et al. (2012) valued the importance of considering patients' needs while developing the life-saving training module to increase training efficiency and ease the process of training impacts' measurement.

In addition, literature has identified the need to boost the retention level and skills refreshment of health care providers continually after life-saving training. Such refreshment could be ensured by frequent clinical drills of cardiac arrest or assessment sessions (Nambiar et al., 2016). Such informal sessions should act as booster and follow-up measures for reviving doctors' and nurses' knowledge and skills to enable them to practice efficiently while providing CPR interventions during the actual onsets of cardiac arrest. Thus, training modules should demonstrate the whole scheme of training objectives that continue even after the training by proposing follow-up sessions and monitoring every three months. Long-term training goals are highly efficient in ensuring continuity of education and training and overcoming traditional concerns about the inefficiency of retention and inadequacy of competency after life-saving training (Pareek et al., 2018).

Moreover, this review paper highlighted the need to adopt standardized training modules of CPR training that are accredited by recognized institutions, which ensures a comprehensive system of instruction, facilitation, training, evaluation, and monitoring of training impacts (Preusch et al., 2010). Indeed, accredited training programs are scientifically developed by experts based on up-to-date evidence for their efficiency and productivity. Standardized life-saving training includes valuable training instruction and skills scaffolding mechanisms that gradually build knowledge and skills and allow for practice and reflection.

Recommendations

The extensive studies about assessing the effects of CPR on knowledge and skills retention, health care professionals' competence, and patients' outcomes illustrated apparent discrepancies about the effects. Many

dimensions of the CPR effects and impacts were explored in those studies; however, specific researches are needed that should focus on synthesizing the barriers of CPR impacts on health care services. Similarly significant, the impeding factors for retention, competence, and patients' outcomes must be explored in different experimental and comparative settings to identify the barriers and explore the solutions. In the same context, the identified factors in terms of barriers or possible weaknesses that were explored in previous related studies could be assessed by examining their efficiency in improving the CPR training impacts.

In addition, studies that explore the patients' outcomes as a central focus for life-saving training could be tackled in a long-term study to identify the factors that facilitate or hinder the training impacts. Thus, advanced patients' health outcomes could be studied to identify the factors that might improve medical interventions during cardiac arrest. In summary, health outcomes could be studied as guidelines or protocols for implementation during cardiac arrest in the hospitals to verify compliance and adherence to the standardized patients' outcomes. This specific research-based approach could help identify the specific gaps and suggest particular improvement strategies for the training modules. Thus, an explicit scheme for evaluating the current life-saving training outcomes in healthcare professionals' long-term retention and competency in developing healthcare systems would be the future direction for applied researches.

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