1-1-2016

The introduction of Booster Cardio Pulmonary Resuscitation Training for nurses working in Accident and Emergency Department

Mohamed Seif Shehata

Royal College of Surgeons in Ireland

Citation

Shehata MS. The introduction of Booster Cardio Pulmonary Resuscitation Training for nurses working in Accident and Emergency Department [MSc Thesis]. Dublin: Royal College of Surgeons in Ireland; 2016.
Creative Commons Licence:

This work is licensed under a Creative Commons Attribution-Noncommercial-Share Alike 4.0 License.

This thesis is available at e-publications@RCSI: http://epubs.rcsi.ie/msttheses/99
I hereby certify that this material that I now submit for assessment for the Project Dissertation and Action Learning Sets module on the MSc in Leadership in Health Professions Education is entirely my own work and has not been submitted as an exercise at this or any other University.

Student’s signature

Date 11 April 2016

Student number 1413 9308

Word count 15348
The introduction of Booster Cardio Pulmonary Resuscitation Training for nurses working in Accident and Emergency Department

MSc Leadership in Health Professional Education
Year 2, Dubai/UOS, 2015-2016

Student ID: 14139308
Submission Date: 25 April 2016
Word Count: 14709
Supervisor: Dr. Pauline Connolly
Table of Contents

Table of Contents .................................................................................................................. i
Acknowledgments .................................................................................................................. iv
Abstract ................................................................................................................................. v
List of Abbreviations ........................................................................................................... vi
List of Tables ........................................................................................................................ viii
List of Figures ....................................................................................................................... ix
List of Appendices ............................................................................................................... x

Chapter 1: Introduction ...................................................................................................... 1

1.1 Introduction .................................................................................................................. 1

1.2 Nature of the change ................................................................................................... 2

1.3 Aim and Objectives .................................................................................................... 2

1.4 Rational for carrying out change .............................................................................. 3

1.5 Organizational impact ............................................................................................... 4

1.6 Methods ..................................................................................................................... 5

1.7 Challenges and obstacles ......................................................................................... 6

1.8 Organizational role .................................................................................................... 6

1.8 Conclusion ................................................................................................................... 7

Chapter 2: Literature review ............................................................................................. 8

2.1 Introduction ................................................................................................................ 8

2.2 Search strategy .......................................................................................................... 9

2.3 Effectiveness of refresher training ........................................................................... 10

2.4 Key dimensions in refresher CPR training ............................................................... 11

2.4.1 Teaching approaches ........................................................................................ 11

    A – Instructor-led versus CPR self-learning sessions .......................................... 11

    B - Cardiac arrest Simulation ............................................................................... 12

    C – Video review of CPR quality ........................................................................... 13

    D – Peer Tuition ...................................................................................................... 14
I am highly grateful and thankful to my wife, Dr. Azza and children, Omar, Islam and Abdulrahman, for supporting me during this long journey and encouraging me along the way.

I would like to thank most sincerely Dr. Pauline Connolly, my principle advisor, whose guidance and support throughout the past two years was instrumental in the completion of this project. I appreciate your expertise and your suggestions throughout this process, and I thank you for your time and dedication to this piece of work.

I would like to acknowledge the support of my classmates at Dubai center of RCSI. Special thanks to my action learning group for their honest critique, support, and guidance.

Sincere thanks to my Hospital Nurse Manager Ms. Carol, who supported this project. I would especially like to thank the Nursing Education great team especially Precella, Bernadette, Dollimar and Abdulrahman Al Hamimi for their admired efforts and unlimited support. Finally, special thanks to all hospital Accident and Emergency staff involved throughout this project for their hard work and enthusiasm.
**Abstract**

**Background:** The quality of cardiopulmonary resuscitation (CPR) is an important determinant of survival from cardiac arrest. However, the evidence suggests that retention of BLS knowledge and skills is reduced. The aim of this organizational development (O.D.) project was to improve retention of CPR psychomotor skills for nurses working in Accident and Emergency (A/E) Department in a tertiary care hospital through the introduction of booster CPR simulation training.

**Methods:** Pre and post testing of the staffs' CPR skills were done according to their availability in the unit. After filling up the survey questionnaire, an adopted CPR skills checklist was utilized in the pretest session following a CPR scenario. After debriefing, an interactive on spot training was provided. Later, participants undertook an unscheduled post-test after four weeks that included the same pretest items.

**Results:** Kirkpatrick’s model was employed to evaluate the booster CPR simulation training. Twenty-seven nurses working in A/E department were included. The effectiveness of CPR simulation training was shown in the project by an overall improvement in CPR skills and BLS scores post training (average score of 17.85 comparing to 16.00 pre-training, P=0.001). Besides, there was an increase in the efficiency of conducting individual CPR skills like chest compression and assisting ventilation.

**Conclusion:** the project provided data on the efficacy of such simulation sessions on the skills and performance of nurses which will guide the management to update the CPR policy in the organization. Refreshment BLS training sessions for nurses are highly recommended to increase the readiness of nurses to implement their knowledge and skills in performing high-quality CPR. Improving quality of care for those critical patients will improve their survival rates post-cardiac arrest.
List of Abbreviations

A:
A/E - Accident and Emergency
AHA – American Heart Association

B:
BLS – Basic Life Support

C:
CEO – Chief Executive Officer
CINAHL – Cumulative Index of Nursing and Allied Health Literature
CIPP – Context, Input, Process, Product
CPR – Cardio Pulmonary Resuscitation

D:
DOF – Director of Finance
DON – Director of Nursing

E:
ER – Emergency Room
ERC – European Resuscitation Committee

F:
FFA – Force Field Analysis

H:
HCW – Health Care Workers
HSE – Health Care Executive
I:

ICU – Intensive Care Unit
IL – Instructor – Led

J:

JCI – Joint Commission International

K:

KPI – Key Performance Indicators

M:

MD – Medical Director
MEDLINE – Medical Literature Analysis and Retrieval System on Line

O:

OD – Organizational Development
OSCI – Objective Structured Clinical Examination
OVID – Offshore Vessel Inspection Database

P:

PUBMED – US National Library of Medicine

R:

RCSI – Royal College of Surgeons in Ireland

S:

SL – Self - Learning
SWOT – Strengths, Weaknesses, Opportunities and Threats

V:

VAM – Voice Advisory Manikin
List of Tables

Table 1  Stakeholders Analysis Table (HSE: 2008)…………………………………………………………29
Table 2  SWOT analysis (HSE, 2008)…………………………………………………………………………32
Table 3  Main themes in focused groups discussion pre and post training……………..42
Table 4  Results of the simulation Pre-test: Total and Individual items…………………………45
Table 5  Results of the simulation Post-test: Total and Individual item…………………………..45
Table 6  Results of the simulation Pre-test according to Nurses’ characteristics………………46
Table 7  Results of the simulation Post-test according to Nurses’ characteristics……………47
List of Figures

Figure 1  HSE Change Model (HSE, 2008)................................................................. 24
Figure 2  Force Field Analysis (Rozac, 2003)......................................................... 27
Figure 3  Kirkpatrick Model of Evaluation.............................................................40
Figure 4  Comparison of Pre and Post CPR skills test mean score.........................46
Figure 5  Comparison of Pre and Post total score in nurses had BLS > 6 months.........47
Figure 6  Comparison of Pre and Post mean score of depth of chest compression.......48
Figure 7  Comparison of Pre and Post mean score of rate of chest compression.........48
Figure 8  Comparison of Pre and Post training of mean score of total basic CPR skills......50
Figure 9  Comparison of Pre and Post mean score of depth & rate of chest compression.51
Figure 10 Comparison of Pre and Post mean score of skills of assisting ventilation........52
List of appendices

Appendix 1  Change Implementation Project Grant Chart.............................................72
Appendix 2  Pre-training Informed Consent and Questionnaire........................................73
Appendix 3  CPR Skills Testing Checklist........................................................................75
Appendix 4  Guiding Questions for Focused Group Discussion.......................................76
Appendix 5  Pre-training CPR Skills Check and Debriefing.............................................77
Appendix 6  Simulation CPR Training Session.................................................................78
Appendix 7  Poster...........................................................................................................79
“The introduction of Booster Cardio Pulmonary Resuscitation Training for nurses working in Accident and Emergency Department “
Chapter 1 Introduction

1.1 Introduction

Cardiopulmonary resuscitation (CPR) is a lifesaving intervention and the cornerstone of resuscitation from cardiac arrest (Travers, et al. 2010). Survival from cardiac arrest depends on early recognition of the event and immediate activation of the emergency response system, but equally critical is the quality of CPR delivered (Meaney & Bobrow 2013). As nurses are usually the first professional persons to provide basic life support (BLS) during emergency situations, they should maintain the knowledge and skills to be able to perform CPR efficiently and thus to save lives. Inadequate initial assessment, inappropriate treatment, and inadequate monitoring contribute to poor CPR outcomes (Rajeswaran & Ehlers 2014). The complex CPR tasks require that all critical skills should be applied effectively during CPR interventions to enhance patient outcomes (Woollard et al. 2006).

The writer's organization is a teaching semi-governmental, Joint Commission International (JCI) - accredited hospital in the United Arab Emirates. It comprises 230 beds with plans to expand to 350 beds. The hospital has over than 300 multinational well-trained health care professionals include physicians, nurses and allied staff. A total of two hundred and seventy nurses is working in different clinical departments in the hospital. Among them, thirty nurses are dedicated to working in the Accident and Emergency department in periodically rotating shifts. The hospital is serving a total of approximately seventy thousand patients in outpatient clinics, thirty thousand patients in Accident and Emergency department and four thousand patients admitted yearly. The hospital's mission is to provide leading edge and highest-quality care to all patients with compassion and a patient-centered focus (Bate et al. 2008).
1.2 Nature of the change
The change project consists of implementing booster training sessions to improve cardiopulmonary resuscitation (CPR) skill retention in simulated situations among nurses working in Accident and Emergency, who are basic life support providers. Currently, almost all our health care professionals including physicians, nurses and allied staff are holding Basic Life Support (BLS) cards after having a one-day training class on the essential skills of the cardiopulmonary resuscitation that needs to renew every two years. The majority of the staff might not face frequent real arrest cases till their recertification time. Sahu and Latal (2010) reported that formal BLS classes are not adequate to prepare nurses to provide high-quality resuscitation efforts because of the rapid decay of CPR skills over few months following BLS session. Consequently, the organization needs to make strategies that could be incorporated into CPR training to enhance learning and improve retention of CPR skills and improve their staff’ comfort in handling cardiopulmonary arrest as first responders.

1.3 Aim and Objectives
The overall aim of this change project is to introduce booster CPR training for nurses working in Accident and Emergency Department in a tertiary care hospital.

The objectives of the project are: By March 2016, the following tasks will be achieved:

- To improve performance and retention of CPR skills among nurses working in Accident and Emergency physicians.
- To enhance the performance of chest compressions regarding the rate and depth of compressions according to AHA guidelines (Berg & Hemphill 2010) by 10% comparing to the pre-training test scores.
- To improve nurses’ skills in assisting ventilation by the proper opening of the airway and giving supplemental breaths as per guidelines (Berg & Hemphill 2010) by 10% comparing to the pre-training test scores.
1.4 Rational for carrying out change

A significant amount of literature in recent years had analyzed the efficacy of resuscitation training and highlighted the fact that skills and knowledge decline over time. Poor knowledge and skill retention following cardiopulmonary resuscitation (CPR) training for nursing and medical staff was documented over the past 20 years (Hamilton, R. 2005). The skills required in basic CPR have been characterized as difficult to teach (Cason & Baxley. 2011) and once taught, difficult to retain (Christenson et al. 2007). More frequent training is recommended and may be dictated by local policies and regulations (Jacobs et al. 2004). In the writers’ institution, Resuscitation Committee had organized training sessions in the early recognition of the cardiac arrest situations and reduction of the time required for the code announcement upon activation of Mock Codes. These are non-real codes conducted for training purposes and periodic monitoring of the staff performance during resuscitation. Training included a hundred nurses and had been done between Aprils to July 2012. Evaluation after training showed that 54.3 percent of participants showed a satisfactory improvement in reducing the announcement time to be within 16-20 seconds comparing to 31-40 seconds before the training.

As a change leader, the writer will choose to use and follow the HSE change model throughout the change process because it is developed by a medical institute, modern and updated. Also, because the HSE change adopted is an organization development approach that places a strong focus on the people aspects of change such as teamwork, communication, participation and cultural change. It is combined with project management that brings structure and discipline to the process. HSE change model consists of four main interacted phases; initiation, planning, implementation and mainstreaming (HSE, 2008). HSE change model is also fulfilling the useful activities contributing to effective change, creating a vision for change, developing political support, managing the transition of change and sustaining momentum (Cummings & Worley, 2008).
Stakeholders are people who have a stake in the program: They fund, administer, provide services, receive services or are denied access to services. In the writer’s hospital, they will include Chief Executive Officer (CEO), Medical Director (MD), Director of Nursing (DON), Director of Finance (DOF), Resuscitation Committee members and all health care professionals. Defining stakeholders who need to be included at the very beginning is crucial; this can help in avoiding disasters at the end of evaluations if the proper people were not involved. The leading team and stakeholders need to devise strategies for interactions that allow for the development of an egalitarian relationship.

The communication dynamic needs to be designed so that stakeholders are motivated to have sustained involvement and allow every voice to be expressed. The leading team needs to be able to interact with the stakeholders in the planning, implementation, and evaluation in a manner that are culturally respectful, cognizant of the strength in the hospital and facilitates desired change.

1.5 Organizational Impact

The beneficial effect of improving psychomotor skills and enhancing retention of the CPR skills of all health care professionals— including nurses as the first responders— on the quality of resuscitation services and improvement of patients’ survival are well established. Recent studies suggest that high-quality resuscitation efforts have positive results on organizational performance (Meaney & Bobrow 2013). Shifting the focus from practicing only at the time of certification to regular assessment and maintenance of competence will only occur if opportunities for training are available and easy to access and if health care providers are aware of the need to frequently refresh their skills. This quality principle of regular assessment can be applied to other clinical interventions as well. Health care staff training in a simulated environment allows skill acquisition without compromising patients’ safety. Subsequently, the organization and insurers gain more trust in and insight into the services provided.
1.6 Methods

The detailed methods will include using a survey questionnaire together with focused group interview at the beginning to address the needs of Accident and Emergency nurses and to tailor the planned refresher training session accordingly. The writer’s intentions will be to use supervisor-filled CPR checklists to rate their baseline performance in a simulated session numerically before the booster training session. The same list evaluation will be repeated after finishing the training. Following the booster session, the focused group analysis will be repeated to assess their growing confidence in handling real arrest situations in the future. Accordingly, the proposal will lie within the combined quantitative and qualitative research domain. Although the research plan is mainly involving nurses working in Accident and Emergency Department and does not include new clinical interventions or direct patient care, the project should be appropriately presented to the hospital management and its related research and ethics committee.

Kirkpatrick’s evaluation will be used to evaluate the simulation CPR training offered to A/E nurses. It is a four-level model; each level measures different but complementary aspects of training and development. Kirkpatrick (2005) provides a framework proposing training evaluation to be made through sequential levels, from assessing participants’ reactions to training, learning effects, behavioral changes and finally organizational results. It has made vast contributions to educational evaluation through its clear focus on learners’ behavior in the context for which they are trained (Frye & Hemmer, 2012). The model not only considers learner satisfaction and response to the program; actual behavioral changes in the learner and final results are also evaluated (Bates, 2004).

Gantt Model for Proposed Research is seen in Appendix 1
1.7 Challenges and obstacles

Among the expected challenges for the proposed project is the time factor, the proposed intervention needs sufficient time to have an effect on both trainees and supervisors. The dedicated time to provide supervision and feedback by the hospital’s BLS instructors will be added to their responsibilities. Moreover, the intention of the project is to implement booster CPR training sessions then to evaluate its impact on the quality of resuscitation in daily practice. The clinical outcome of the performance of staff in real in-hospital arrest situations will need sufficient time to produce tangible results. Changing the hospital culture is another challenge as Healthcare professionals can be resistant to change (Kumar, 2013). Although trainees have expressed the need for training programs, work overload in Accident and Emergency Department is a probable hindrance. The writer will try to bridge this gap through early engagement and communication to highlight the urgency of implementing the change and keep the staff motivated.

1.8 Organizational role

The writer is currently working as a consultant cardiologist at the hospital where he is managing patients presented with various adult cardiac diseases including those who are admitted with life-threatening cardiovascular situations. The writer was nominated as the chairperson of the hospital’s Resuscitation Committee based on his clinical background. He was tasked with the hospital management – together with the other committee’s members - to suggest, discuss and formulate competitor resuscitation plans such as conducting refresher CPR training sessions, planning "Mock Code" situations, formulating policies, and arranging workshops to improve CPR skills of their health care professionals. As the project leader, he had the initiatives to define, plan and manage the introduction of the booster training to the Accident and Emergency nurses. He was responsible for determining the principal resources, formulating the leading team, implementing the project plan and evaluating the training outcome.
1.9 Conclusion

Healthcare organizations worldwide are under accelerating pressure to change and improve the quality of services provided to internal and external customers. This change project will be undertaken in a teaching hospital in one of the Gulf countries. The change aimed to improve the retention of the psychomotor resuscitation skills among the nurses working in Accident and Emergency department as a model for further expansion of all health care providers working in the hospital. The change process will be conducted using HSE model. Hopefully, the project will be successful in planting the seeds of a continuous quality improvement culture in the organization.

In the next sections, chapter two is a systematic review of the literature relating to the booster CPR training. Principally the main themes extracted from the articles are discussed, and the implication of these themes for the project are discussed. Chapter three represents methods used on the change model and rationale for its selection. It describes the implementation of the change using the HSE Change Model (HSE, 2008). Chapter four explores the significance of evaluation within healthcare and provides the reader with a detailed description of the project evaluation, which assessed if the objectives were successfully achieved. The final chapter five contains discussion and conclusion on the findings, explains the organizational impact of the project and identifies strengths and weakness in the approach. Future recommendations and the potential dissemination were also considered.

The next chapter represents the key findings from the literature review undertaken.
Chapter 2 Literature Review

2.1 Introduction

The quality of cardiopulmonary resuscitation (CPR) is an important determinant of survival from cardiac arrest (Idris et al., 2012, Gallagher and Lombardi 1995). As a crucial part of CPR, basic life support (BLS) is now widely taught around the world. However, recent data have shown that CPR quality in both pre-hospital and in-hospital resuscitation is sub-optimal (Cheng et al., 2015, Sutton et al., 2013, Abella et al., 2005 and Wik et al., 2005). The poor skills acquisition and retention of CPR after training may contribute to the low survival rate after cardiac arrest (Nishiyama et al., 2014, Anderson et al., 2012 and Niles et al., 2009). The International Liaison Committee on Resuscitation identified that the quality of CPR education is one of those three factors which influence outcome from cardiac arrest (Chamberlain and Hazinski, 2003).

Outcomes among patients receiving CPR during an Emergency Department visit are likely affected in a more complex manner by prehospital care, premorbid medical conditions, and variances in care processes that patients in other in-hospital settings (Donoghue et al., 2015). Emergency nurses are often involved in the management of cardiac arrest. Nurses have a professional responsibility to remain competent in CPR through regular updates. The use of frequent assessments may identify those individuals requiring additional training (Castle et al., 2007, Wik et al., 2005 and Niles et al., 2009 and Hamilton et al., 2005). In spite of being recommended by the American Heart Association (AHA), systematic testing of healthcare providers after a course or after a predefined interval is still not current practice. According to Dwyer and Moser Williams (2002) CPR training strategies that encourage nurses to update CPR skills and ensure high-quality resuscitation performance should be developed.
2.2 Search strategy

The literature review carried out as part of this change project was retrieved from medical, nursing and educational journals. Four electronic databases were searched: MEDLINE, OVID, CINAHL and PUB MED. Searches of these databases were performed using the keywords: cardiopulmonary resuscitation, basic cardiac life support, booster CPR training and refresher CPR training for nurses. The database search was supplemented with the manual search of the following journals: Intensive and Critical Care Nursing, Resuscitation, Nurse Education Today, Journal of Emergency Nursing and Journal of Nursing Staff Development. The search was limited to material published from 2010 onwards, but the writer included papers published between 2005 and 2015 as many relevant CPR training studies were conducted and published during this period. Exceptionally added few older related articles extended to the last 15 years were included to cover all required information. Inclusion and exclusion criteria were applied including those “Published between 2005 and 2015”, “English language only”, “Full- text availability” and “Articles that identified strategies to enhance the acquisition or retention of CPR skills and knowledge”.

A manual thematic examination was utilized to determine and categorize into three main themes: various teaching methods (Instructor-led versus CPR self-learning; Cardiac arrest simulation, Video review of CPR quality and Peer-tuition), skills outcome and value of real-time feedback. These themes are chosen to elaborate factors that improve knowledge and skills retention during or after CPR training, to explore strategies that could be integrated in training to enhance learning and help retention of CPR skills, to make suggestions for the future CPR training and to highlight the effect of improving retention of CPR skills on the survival of the victims of cardiac arrest. Lastly, the implication of literature review for the change project will be discussed.
2.3 Effectiveness of refresher training:

Sahu and Latal (2010) reported that formal BLS classes in the form of BLS training courses that are based on one session training are not adequate to prepare nurses to provide high-quality resuscitation efforts that may improve post-cardiac arrest survival. Moreover, retention and maintenance of the learned CPR skills are challenges, even for critical care unit nurses, including junior and senior staff (Hill et al., 2010). Therefore, the need for frequent real scenario training has arisen as a means to maintain staff competency.

Consequently, patient simulation has emerged as a valuable educational tool that is aimed at providing practice training on patients’ care within a controlled environment. The use of simulation provides the learner with an opportunity to improve their competence, ability and confidence levels with the tasks being performed. Literature has revealed a direct correlation between survival rates and the increased number of BLS simulation training (Andreatta et al., 2010).

Mpotosa et al. (2013) developed a strategy of short CPR self-learning sessions followed by automated assessment with feedback and investigated its effectiveness to achieve a pre-defined level of compression skills. After five months, retention of compression depth and complete release was very high. However, only 48% still obtained a 70% combined score for compression skills, highlighting the significance of regular assessment and retraining. However, the absence of feedback/feed forward on ventilation skills performance in this study was reflected in the lack of improvement in ventilation mastery after multiple training sessions. Besides, the study population has consisted of young, motivated lay students, which do not represent the general population.
2.4 Key dimensions in refresher CPR training:

There are several principal aspects regarding refreshing CPR training for nurses. The following section will review the literature about teaching approaches, skills outcome, and real-time feedback.

2.4.1 Teaching methods:

A – Instructor-led versus CPR self-learning sessions with an automated assessment:

As an alternative to evaluation by instructors, Mpotos et al. (2013) had previously developed an automated testing station enabling formative assessment and certification procedures in a time-efficient manner without instructor involvement. Automated assessment also offers the possibility to provide an immediate and accurate test result (Feedback) together with information on how to further improve (Feedforward), which according to Hattie (2009) is the most powerful tool for learning improvement. Previous research demonstrated that for the training in a self-learning (SL) station, a combined instructional strategy consisting of video followed by refinement with voice feedback exercises was non-inferior for the acquisition of chest compression skills compared to instructor-led (IL) training (Mpotos et al., 2011).

Achieving or maintaining high-quality resuscitation skills and facilitating the process of learning are possible by increasing the motivation of candidates. As highlighted by Hopstock (2008), the motivation to learn is essential if education is to be successful. Organized training can influence motivation in many ways, by attention to the learning environment, by providing material appropriate to the candidate’s needs.
B - Cardiac arrest Simulation:

Patient simulation has emerged as a valuable educational tool that is aimed at providing clinical training within a controlled environment. Simulation is described as "a set of techniques to restore or amplify real experiences with planned immersive practices to evoke or replicate substantial aspects of the real world in an interactive fashion" (Sahu and Lata, 2010). Simulation provides a learning chance for controlled clinical practice without putting patients or others at risk. One of the major benefits of simulation training is utilizing critical-thinking and clinical decision-making skills. Skills include difficult and challenging goals and tasks such as teaching nurses critical thinking and going beyond simply "knowing," to advancing synthesis and application of knowledge, and planning, implementation, and evaluation of proper nursing care (Andreatta et.al. 2010). Simulation provides an alternative to the traditional teacher-centered approach to nursing education with an emphasis on the learning needs and preferences of nurses.

Simulation is used as a convenient training mean in current advanced life support teaching. It is evident that the introduction of simulation training sessions has reduced staff stress, improved the knowledge of participants and provided the bedside nurse with the opportunity to apply infrequently used skills (Hill et al., 2010). Also, implementing a BLS simulation training program for acute care has added a valuable and appreciated source of support for bedside nurses, increased comfort for first responders in an emergent situation, and promoted teamwork and collaboration among all levels of caregivers (Hill et al., 2010). The use of BLS simulation provides the learner with an opportunity to improve their competence, ability and confidence levels with the tasks being performed. (Andreatta et al., 2010)
C – Video review of CPR quality:

Innovative methods of teaching have been introduced in an attempt to improve the results. Some have used videos with and without student interaction (Cheng et al., 2015). Eisenburger and Safar (1999) concluded that the time required for the acquisition of knowledge and skills vary widely between students and that individual practice coached by video has advantages over instructor lead courses. Instructors have been reported to provide poor feedback including correction of skills (Cheng et al., 2013). The use of video recording to retrospectively review CPR quality has been thoroughly described in simulation literature (Cheng et al., 2015, Cheng et al., 2013, Donoghue et al., 2010, Hunt et al., 2008). Additionally, preliminary data exists in adults supporting the feasibility of video review as a technique for assessing CPR quality (Park et al., 2013).

Preliminary studies in adults have described the use of video recording during cardiac arrest to evaluate CPR performance in the emergency department (Hossein-Nejad et al., 2013). In pediatrics, there are multiple studies of the video-assessed performance of CPR in simulated cardiac arrest cases; these studies have clearly documented opportunities for performance improvement (Niebauer et al., 2011, Cheng et al., 2013, Cheng et al., 2015). While video recording may be an ideal modality for determining some CPR parameters (e.g. compression fraction, duration of CPR by the individual compressor), recently Hsieh et al. (2015) suggest that human observation by video is insufficient to measure chest compressions’ depth and chest wall release during CPR. However, the small number of patients in their report limits the ability to draw conclusions about qualitative assessment through video recording.
D - *Peer tuition*:

Peer education is an interesting concept for the mass-training of students in CPR because it may reduce the costs and improve the students' learning. Involving peers in the training of students have a multiplicative effect that reduces the personnel requirement of professionals. Furthermore, peer-education has two strategic opportunities regarding learning theory. On the one hand, experts rate the appropriate knowledge-transmission to the learners on the aspects of content, language, and learning strategy. On the other hand, peers have the ability to alter the behavior of their groups substantially by encouraging the reflection of their values and attitudes (Beck, 2015). The literature review similarly supports the use of peer-teaching in selected contexts, which suggests that it is at least equivalent to conventional senior faculty-led teaching with added benefits regarding the professional development of the student instructors and examiners (Harvey, 2012).

Long-term outcomes of peer-led education, beneficial or not, are unknown. Bulfone et al. (2008) found that peer instructors locate the responsibility of the role stressful and that supporting such students is important. In the course reported in their article instructors are supported by teaching in groups of three, and with the benefit of having experienced instructors circulating between groups. Furthermore, two publications looking at peer-assessment were also reviewed: Rudy et al. (2001) utilized anonymous feedback demonstrating an excellent correlation between faculty and peer-assessment. While showing the potential of students to appraise accurately performance, this is not feasible for formal OSCE style examinations. The study by Bucknell et al. (2008) was performed at this center, the validated peer-assessment model described is currently in use.
2.4.2 Skills outcome

CPR skill performance is defined by the international guidelines for resuscitation (American Heart Association and European Resuscitation Council). The 2010 Guidelines name five critical components in CPR: Minimize interruptions in chest compressions, provide compressions of adequate rate and depth, avoid leaning between compressions, and avoid excessive ventilation (Nolan et al., 2010). All of these are prerequisite for effective CPR.

Estimation, especially of optimal depth (50 mm) and rate (100 minutes–120 minutes), remains difficult even for professionals, though, and the demand for monitoring and feedback during events of resuscitation has been stated (Abella, 2005). Delivery of chest compression is the CPR skill most likely to improve survival and therefore a method for valid determination of rescuers’ competence to perform this skill is important (Lynch et al., 2007 and Field et al., 2012). As such, educational interventions need to be evaluated to ensure that they achieve the desired educational outcomes.

Recently, Wutzler et al. (2015) used a novel feedback device which provides audio–visual information about compression depth and rate. Results showed that the feedback device significantly improves chest compression quality and may thus improve outcome and survival. At the end of training, the absolute percentage of optimal compressions had increased substantially. Besides, there was an increase in the percentage of chest compression in target depth and target rate. The longest interval without good compressions was significantly shorter with the use of the device. However, a manikin trial cannot perfectly mimic real life situations. In a study like this stress levels are much lower than in clinical practice. CPR was conducted for a shorter period.
### 2.4.3 Real-time feedback

Feedback and evaluation are two of essential characteristics in simulation-based medical education, and they have a variable influence on educational quality through their format, content and programming (Issenberg et al., 2005). In a traditional BLS course, feedback is given during training (concurrent feedback) and skills are tested after training (post-training evaluation). Concurrent feedback is useful to guide trainees to correct their errors during practice. However, concurrent feedback might provide a high extraneous cognitive load on trainees and contribute to trainees’ development of dependence, which might impair feedback quality (Walsh et al., 2009). Also, skills evaluation is not only a tool to assess skills competency, but also a resource that feedback can be derived from it.

However, since the training was already ended, few of results in post-training evaluation could be delivered as feedbacks to current trainees and help them to improve their acquired skills, unless further training was instructed. Therefore, those drawbacks of concurrent feedback and post-training evaluation in a traditional BLS course have a negative impact on the quality of BLS education (Spooner et al., 2007).

Smart et al. (2015) suggest that the use of real-time feedback appears to improve the overall CPR performance of the participants for both the adult and the infant out of hospital cardiac arrest assessments significantly, especially when frequently practiced. The study objectives were intended to help the participants improving their educational efficiency (using objective feedback) and local implementation (by introducing competition). They concluded that the availability of objective feedback when undertaking manikin training to improve CPR performance can have a positive and motivational impact on CPR quality training and could have a positive effect on ‘Educational Efficiency.’
Providing feedback on a trainee's skill level is also known to have a high impact on acquisition and retention of competencies (Li et al., 2011, Hattie et al., 2013, Raemer et al., 2011 and Ericsson 2008). Analysis of Efficient self-learning stations, a voice feedback exercises appeared to be more effective than a video in retraining CPR skills (Mpotos et al., 2013). Providing feedback on a participant's actual training level after assessment together with feedforward is the most powerful tool for improvement (Dine et al., 2008, Seethala et al., 2010 and Andriessen et al., 2012). Audio–visual feedback improves compression rate and depth and has been shown to improve significantly CPR quality (Becker et al., 2007).

Wik et al., (2002) reported an immediate improvement in the performance of BLS core skills by paramedic students when using an automated voice advisory manikin system (VAM) for three minutes. With this system, the manikin gives on-line feedback to the student based on accurate measurements of the performance versus set and adjustable limits without any instructor. The crucial role of feedback was highlighted in the same study when their performance remained at the same level when tested again immediately after that on the same manikin with the feedback system silenced. Using quantitative CPR quality data and provider perceptions, Cheng et al., (2015) demonstrated that healthcare providers tend to overestimate the proportion of time they achieve target CPR depth and rate. The use of real-time CPR feedback improves accuracy in the perception of CPR depth in CPR providers compared with team leaders. However, these results correctly reflect the perception of CPR quality in the simulated context. As the perception of chest compression quality may potentially be different in real patients versus manikins, further research will be required to determine if these results can be generalizable to the real clinical environment.
2.5 Implication for the change project:

The literature review has highlighted factors that enhance retention of knowledge and skills during and after resuscitation training, to identify educational strategies that will optimize survival for victims of cardiopulmonary arrest. Poor knowledge and skill retention following cardiopulmonary resuscitation training for nursing and medical staff has been documented over the past 20 years. Change project including simulated cardiopulmonary resuscitation training is necessary for nursing staff and is important as nurses often discover the sacrifices of in-hospital cardiac arrest. Many different approaches to improving this retention have been devised and assessed. However, the content and manner of this training lack standardization.

The literature review has given conviction to the change project. This evidence will ensure that the training reflects the potential situations that nurses may face in practice. Staff should be formally evaluated using a manikin with an expert tutor to assure that chest compressions and ventilations are satisfactory at the time of training. Remedial practice must be provided as often as required. Resuscitation training tools should be made available at the unit level to allow practice and motivate nurses to participate. An in-hospital simulating, scenario-based video should be devised and examined to assess the efficacy of this medium in resuscitation training for nurses. The writer decided to use CPR simulation training with BLS instructor feedback.

2.6 Conclusion: The literature on booster CPR training for nurses and the key dimensions have been outlined. Training should be tailored to the needs of different types of learners and learning styles to ensure adequate acquisition and retention of skills. The following chapter outlines the change initiatives to introduce booster CPR training sessions to nurses working in Accident and Emergency department.
Chapter 3 Methods

3.1 Introduction
Organizational change that is essential, sustainable, and constant is critical to the survival, growth and effectiveness of all organizations (Schech-Storz, M. D. 2013).

Before implementing any change in health care organization, it is recommended to put a plan and follow the well-designed methods to achieve the desired target. Using change model will facilitate understanding the change project. This chapter will review the methods in details, the supporting organization tools which I used to deliver this organizational change project and the rationale for choosing the Health Care Executive (HSE) change model for this project rather than others.

3.2 Approaches to Organizational Development
Organizational development (OD) was defined as one way through which organizations can continuously improve on their activities and increase their long-term prospects (Mwanza B. & Wong, P. 2011). Holland and Salama (2010) further define the organizational development (OD) as a process through which organizations develop by adopting a series of planned intervention strategies that aim to enhance the effectiveness of the organizations and the well-being of organizational members. Organizations need an integrated approach to driving systematic, constructive change and minimize the destructive barriers to change, as well as addressing the consequences of making the change (Al-Haddad & Kotnour, 2015).
There are five key features of OD (Mwanzia & Wong 2011) First; OD is a planned, a proactive performance as opposed to being a reactive activity. Second, OD focuses on an entire organization or a large part of an organization. Third, it is initiated and managed from the top level of an organization. Fourth, OD enhances an organization's problem-solving and renewal processes so that the organization can achieve its goals and objectives. The well-being of organizational members is a primary concern of OD. Lastly, OD is based on planned change or interventions made with the help of change agents or third parties who are familiar with the behavioral sciences and action research. Along with people, structure and resources determine the success of the change initiative (Mathews, J. 2009). Efficient and active teams can enable an organization to gain a competitive advantage. Therefore, intervention strategies aimed at enhancing the functioning of groups can be highly valuable to an organization (Mumford, 2011).

Moore (2011) notes that "understanding where your institution sits today and what processes it needs to enhance, change or modify is crucial. Considered such recognition as the first step toward starting an efficient process change discipline." A consistent theme in the O.D. literature is the need for structured and systematic planning and implementation. As organizational change takes place over time; to increase the probability of success, it is important to plan for change, setting a definite timeframe and addressing the critical factors that affect varying success (Chrusciel and Field, 2006). Kelly (2007) states that quality management in healthcare requires a systematic approach to ensure the delivery of an effective, efficient and economical service.
3.3 Rationale for the selection of an Organizational Development Model.

Change models help to clarify the change's process and determine the method of implementing the change based on evidence to proceed with the management action.

There are several theories on change models available to highlight the principle of using each of them. One example is Lewin's model which includes the three phases of unfreezing, moving and refreezing (HSE, 2008). Although Lewin’s model was considered highly effective, it is not suitable for this project because it is too fixed and run in one pathway with no flexibility. Also, this model is applicable to isolated changes and more convenient for stable institutions (Todnem By, 2005). Accordingly, Lewin’s model is unsuitable for use in unstable organizations, such as the rapidly adapting health services (Burnes, 2004).

Another example is Kotter’s model (Kotter, 1995) which emphasizes urgency, vision and small incremental initial gains (Gill, 2011). Kotter’s model is still considered an essential reference in the field of change management. The most comprehensive measure in his model, which purported to avoid the high failure rate of change projects, is the creation of a sense of great urgency in a strong team of managers (Brisson-Banks, 2010). Appelbaum et al. (2012) concluded that few studies have investigated the validity of Kotter’s model. Additionally, it has been claimed that a model is a rigid approach while organizations prefer models that are easily amended or replaced. Another limitation for using this model was mainly due to its linearity as it may lead to the wrong assumption. Also, it may lead to workers’ dissatisfaction if their requirements not considered (Fernandez & Rainey, 2006). Subsequently, this model is also seen as more suited to stable organizations.
Senior and Swailes (2010) OD Model consists of five primary processes. They developed a change model which includes action research and continuous improvement. It is clear that there is a connection between change’s levels which makes it flexible for modification during implementation. This model is a long-term process for applying change where the whole organization gets involve in it with top management support (Senior & Swailes, 2010).

Senior and Swailes developed their change model which includes action research and continuous improvement. However, they discussed at length the reasons as to why models to theirs may not succeeding the public sector. They referred to mechanistic reporting structures such as the public service, as being authoritative, lacking funding, having conflicting interests and being too unwieldy as to make decisions and enable organizational change (Senior & Swailes, 2010).

The HSE model (HSE, 2008) is an evidence-based hybrid type model specifically designed for institutional development in the Irish healthcare sector. Internal change experts had developed the model based on a comprehensive literature review of international best practice. The HSE has advanced its organizational development to help change representatives in their proposal implementation roles by offering a structure for project implementation, planning and execution. While some may consider the fact that the HSE model is tailored toward the specific needs of Irish Healthcare as a limitation, in fact, for this change project, this is a distinct advantage. It should enhance the sustainability and further rollout of the project as the model is readily available and, according to the HSE, is well supported by the organization (H.S.E, 2008).
The main objectives of HSE are: to enhance patients’ and users’ experience, to facilitate the cooperation between the employee in order to improve the quality of service and promote sustainable approach to change across the system. The model recommends taking decisions supported by data in order to justify the reason for the change and thereby to get support from all stakeholders and subsequently preserving resources. There is a consistent trend in HSE models towards engaging people, encouraging participation and collaboration. The models is flexible which allow for a continuously advanced support, sustained improvement, and adaptation during the change. It is well known that the change is usually unsettled and not linear as its components are interrelated and can affect each other at any time (HSE, 2008).

Moreover, the HSE model (HSE, 2008) broadly identifies the confrontation to include the external and the internal groups and individually advise to create methods which promote good working relationship with both. Also, the HSE change model (HSE, 2008) is quite distinct about one person who actions, leads and manages the change. It allows the change leader to determine and plan for potential barriers and risks in the pre-planning section which can be further discussed with the stakeholders and the targeted staff. The change leader will subsequently take responsibility for the success or failure of the implementation plan and facilitates the barriers for the achievement of the outcome. HSE change model is also fulfilling the useful activities contributing to effective change, creating a vision for change, developing political support, managing the transition of change and sustaining momentum (Cummings & Worley, 2008).

Accordingly, I concluded that the HSE model was a comprehensive fit for the organizational change.
3.4 Application of the HSE change model to the proposed change:

As organizations need an integrated approach to driving systematic, constructive change and minimize the destructive barriers to change, the HSE change model (HSE, 2008) was developed to guide change agents and to support them in guiding their way through the comprehensive organizational change in an organized and committed way to achieve the desired goals. As shown in Figure 1, it can be seen that this model describes a pathway from the initial current state to some desired future situation while the organization obtains a shared vision for change and development. The model also describes four stages in the lifecycle of change implementation: Initiation, Planning, Implementation, and Mainstreaming.
3.4.1: Initiation; preparing to lead the change.

Initial preparation focused on determining the ‘rational and mandate’ for supporting the need for introducing the Booster training by data from literature and research. I made a comparison by evaluating the current status of the organization as compared to the improved state after implementing the change. The preparation phase also required ensuring a sense of shared responsibility amongst healthcare staff involved in leading the booster training sessions primarily resuscitation committee members, nursing education team and nursing manager in A/E. I used to create a sense of urgency as the hospital records showed that A/E department was receiving the highest number of cardiopulmonary arrest cases. Initial phase also included the identification of the key influencers like stakeholders, leaders, and followers with a determination of leadership and management role. Finally, I tried to get support and commitment from the entire organization by giving a lecture to the whole staff about the effect of high-quality CPR on the improvement of survival outcome. Time and effort invested in this phase have shown to contribute significantly to a positive consequence (HSE, 2008).

3.4.1.1: Forming a case for the intended change.

The purpose of this project was to assess the influence of a BLS simulation booster training on the improvement of CPR skills for nurses working in Accident and Emergency department. The driver for the change was the recognition of the whole organization that performing safe and high-quality CPR for the patients will increase survival rates post-cardiac arrest. Moreover, the writer's institution is following the requirements of the Joint Commission International (JCI) accreditation, which created a culture of continuous quality improvement within the organization, as each department is required to submit their intended development plan for the year. This culture of quality enhancement provided positive reinforcement for the change initiative.
3.4.1.2 The driving forces behind the change

Lewin (1951) had identified Force Field Analysis as a "problem-solving technique" which elaborates the antagonizing effects 'for and against change.' As part of the preparation, it was essential to analyze the driving and the opposing forces to the change by applying Force Field Analysis (Figure 4). In devising the force field analysis (FFA), each driver was assigned a score or weighting from 1-5, with 5 being the most forceful. I found the driving forces as following: First, the urgent need to improve the efficiency of the CPR skills of nurses as first responders to arrest cases. Second, the organization focuses on patients' safety and periodic quality improvement as part of JCI requirements. Third, the high support from the management especially Director of Nurses to implement this change. Finally, the authority is given to me as a chairperson of the resuscitation committee and the consensus agreement among the committee members to consider this change as a top priority task.

On the other hand, the resisting forces in this project were mainly natural human resistance which was particularly from few nurses who like the routine work and consider these training sessions as extra commitments. Also, part of the resistance was due to prolonged clinical shifts, physical and mental exhaustion, time pressure and increased patients' numbers. As a change leader, trying to explore the values and experiences of nurses helped to understand the causes behind their acceptance or resistance to the change project. Creation of emotional intelligence by the initial approach and better communication with them was useful to alleviate negative feelings against the project.

In this project, I found that the driving forces are much exceeding those of the opposing forces (see Figure 4), and that encouraged me to continue my project and move forward.
Question:
What forces positive or negative could have an influence on introducing booster CPR training sessions in our hospital?

FORCES FOR

Urgent need to improve the efficiency of the CPR
SCORE: 5

Organization focus on patients’ safety as part of JCI requirements.
SCORE: 5

Management support especially Director of nurses.
SCORE: 4

Authority given to me as a chairperson of the Resuscitation Committee
SCORE: 4

Total score for 18

FORCES AGAINST

Culture, Resistant to change, Staff attitudes and believes.
SCORE: 4

Prolonged working shifts with physical and mental exhaustion
SCORE: 3

Competing demands on the staff.
SCORE: 2

Over crowdedness of A/E Department.
SCORE: 2

Total score for 11

Figure 2: Force Field Analysis (Rozac, 2003)
3.4.1.3 Recognizing key stakeholders (Stakeholder analysis)

It was important to identify a list of stakeholders and their relative levels of importance to consider how they might influence or be affected by the implementation of the change project. Freeman (2010) stated that stakeholder response to change is the single biggest factor impacting a change process outcome. Identification of primary drivers for change within this group, allowed me to target supporters such as Resuscitation Committee members and Director of Nursing. The Medical Education Department members and the ICU Nurse Manager, who are all BLS instructors, were identified as essential to the change initiative. From a list of stakeholders, a stakeholder analysis (see Table 1) was conducted illustrating the stakeholders' level of importance and influence within the setting of the intended change.

Based on this chart, among the four kinds of people classified, high importance with the High power group are the key stakeholders who should be totally engaged and have to be managed carefully by an efficient communication for their opinions. This analysis also helped to identify which groups within the organization would need to be represented on the project implementation team and indeed, which staff members would be good candidates for supporting the team. The resuscitation committee’ members and medical education nursing team were identified as essential to the change initiative. (Sirkin, 2005) stated that sponsors significantly influence the possibility of success by ensuring power, authority, support, and resources are deployed promptly on time. Accordingly, I approached the Nursing Director earlier in October 2015 where she agreed to assume the role of the sponsor to the project.
<table>
<thead>
<tr>
<th>High Importance/Low influence</th>
<th>High Importance/High influence</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Manage – Keep satisfied</strong></td>
<td><strong>Engage : Manage closely</strong></td>
</tr>
<tr>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>Chief of Executive Committee</td>
<td>Director of Nursing</td>
</tr>
<tr>
<td>(CEO)</td>
<td></td>
</tr>
<tr>
<td>All Physicians</td>
<td>Head of Resuscitation</td>
</tr>
<tr>
<td></td>
<td>Committee members</td>
</tr>
<tr>
<td>Other ward managers</td>
<td>Resuscitation Committee</td>
</tr>
<tr>
<td></td>
<td>members</td>
</tr>
<tr>
<td>Head of Finance Department</td>
<td>All Nurses</td>
</tr>
<tr>
<td>All patients</td>
<td>Medical director</td>
</tr>
<tr>
<td>CPR Training Centre</td>
<td>Head of Quality section</td>
</tr>
<tr>
<td>(External)</td>
<td>Medical education team</td>
</tr>
<tr>
<td>Low importance/Low influence</td>
<td>Low importance/High influence</td>
</tr>
<tr>
<td><strong>Tell: Monitor 1 way</strong></td>
<td><strong>Consult: Keep informed 2</strong></td>
</tr>
<tr>
<td>communication</td>
<td>way communication</td>
</tr>
<tr>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>Administrative Staff</td>
<td>Emirates Heart Society</td>
</tr>
<tr>
<td>Hospital technicians</td>
<td>Gulf Heart Associations</td>
</tr>
</tbody>
</table>

Table 1: Stakeholders Analysis Table (HSE: 2008)
3.4.1.4 Clarifying leadership roles

In November 2015, the scope of the project was agreed with senior management. It was decided that this project was in alignment with the organizational goal of improving patients’ safety. Therefore, Resuscitation Committee would act as the steering committee. The Educational Nursing Department was also identified as the enabler for the implementation of the project. As a change leader, it was my responsibility to promote change in a positive fashion, perhaps to emulate the qualities of the transformational leader, leading change by example and energizing staff towards a higher vision. Early participation of stakeholders was sought to create, agree and align on the case for the change. Before engaging staff, an analysis was undertaken to identify strengths, weaknesses, threats and opportunities (SWOT) about the project (see Table 2).

S W O T analysis (Strengths, Weaknesses, Opportunities, and Threats) was performed. It is a strategic management tool that assists in understanding the factors which may influence the change in organizations. It was used to identify and capitalize on organizational strengths while mitigating against or reducing weaknesses and threats while exploiting opportunities (Gill, 2011). This analysis helped to determine the positives and negatives of the external and internal environment of the organization to create full awareness of the situation (Ayub et al., 2013). Also, undertaking a SWOT analysis gave more clarity on the stakeholders and the project environment (HSE, 2008). On completing the SWOT analysis (Table 2) there was a reinforced need to understand the environment of working and analyze the factors which can have a positive or negative impact on the success of the change.
The strength points of the project were the need for improving the outcome of the CPR and maximizing the patients' safety, the support from the management, the positive contribution of the Resuscitation Committee, the scientific atmosphere of the university hospital which enriches the nurses' knowledge and the interaction and commitment of the stakeholders. The identified opportunities were the trust objectives for enhancing patients' safety and improving the quality of care offered by nurses as the first responders to arrested patients in Accident and Emergency department.

However, weaknesses were the time limitation as extended time is needed for correlating the beneficial effect of simulated training with the improved clinical outcome. Other discouraging factor was the crowdedness, and overwhelming workload on emergency staff. Initial perception of few nurses to training as an additional commitment was related to their resistance to change while the threats appeared as rapid turnover of well-trained health care staff especially nurses. The other Competitors quality projects that have the support of the hospital management and assigned to the Nursing Education team was another threat. They were requested to supervise other quality projects primarily for monitoring the performance of the nursing staff in different clinical skills other than CPR. Early communication of the change leader with the stakeholders succeeded to assign the booster CPR project as a priority object. One of the external threats was building of new trauma center near to the hospital which might attract our well trained Emergency Nurses (See table2). Based on the findings, the developed aim was to concentrate on the strengths and opportunities of the project to and to find solutions and overcome the weaknesses and threat through an early and efficient communication and the utilization of a transformational leadership style.
<table>
<thead>
<tr>
<th>Strengths</th>
<th>Weaknesses</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Staff expertise: The staff body has a great deal of knowledge, experience and expertise.</td>
<td>• The time required to appreciate the effect of CPR training on the clinical outcome.</td>
</tr>
<tr>
<td>• Supportive Stakeholders especially Director of nursing.</td>
<td>• The Emergency Department’s nurses are quite busy with overwhelming workload.</td>
</tr>
<tr>
<td>• Staff commitment: The majority of staff will support the change as it is the right thing to do.</td>
<td>• Staff morale. Morale may decline with nurses who are already very busy.</td>
</tr>
<tr>
<td>• Peer trainers will come from within - we can identify trainers who will commit to this effort.</td>
<td>• Lack of updated CPR knowledge with occasional limited resources.</td>
</tr>
<tr>
<td>• Presence of dedicated Resuscitation Committee: they need to be on the project team and will be able to assist in teaching and auditing readiness.</td>
<td>• Initial staff perception to training sessions as an additional commitment</td>
</tr>
<tr>
<td>• Available literature/scientific evidence/Data There is a wealth of literature that scientifically supports the change.</td>
<td>• Lack of the standard guidelines for the optimal duration and frequency of the refresher CPR training.</td>
</tr>
<tr>
<td>• Low cost: A cost benefit analysis does need to be carried out.</td>
<td>• Staff anxiety there will be more auditing increased oversight?</td>
</tr>
<tr>
<td></td>
<td>• Unscheduled assessment increases staff anxiety.</td>
</tr>
<tr>
<td></td>
<td>• Competing priorities Competing priorities could inhibit execution.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Opportunities</th>
<th>Threats</th>
</tr>
</thead>
<tbody>
<tr>
<td>• High Impact: we have an opportunity to implement a high impact change and generalize the CPR training all over the hospital with a direct positive impact on our patients and our KPIs (Key Performance Indicators).</td>
<td>• Rapid turnover of well-trained health care staff especially nurses.</td>
</tr>
<tr>
<td>• Peer trainers with availability of new BLS instructor.</td>
<td>• Building of new trauma center near to the hospital which might attract our well trained Emergency Nurses.</td>
</tr>
<tr>
<td>• Standardized training with our approach, every clinical area will get the same training from the same trainers.</td>
<td>• Lack of engagement from individuals: Some individuals may not support the effort as they prefer routine practice.</td>
</tr>
<tr>
<td></td>
<td>• Competitive quality projects that have the support of the hospital management and assigned to the Nursing Education team - do we need to get prioritization over other efforts?</td>
</tr>
</tbody>
</table>

Table 2: SWOT analysis (HSE, 2008)
3.4.1.5 Creation of urgency:
By the first week of December, I had conducted a meeting with the physician-in-charge of the Accident and Emergency (A/E) Department, Nurse Manager in A/E and two representatives of the Educational department. The purpose of the meeting was to introduce the change initiative, explain the urgent drivers of the change, discuss the expected outcomes and agree on the timeline of the project. It was decided to distribute a questionnaire survey to all nurses and to elaborate fully on them the aim and objectives of the change project. Written consent was decided to be taken from all nurses stressing that their participation is on a voluntary basis. The creation of urgency is essential, as change projects require aggressive employee cooperation (Appelbaum et al., 2012).

3.4.1.6 Team Development:
A group was formed of four members, including myself as a team leader, two senior nurses from the educational department and one senior BLS instructor, to act as a coalition group, organize the in-service training sessions and provide support for the employees. I shared with the team the aim of the change project that was adopted as the mission of the team. The ultimate vision was to improve retention of the CPR skills among nurses working in A/E as a model for change throughout the organization. Additionally, the team decided on the main steps to be taken toward the change, such as preparation of the CPR assessment forms, training sessions needed for the employees, resource allocation and the timeframe of the training sessions. The initiation stage was a long scene that included significant steps toward the planning stage. Nevertheless, the foundation was laid as the organization was analyzed, permission granted, focus groups conducted, urgency created, a team formed, the vision created and the assets discussed. It begins at first week of November and end at the Mid-December.
3.4.2 Planning:

The planning stage determines the details of the change and to build support for the change process (HSE, 2008). This scene gradually shifts the power from the leader to the followers through honest communication of the vision, gaining commitment and engaging employees in the change project. Fernandez and Rainey (2006) refer to a necessity for leaders to express the necessary for change to staff and the goals behind any proposed change. The appropriateness of the change needs to be communicated and accepted by staff for real change to occur (Holt et al., 2003). The focus therefore in the planning stage was to build organization-wide commitment, momentum, and capacity.

3.4.2.1 Formulation of the CPR skills checklist:

I had reviewed the literature regarding psychomotor CPR skills’ assessment forms and read the available guidelines published by different international organizations, such as American Heart Association (AHA) and the European Society of Cardiology. Therefore, an adopted CPR skills checklist was formulated to evaluate CPR performance on manikins and to assess psychomotor skills. Participants were tested on BLS, high-quality cardiac compression and airway management. To evaluate the performance of a quantitative approach, the CPR skill testing sheet was divided into ten items of critical CPR steps and each item would be rewarded a maximum of two marks if the task was correctly done. A score of one would be given to each item if the task was sub-optimally done while a score of zero would be granted if the work was not performed during the sequence of resuscitation and the total skill score was obtained by summing the ten items. Accordingly, ratings were based on a scale of one to twenty (Appendix 3). This observational CPR checklist was planned to be used to assess skills at the beginning and four weeks after a simulation skill training session.
3.4.2.2 Building Commitment:

This step of the planning stage is an essential step that deals with resistance to change and transforms resistance into commitment. Engaging the key stakeholders in the change process produces a sense of ownership of the change and, hence, commitment (HSE, 2008). As project leader, I managed to communicate a shared vision through a series of meetings and communication sessions with Resuscitation Committee members, medical nursing education team and the nursing manager of A/E with all nurses working in Accident and Emergency. The vision was communicated on several different occasions utilizing numerous methodologies employing the comprehensive stakeholder engagement plan, facilitating the open receipt of feedback by distributing a questionnaire survey and conducting focus groups to explore nurses' ideas regarding the possible impact and necessary action arising.

3.4.2.3 Developing an implementation plan:

An implementation plan was devised to guide the change process so that the team members could visualize a clear outline of the project. A detailed explanation and clarification of the aim and methods of the change were presented to the educational department personnel and A/E Nursing Supervisor. Also, detailed and accurate description of the objectives and methods of the project were declared to participants. All participants would have one session simulation training for two hours before which the participants had hands-on practice pre-test to assess their BLS baseline skills by the AHA guidelines-2010. Four weeks following completion of the simulation training, participants would have unscheduled simulation hands-on post-test to assess their current skills about BLS and evaluate the training session efficiency. A collection of data of pre-test, the simulation course and the post-test for the participants would take place over a seven weeks period. Focus groups sessions would be repeated after the post-test assessment.
3.4.3 Implementation:

Leadership is important in setting the vision, values and sense of urgency about the change but for it to be successful, it has to be managed appropriately. The project started with all nursing staff from the Emergency Department of our hospital. The participants were given a survey questionnaire which includes their demographic profile such as age, gender, position/designation and knowledge on some aspects of CPR (Appendix 2)

The Pre-test The observers presented a scenario of a patient who suddenly collapsed while recording vital signs, and asked participating nurses to act as if they were in an actual emergency and the manikin was a real patient. The performance of each of the ten items of the BLS-testing checklist was scored following observation of the performance by an AHA-certified BLS instructor.

The Simulation Training Course After the participants demonstrated their skills and knowledge in the pre-test, a debriefing session was directed to highlight critical points in their performance. We explained the ideal performance according to AHA guidelines, pointing out the observed strengths and weaknesses and conducted a one-day simulation training course for the participants. Also, a review of the BLS concepts including the chain of survival, correct CPR performance and operation of AED was provided in a 25-minute discussion session.

The Post-test After a four-week period, the observers returned to evaluate the BLS performance through hands-on simulation post-test. The subjects were not aware of the scheduled post-test assessment beforehand. The testing and the scoring were conducted in the same manner as the pre-training session.
3.4.4 Mainstreaming:

This stage focusses on integrating and sustaining the change into new ways of working and behaving (HSE, 2008). For change to be permanent, it must become part of the organization's culture or the "way we do business here" (HSE, 2008). Central to this vision is that this development/change was to be at the very core of the Hospital Quality and Patient Safety KPI monitoring. The introduction of refresher CPR training was deemed vital to insure safety and optimum care of the patient, reducing staff and organizational risk. The initiative was relatively cost effective utilizing in-house training, manpower and simple CPR tools' requirements. A focus group discussion with the A/E nurses following posttest evaluation was conducted where nurses had admitted the importance of these booster training sessions. The outcome of the meeting with the comparative results of the pre and post tests were raised to the hospital management with a recommendation to be generalized to different clinical areas of the hospital.

3.5 Conclusion:

This chapter traced the change process using the HSE change model (HSE, 2008) through its stages of Initiation, Planning, Implementation and Mainstreaming. The scientific support from the literature review and the concepts discussed in the OD literature are powerful drivers in helping to persuade those less convinced of the change in the initial stages. The HSE's model (HSE, 2008) with its clear focus on SWOT, stakeholder and force field analyses ensured stakeholder engagement throughout the project. Embedding the change in the organization is the final stage of the process. The HSE model (HSE, 2008) finishes with an evaluation stage which is described in chapter 4.
Chapter 4: Evaluation

4.1 Introduction:

Evaluation has been defined as a systematic and structured review of a service to determine whether outcomes provide value for money and whether it supports the intended objectives (HSE, 2008). Evaluation is considered as a broad concept which includes the validation of the learning event and looks particularly at issues concerned with the application of the learning in the workplace, its longer term implementation, and the costs and value effectiveness of the training and development provided (Purbey et al., 2007). Conducting a detailed evaluation of the change project, therefore, is key to understanding which methods and innovations worked to improve patient outcomes or if the evaluation survey can be replicated in other clinical areas of the organization to effect improvement cardiopulmonary resuscitation on a larger scale. However, evaluating the introduction of booster training sessions, designed to improve patients’ outcome in the Accident and Emergency is complex and challenging as sufficient time is required to appreciate the relation between the training and the desired outcome.

Evaluation is important in determining whether an intervention has succeeded and by extension, can aid in better planning for future interventions. Evaluation is therefore an essential component of this organization development project. Healthcare evaluation is based on data collection and helps people to rationalize the initiation of projects and make future plans for improvement (Hughes & Nieuwenhuis, 2005). In this chapter, I revise different models of evaluation and outline the methods of evaluation employed. I also present findings in terms of data and information and assess the change relative to its aims and objectives as documented in chapter one using an evaluation tool appropriate to the subject matter.
4.2 Models of evaluation:

There are many different models and types for healthcare evaluation including process, outcome and impact evaluations (Hughes & Nieuwenhuis, 2005).

The timing of assessments has evaluation survey into summative evaluations (retrospective assessments of completed or established programs) and formative evaluations (conducted during the development of a program). Formative evaluations are used to modify and improve a program, and this is frequently used to provide feedback to staff while the program is in operation. These evaluations assess and assist with the formation of goals and priorities, provide direction for planning and guide program management. Information from formative evaluations is aimed at improving operations and serves quality assurance purposes. In contrast, summative evaluations are used to prove something, satisfy accountability or make a judgment about the overall quality of the program.

The CIPP (Context, Input, Process, and Product) model provides a comprehensive framework for guiding formative and summative evaluation that deems it appropriate at the beginning and on completion of a project (Frye & Hemmer, 2012). The non-linear design and flexibility of the model allow it to be used in a variety of educational and non-educational settings. It allows evaluation of the study's effectiveness, feasibility and decisions made, as well as evaluation of the final outcomes. Also, CIPP acknowledges the impact of the whole context surrounding the change project. However, this model requires careful planning and multiple sets of data collection are needed to use it successfully. Hence; I believed this model would be too time-consuming for the context of this project.
Comparably, Kirkpatrick's four-level model is extremely agile and can be modified to suit various scenarios. Moreover, Kirkpatrick's model is preferred in training evaluation considered the clarity of the model and its clear focus on educational outcomes (Frye & Hemmer, 2012). Consequently, I believed this model was the most suitable to evaluate their project. Most program evaluation experts agree that there is no one best model. It is necessary, therefore, for the program evaluator to select a model which matches the requirements of a situation to produce evaluation findings which are most likely to appraise a program's merits, worth, probity, feasibility, safety, significance, and equity accurately.

**Kirkpatrick Model:**

![Kirkpatrick Model](image)

Figure 3: Kirkpatrick Model of Evaluation

Kirkpatrick's four-level evaluation model remains the standard evaluation model for industry and business. It has made vast contributions to educational evaluation through its clear focus on learner behavior in the context for which they are trained (Frye & Hemmer, 2012). The model not only considers learner satisfaction and response to the program; actual behavioral changes in the learner and final results two. The above figure presents Kirkpatrick's evaluation model.
4.3 Evaluation tools:

The Kirkpatrick model (1994) contains four sections; Reaction, Learning, Behavior and Results (Parry et al., 2013). "Reaction" refers to the participant's level of interest in the subject matter. Typical tools employed to evaluate "reaction" include a post education evaluation survey to gauge the nurses' impressions of the training. "Learning" refers to assessment as to whether the nurses have retained the critical skills needed to execute their responsibilities. Typical tools employed to evaluate "learning" include pre and post Booster training assessments and practical tests. "Behavior" seeks to understand whether nurses have been empowered to use their new skills in their daily tasks. A typical tool used to assess whether there has been a change of behavior is the direct observation and revision of arrest cases.

An evaluation of "results" is the measurement of the impact of the training on key performance indicators (KPIs) which in this instance includes:

(1) Improving retention of CPR skills among nurses working in A/E Accident and Emergency.

(2) Improve performance of chest compressions regarding rate and chest compression according to AHA, 2010 guidelines.

(3) Improving assistance of ventilation by enhancing the individual CPR skills 'scores for opening airway and giving supplemental breath sounds.
Level 1 - Reaction: The aim of this level was to quantify how participants felt; I measured this through the process of qualitative analysis. Two sets of focus groups were conducted before and after the training. Interviews, according to Fontana and Frey are "one of the most shared and powerful ways we try to understand our fellow human beings". The below table shows the main themes of the discussion conducted in the both sessions.

| First theme: The nurses’ opinion of the most challenging CPR skills they are facing in real arrest situation. |
| Second theme: The nurses’ feelings of their self-confidence in confirming an arrest situation as a first responder and activating the code |
| Third theme: The nurses’ perception of the effectiveness of the team approach while resuscitating real arrest cases |

Table 3: Main themes in focused groups discussion pre and post training

Emergent themes from focus group 1: Pre Booster training

In response to the first theme in the above table, most of the staff reported that although there was an insufficient opportunity for them to practice their resuscitation skills, they expressed concerns over whether they would be able to perform resuscitation adequately when a situation called for it in their department. Recalling the sequence of skills, optimizing the ratio and depth of compressions as well as the giving of the rescue breaths on infants, children, and adults during a CPR are well noted by the participants. "It is crucial to be keen in recalling and observing the correct sequence of the steps in doing the CPR. I felt anxious when I hear that there is a code, and I am called to participate not knowing what exactly you will be faced with until you are involved in the scenario". P#2 ER Nurse.
For the second theme, they expressed that their BLS renewals increased their confidence temporarily, and that courage was felt to diminish over time.

"It's hard when I don't have the opportunity to practice what we have just learned...if I've been exposed in ER for several months and haven't had a chance frequently witnessing real codes, I think I'm going to forget my skills." P#14 ER Nurse.

Regarding their view to the third theme, They claimed that there are aspects of team performance that were felt to influence their resuscitation skills which included: discrepancies in skill levels of each staff, sometimes lack communication, and when team leaders are not up to date on their experiences. They felt less confident when team members did not work well together; there was no clear instructions or assignments of the resuscitation code, or if team members did not communicate effectively.

**Emergent themes from focus group 2: Post Booster training**

The focused group was repeated with the same sample where participants reported that they were surprised and anxious when the pretest CPR skills observation started, thinking they were being monitored on how they work in the Emergency Department. Many have appreciated the program as the objectives were explained to them, they mentioned that checking on their CPR skills at an unexpected schedule brought a little anxiety but also considered it as a challenge for them to be always mindful and prepared for such situations. Frequent updates were seen by them as crucial in boosting their confidence in performing resuscitation. They expressed that mock codes, practice with an instructor and a team, self-practice with a mannequin were the right methods where they can update their CPR skills. They added that confidence in their resuscitation abilities was good only after one had recently practiced or engaged in an update or an active debriefing session.
Level two - Learning

Evaluation of CPR Learning

Learning evaluation is the determination of the increase in knowledge and capability, before and after training. In the context of CPR learning, I evaluated their baseline knowledge by distributing a survey questionnaire which included their demographic profile such as age, gender, position/designation besides few basic questions about their CPR knowledge (Appendix 3).

Demographic Data

The study sample consisted of 27 nurses with a mean age of 27 years. The majority of the samples were females (n = 20, 74%). There were 3 Charge Nurses, 20 Staff Nurses, and 4 Nurse Assistants. All of the participants had more than five (5) years but not more than ten years of experience as ER nurse. The average CPR skills they had performed during real cardiopulmonary arrest cases were five to six times in a year, and those who had a previous BLS course completed within the last six months (n = 15, 55%).

A pre and post-booster training simulation assessment utilized an adopted CPR skills checklist (Appendix 4) according to their availability in the unit. Assessment sessions were delivered to participating staff during the first week of January 2016 before training, and another unscheduled post training evaluation session was conducted four weeks after training. The aim was to assess whether the booster training had delivered an increase in their CPR psychomotor skills.
Pre-test and Post-test Scoring Results

Table 1 illustrates result of the pre-test for the 27 participant, showing the mean pre-test value, and the mean values for each of the ten items of the BIS testing sheet.

<table>
<thead>
<tr>
<th>Item</th>
<th>Mean score</th>
</tr>
</thead>
<tbody>
<tr>
<td>Checks for responsiveness.</td>
<td>1.92</td>
</tr>
<tr>
<td>Scans for breathing not more than 10 seconds</td>
<td>1.59</td>
</tr>
<tr>
<td>Activates Code Blue</td>
<td>1.18</td>
</tr>
<tr>
<td>Checks pulse not more than 10 seconds</td>
<td>1.51</td>
</tr>
<tr>
<td>Bares patient’s chest and starts chest compressions with correct CPR hand position.</td>
<td>1.55</td>
</tr>
<tr>
<td>Notes the compression rate of 100/min. (for 30 compressions at least 18 seconds or less)</td>
<td>1.88</td>
</tr>
<tr>
<td>Allows complete chest recoil after each compression.</td>
<td>1.81</td>
</tr>
<tr>
<td>Notes the compression depth of: (2 inches or 5 cm – for adult; 4 cm – for infant; 5cm – children)</td>
<td>1.62</td>
</tr>
<tr>
<td>Opens the airway and head must be tilt or chin lift maneuver</td>
<td>1.40</td>
</tr>
<tr>
<td>Delivers 2 breaths not more than 2 seconds. (1 breath per second)</td>
<td>1.62</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>16.14</strong></td>
</tr>
</tbody>
</table>

Table 4 Results of the simulation Pre-test: Total and Individual items

Nurses showed overall improvement in skills on the BLS simulation training post-test (Improvement of mean value from 16.14 pre training to mean of 17.85 post training).

<table>
<thead>
<tr>
<th>Item</th>
<th>Mean score</th>
</tr>
</thead>
<tbody>
<tr>
<td>Checks for responsiveness.</td>
<td>2</td>
</tr>
<tr>
<td>Scans for breathing not more than 10 seconds</td>
<td>1.74</td>
</tr>
<tr>
<td>Activates Code Blue</td>
<td>1.48</td>
</tr>
<tr>
<td>Checks pulse not more than 10 seconds</td>
<td>1.59</td>
</tr>
<tr>
<td>Bares patient’s chest and starts chest compressions with correct CPR hand position.</td>
<td>1.85</td>
</tr>
<tr>
<td>Notes the compression rate of 100/min. (for 30 compressions at least 18 seconds or less)</td>
<td>2</td>
</tr>
<tr>
<td>Allows complete chest recoil after each compression.</td>
<td>1.88</td>
</tr>
<tr>
<td>Notes the compression depth of: (2 inches or 5 cm – for adult; 4 cm – for infant; 5cm – children)</td>
<td>1.85</td>
</tr>
<tr>
<td>Opens the airway and head must be tilt or chin lift maneuver</td>
<td>1.62</td>
</tr>
<tr>
<td>Delivers 2 breaths not more than 2 seconds. (1 breath per second)</td>
<td>1.85</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>17.85</strong></td>
</tr>
</tbody>
</table>

Table 5 Results of the simulation Post-test: Total and Individual item
A dependent sample paired t-test indicated that the better mean total scores after the BIS training program had reached a statistically significant difference (P value = .002), which suggested the effectiveness of the BLS simulation program in improving the skills.

Figure 4 shows the pre and post-CPR skills test mean score.

![Pre and post-CPR skills test mean score](image)

Figure 4: Pre and post-CPR skills test mean score

Correlation of nurse characteristics such as age, gender and time interval between latest formal BLS training till pre-training test and their pre-test score of each group were tested. These variables and pretest assessment mean score were examined using independent sample t-test. The results showed that none of the demographic variables were statistically significant as indicated in Table 6.

<table>
<thead>
<tr>
<th>Item</th>
<th>Mean score</th>
<th>P value</th>
<th>Standard Deviation</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Gender</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>- Female</td>
<td>16.1</td>
<td>0.91</td>
<td>1.97</td>
</tr>
<tr>
<td>- Male</td>
<td>16.3</td>
<td></td>
<td>4.27</td>
</tr>
<tr>
<td><strong>Age</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>- &lt; 30 years</td>
<td>15.6</td>
<td>0.45</td>
<td>3.7</td>
</tr>
<tr>
<td>- &gt; 30 years</td>
<td>16.5</td>
<td></td>
<td>1.6</td>
</tr>
<tr>
<td><strong>Time interval since latest BLS</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>- &gt; 6 months</td>
<td>15.5</td>
<td>0.16</td>
<td>3.11</td>
</tr>
<tr>
<td>- &lt; 6 months</td>
<td>16.9</td>
<td></td>
<td>1.78</td>
</tr>
</tbody>
</table>

Table 6: Results of the simulation Pre-test according to Nurses’ characteristics
For post training assessment session, there was no statistical difference between the mean total score and above demographic characteristics as shown in table 4.

<table>
<thead>
<tr>
<th>Item</th>
<th>Mean score</th>
<th>P value</th>
<th>Standard Deviation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gender</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>- Female</td>
<td>17.8</td>
<td>0.52</td>
<td>0.95</td>
</tr>
<tr>
<td>- Male</td>
<td>18.0</td>
<td></td>
<td>0.58</td>
</tr>
<tr>
<td>Age</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>- &lt; 30 years</td>
<td>17.7</td>
<td>0.58</td>
<td>0.78</td>
</tr>
<tr>
<td>- &gt; 30 years</td>
<td>17.9</td>
<td></td>
<td>0.94</td>
</tr>
<tr>
<td>Time interval since latest BLS</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>- &gt; 6 months</td>
<td>17.8</td>
<td>0.92</td>
<td>1.00</td>
</tr>
<tr>
<td>- &lt; 6 months</td>
<td>17.9</td>
<td></td>
<td>0.74</td>
</tr>
</tbody>
</table>

Table 7: Results of the simulation Post-test according to Nurses’ characteristics

Nurses attended previous BLS training courses more than six months before the booster training had a non-significant lower pretest score compared to another group who had BLS less than six months (P = 0.16). However, they showed statistically significant improvement in post–test scores compared to their pretest scores (P = 0.008).

![Pre and Post total average score in nurses had BLS > 6 months](image)

**Fig. 5:** Comparison of pre and post total score in nurses had BLS > 6 months
Further analysis of individual CPR skills revealed significant improvement in the mean score of particular CPR skills items which includes mainly: Depth & rate chest compression.

Figure 6: Comparison of Pre and Post training of mean score of depth of chest compression

Figure 7: Comparison of Pre and Post training of mean score of rate of chest compression
Level three- Behavior

Behavior evaluation is the extent to which the learning is applied back on the job. I was concerned with the sustainability of psychomotor CPR skills for nurses in their daily practice. It was, therefore, imperative to acknowledge the achievement of the change process (Kotter, 1995) also to consider that organization will continue to change; managers must provide clear lines of accountability and responsibility to promote sustainable change (HSE, 2008). Furthermore, according to Bird & Cassell (2013), behavioral evaluation is less easy to quantify; observation and interviews are required on an ongoing basis to reduce a subjective result. Time is a variable to consider, thus the evaluation team should allow sufficient time for behavioral changes to occur. If possible, evaluation should be conducted before and after the training (pre- and post-test). If that is not possible, evaluation should be conducted after the program and different practices in the participant should be observed.

Focus group analysis revealed that nurses became more knowledgeable and more confident in their abilities after practicing CPR techniques in simulations, and that also improved staff comfort with BLS and the decisions to be made in code situations. Resuscitation Committee was regularly reviewing real cardiac arrest records on a regular interval. Arrest cases analyzed in the subsequent two months following training revealed marginal improvement in the performance of Code teams in arrest cases in the Emergency room which could be viewed as a satisfactory ongoing tool for assessment of advancement of nurses' behavior after receiving booster training.
Level Four- Results

Results evaluation is the effect on the organization or environment caused by the improved performance of the trainee. The aim of this level was to measure the quantifiable aspects of organizational performance. An evaluation of "results" is the measurement of the impact of the training on key performance indicators (KPIs) which in this case includes the objective mentioned in Chapter 1. The post-training assessment revealed that these objectives are met. The following graphs showed actual improvement in nurses’ performance regarding the three objectives as following:

First Objective: Improving performance and retention of CPR skills among nurses working in Accident and Emergency physicians by 10 % over two months' time. There was an improvement of total average score post training to 17.85 comparing to 16 pre-training.

Figure 8: Comparison of Pre and Post training of mean score of total basic CPR skills
**Second Objective:** Improve performance of chest compressions regarding rate and depth of chest compression according to latest guidelines by 10% comparing to pre-training over two months' time. There was an improvement of the average score of a composite end point of performing chest compression regarding optimal depth and rate as per the guidelines.

![Optimization of Depth and Rate of Chest Compression](image)

Comparison of average score of depth and rate of chest compression  
*P value = 0.005*

Figure 9: Comparison of Pre and Post mean score of depth & rate of chest compression

**Third Objective:** To improve nurses' skills in assisting ventilation by the proper opening of an airway and giving supplemental breaths as per guidelines by 10% over two months' time. There was improvement of average score of a composite end point of skills of proper opening of the airway and giving two supplemental breaths from 1.51 to 1.74 post training.

Figure 7 shows a comparison of a composite endpoint of the average score of an opening airway and giving supplemental breaths before and after training.
As a change leader, these encouraging results deemed vital in enhancing safety and providing optimal care of the patients. Improving CPR psychomotor skills will further reduce the staff and organizational risk. It will further guarantee nurses’ preparedness in actual CPR scenarios. The sustainable positive impact of repeated refresher CPR training on improving knowledge and skills’ retention will help nurses to implement these skills in order to perform safe and high quality CPR.

**4.3.4 Dissemination plan:** Mean streaming of this project to the entire organization will change the current practice of health care training for maintaining CPR skills and influence best practice. These refresher training sessions will thereby improve nurses’ comfort and confidence in dealing with real cardiopulmonary arrest situations. Besides, these sessions will provide better resuscitation care and improve patients’ survival post cardiac arrest.
4.3.5 Key messages and communication plan:

The principal message to stakeholders will include the favorable impact of the project; this will be conveyed through the positive results in relation to improve retention and better performance of CPR skills by the trained nurses. Various sources of communication will be employed to ensure the transfer of the positive result of the refresher training is effective. Booster BLS training sessions are associated with significant improvement in the performance, confidence and skills of Accident and Emergency nurses in a hospital setting. A large-scale multi-centers study is needed to investigate the influence of such a training program on the overall nurses' BLS skills and performance at different health care systems. Future studies should focus on identifying the optimum time intervals between BLS courses and additional strategies for improving skills' retention.

4.4 Conclusion:

The use of Kirkpatrick's model in objective one ensured all aspects of the educational evaluation were considered. The aim of the evaluation methods employed in this chapter was to assess the effectiveness of the booster training simulation program. Various qualitative and quantitative methods were included to ensure a comprehensive assessment; this involved survey questionnaire, focus group, and Kirkpatrick's model analysis. Obtained data showed that the evaluation results reflect achievement of set objectives. Overall improvement of the average score of CPR psychomotor skills in addition to the enhancement of the quality of chest compression and assisted ventilation highlighted the efficiency of the simulating training session. The subsequent chapter, chapter five will explore the findings and suggest further recommendations.
Chapter 5

Discussion and Conclusion

5.1 Introduction

This chapter will discuss our findings with similar projects in the literature. It will also outline the impact of the change in the organization, the behavior of employees, leadership, and the culture. The strengths and limitations of the project will be discussed. Furthermore, future recommendations will be highlighted. Finally, a conclusion will be offered.

5.2 Discussion

The effectiveness of BLS simulation training as shown in our project is similar to the findings of (Toubasi et. al.2015 & Yeung et. al.2009) who noted an increase in BLS skills after completion of a BLS simulation training program. Debriefing and feedback were given to participating nurses to optimize learning immediately after a pretest assessment and during a scenario-based training session. This immediate debriefing is supported by Li et al. (2011), who stated that feedback and evaluation play important roles in simulation-based medical education. These methods of interactive BLS training are highly relevant for nursing staff with their wide range of learning needs and experiences (Gaberson and Oermann, 2010).

Qualitative assessment of nurses' perception in post training focused group interview revealed that they became more confident in their abilities after practicing CPR techniques in simulations. This observation was concordant with a conclusion made by (Leighton and Scholl, 2009) who stated that simulation improves staff comfort with BLS and facilitates the decisions to be done in code situations.
An important observation in the study is that participants attended previous BLS training courses more than six months before the training showed statistically significant improvement in post-test scores compared to their pretest scores. This finding highlights the fact that retention of skills following BLS training sessions is lost with time and highlights the essential need of suggesting and implementing suitable quality measures such as compulsory BLS renewal policy. This observation was matching with (Woollard et al. 2006) who conducted a study about optimal refresher training intervals for CPR skills and using AED. He stated that refresher classes held more frequently and at shorter intervals increased subjects’ self-assessed confidence. He concluded that in order to limit skill deterioration between classes, refresher training intervals should not exceed seven months.

Many investigators emphasized the importance of repeating the CPR courses at regular intervals to enhance skill and knowledge retention; however, the optimal interval between the courses remained unclear. The American Heart Association recommends renewal of the BLS provider course every two years (Berg et al., 2010). Nevertheless, other investigators had different opinions about the optimal interval between the courses, for example, a study by Villamaria et al. (2008) recommended that CPR refresher courses should be conducted at least every three to six months to prevent skill and knowledge deterioration. Based on the above observation, arranging a bi-annual booster BLS training was raised to the hospital management supported by the results of the booster training and by the above evidence from literature.
5.3 Impact of the Change Project

The assessment of the effectiveness of the project is a multifaceted process. The project positively affected many areas, such as the organization, patients, staff, the leader of the project and, finally, the culture.

5.3.1 Impact on the organization

The project introduced a program of simulation training in the organization to enhance retaining of psychomotor CPR skills in nurses working in the A/E physicians with the intention of streaming of the change to all health care providers in other clinical areas of the institution. Hence, the project initiated in-service training in the organization that acted as a continuous educational program for all employees. Furthermore, simulation training sessions have assisted in meeting the requirements of Joint Commission (2010) that hospitals gather data to measure the performance of potentially high-risk processes: resuscitations and their outcomes.

Health care staff training in a simulated environment allows skill acquisition without compromising patient safety. Moreover, the project will provide data on the efficacy of such simulation sessions on the skills and performance of nurses which will guide the management to update the CPR policy in the organization. Collecting such data will assist the organization to conduct a relevant clinical audit for quality improvement. It will allow the quality department to measure the performance of potentially high-risk processes like cardiopulmonary resuscitations and their outcomes which will have a positive impact on patients' survival. Subsequently, the organization and insurers will gain more trust in and insight into the services provided.
5.3.2 Impact on patients

The potential health outcomes for patients should be one of the primary considerations when designing and implementing change initiatives within health services.

Achieving the goal of improving nurses' skills through positive effects of the BLS simulation training project will improve the quality of patient care. Furthermore, accommodating the adult learners' needs increases the effectiveness of the educational experience, which benefits patients through improved patients' safety. A literature review revealed that increase readiness of nurses to implement their knowledge and skills in performing high-quality CPR for the patients will increase their survival rates post-cardiac arrest.

5.3.3 Impact on nurses’ behavior

It was evident from the qualitative data obtained from focused group analysis post training that the introduction of simulation training sessions has reduced nurses' stress, improved their confidence and provided them with the opportunity to practice infrequently used skills. Moreover, introducing a BLS simulation training project for acute care has added a valuable and admired source of support for emergency nurses, increased comfort for first responders in an emergent situation, and promoted teamwork and more productive group dynamics among all levels of resuscitation' team. Simulation training helped in teaching nurses' critical thinking which is crucial for enriching their knowledge. Also, offering immediate corrective feedback improved and maintained our nurses' CPR skill competence. Constructive feedback also enhanced participants' motivation and self-confidence in their CPR skills.
5.3.4 Impact on change leader

During my journey to lead the change project, I tried to implement a transformational style of leadership through improving communication, addressing the nurses’ needs and keeping the participants motivated throughout the training. Having the theoretical knowledge of leadership styles and skills, allowed me to apply these skills and theories into practice throughout the project. The use of the HSE model had provided me with a framework to be followed through the change process. Also, it supported me to learn strategy and planning techniques. As shown in chapter three, I managed to perform stakeholder analysis, team management, force field analysis and administration and change project implementation skills and reflected on the practice to better manage difficult issues and build leadership traits.

Motivation of the steering team and the involved nurses was crucial to keep them engaged throughout the different stages of the project. Understanding my responsibility to energize and inspire the leading team who will perform the change and improving their readiness to engage in conducting the project and to actively participate in future change projects were quite essential. Improving communication skills and providing an effective communication with the nurses was crucial to the successful change. Many communication methods were tried including survey questionnaire, focused group meetings, mail contacts and frequent visits by all team members to Accident and Emergency Department. Direct face to face meetings with nurses was helpful to know their feedback about each step of the project and to encourage them to explore their feelings. I found that one to one communication is a very successful approach as it establishes respect between the staff and the leading team.
5.4 Strengths and Limitations

The strengths of the project lie mainly in the aim of the project, which was to improve retention of CPR skills in A/E nurses. Although it will require time to prove that better training had enhanced the quality of patient care and subsequent clinical outcome, Nurses’ performance was better in post training evaluation. Also, this project involved all nurses working in Accident and Emergency Department in the planning via the survey questionnaire and the focused group meetings. Such approach motivated them to actively participate in the implementation process and assured their greater commitment to the project. This earlier involvement improved the confidence and morale of the nurses, and built a relationship of trust between them and the leading team of the project. Moreover, a culture of sustainable quality enhancement was initiated in the organization, as the refresher training CPR training program approved by the hospital management to be disseminated to other clinical areas during this year. Finally, the project required minimal resources, and it did not involve equipment or additional staff recruitment.

In contrast, the most significant limitation is our small sample size in compare to samples in the literature reviews but this project was conducted in one department A/E over a short period of time. Also, the study utilized a relatively shorter period of BLS simulation training approach using simplistic manikins, which might not reflect the exact situation in real stressful arrest situations. Another important limitation is our inability to report the long-term skill retention because of the limited duration of the project. This time limitation restricted our ability to precisely figure out the required change. Lastly, the busy environment in the Accident and Emergency Department, the high work load and time inadequacy of the staff added logistic difficulties during implementation.
5.5 Recommendations for Future Improvement:

The project was an initiating step in the process of quality improvement. Important applications of the present project include improving BLS skills for nurses, which may improve the quality of patient care. Furthermore, nursing academics, policy makers, educators, and researchers can facilitate the integration and implementation of BLS simulation training programs that are expected to enhance the technical capabilities and CPR skills of nurses working in various healthcare sectors. The project needs to be spread among other different clinical areas in the organizations. Finally, an ongoing audit and evaluation should continue to determine the resuscitation competencies of the health care professionals, to assess the time required between the refresher training course and to determine if improvements in confidence have been sustained after training.

5.5 Conclusion

The change project aimed to improve retention of CPR psychomotor skills for nurses working in Accident and Emergency Department in a teaching, tertiary care hospital through the introduction of booster CPR simulation training. Additionally, the effect of simulation training on the improvement of both depth and rate of chest compression and CPR skills of assisted ventilation were evaluated. This project followed HSE change model to initiate, plan, implement and mainstream the change process. The effectiveness of CPR simulation training was shown in the project by significant improvement in the post-test scores compared with the pre-test scores of our nurses' performance. The implementation of the booster CPR training has resulted in general comprehension and awareness of the necessity of incorporating a BLS simulation training program to improve nurses' skills in BLS in different clinical areas of health care facilities.
References


Lewin, K. (1951). Field theory in social science: selected theoretical papers (Edited by Dorwin Cartwright.).


Appendix 1: Change Implementation Project Grant Chart

Gantt Model for Proposed Research:

<table>
<thead>
<tr>
<th>Project Step</th>
<th>Sept</th>
<th>October</th>
<th>November</th>
<th>December</th>
<th>January</th>
<th>February</th>
<th>March</th>
<th>April</th>
<th>May</th>
</tr>
</thead>
<tbody>
<tr>
<td>Proposal</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ethical approval</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Questionnaire &amp; Baseline</td>
<td>tan</td>
<td></td>
<td></td>
<td></td>
<td>tan</td>
<td></td>
<td>tan</td>
<td></td>
<td></td>
</tr>
<tr>
<td>CPR Evaluation</td>
<td></td>
<td>tan</td>
<td></td>
<td></td>
<td>tan</td>
<td></td>
<td>tan</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Implementation</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Booster training sessions</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Post training Evaluation</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Analysis</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Writing Thesis</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>blue</td>
<td>red</td>
</tr>
<tr>
<td>Submission</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>blue</td>
<td>red</td>
<td></td>
</tr>
</tbody>
</table>

Figure 1.2. Gantt Model for Proposed Research
Appendix 2: Pre – Training Informed Consent and Questionnaire

**Nursing-Education Department**

**On-site CPR skills retention training sessions**

Informed consent

Dear ____________,

Please complete the form as above and provide us with some demographic information such as age, gender or other attributes important for correlation for individual & focus group findings.

Signature of witness training
Date & time

Signature of staff in

**Questionnaire Survey**

Participants to complete the following questionnaire.

**Demographic information**

<table>
<thead>
<tr>
<th>Name:</th>
<th>Age:</th>
<th>Gender:</th>
<th>Position:</th>
</tr>
</thead>
</table>

1- Number of CPR training courses before attending this training/activity (2011-2015) (years)____, ____ , ____ , ____

2- Number of CPR procedures you have performed on job/real resuscitation attempts in Emergency department: Average per shift:____
Average per month ____
Average per year ____

3- What are the regular physical activities performed at least 30 minutes per day at least three times per week.

________________________________________________________________________________________________________________________________________
4- Rate degree of fatigue on a scale from 1 (no fatigue) to 10 (extreme fatigue) using VAS questionnaire immediately after each compression session.

5- The most appropriate rate of CPR for an adult (chest compression: breaths) is:
   A 5:2  B 10:2  C-15:2  D-30:2

6- Check pulse for no more than
   A 10 seconds  B 5 seconds  C 15 seconds

7- Which maneuver can be used to open the airway?
   A Sweep finger in mouth  B head tilt-chin lift  C chin tilt-head lift

8- If no pulse is present, the next appropriate step is to
   A begin chest compression  B ask for help  C administer 2 breaths

9- If pulse is present, the next appropriate step is to
   A administer rescue breath  B begin chest compressions  C no intervention required

10- Would you feel confident initiating BLS?
    A yes  B No  C do not know

Approved:

Noted:
Appendix 3: CPR Skills Testing Checklist

CPR SKILLS TESTING CHECKLIST 1 – RESCUE ADULT CPR

Name: ________________________________  Test Date: ________________

Score Indication:
0 = Not Performed
1 = Incorrectly Performed
2 = Correctly Performed

<table>
<thead>
<tr>
<th>Clinical Performance Steps</th>
<th>0</th>
<th>1</th>
<th>2</th>
</tr>
</thead>
<tbody>
<tr>
<td>1  Checks for responsiveness.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2  Scans for breathing not more than 10 seconds.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3  Activates Code Blue.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4  Checks pulse not more than 10 seconds.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5  Bares patient’s chest and starts chest compressions with correct CPR hand position.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6  Notes the compression rate of 100/min. (for 30 compressions at least 18 seconds or less)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>7  Allows complete chest recoil after each compression without taking hands off the chest between compressions.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>8  Notes the compression depth of: 2 inches or 5 cm – for adult; 4 cm – for infant; 5 cm – children</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>9  Opens the airway and head must be tilt or chin lift manuver – placing one hand on the patient’s forehead and apply firm backward pressure with the palm to tilt the head back.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>10 Delivers 2 breaths not more than 2 seconds.</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Instructor signature: ________________________________________________

Date: ______________________________________________________________
Appendix 4: Guiding Questions for Focused Group Discussion

FOCUSED GROUP QUESTIONS

1. What are the most challenging skills have you encountered in conducting the CPR?

2. How confident are you to confirm an arrest? What confirmation is required and what is the correct practice?

3. What are the difficulties you have encountered in conducting high quality CPR? Do you feel that you need continuous training?

4. What are the differences between adult/pediatric resuscitation skills?

5. What is your perception towards the effectiveness of a team approach? What is your view about team work in performing CPR?
Appendix 5: Pre-Training CPR Skills Check and Debriefing
Appendix 6: Simulation CPR Training Session
The introduction of Booster Cardio Pulmonary Resuscitation Training for Nurses Working in the Accident and Emergency Department

Student ID: 14139308
MSc Leadership in Health Professional Education

Introduction & Background
Cardiopulmonary resuscitation (CPR) is a lifesaving intervention and the cornerstone of resuscitation from cardiac arrest. As nurses are usually the first professional persons to provide basic life support (BLS) during emergency situations, they should maintain the knowledge and skills to be able to perform CPR efficiently and thus to save lives. Retention and maintenance of the learned CPR skills are challenges, even for critical care unit nurses, including junior and senior staff. Therefore, the need for frequent real scenario training has arisen as a means to maintain staff competency.

Aim and Objective
Aim: To introduce Booster CPR Training for nurses working in Accident and Emergency (A & E) Department in simulated situations.
Objective: To improve retention of CPR skills in BLS-certified nurses working in (A & E) department.

Methods
HSE change model was followed because it is developed by medical institute, being flexible and places a strong focus on the people aspects of change such as teamwork, communication, participation and cultural change.

The initiation stage starts by building the case for change based on data obtained from Stakeholder Analysis, SWOT Analysis, and Force Field Analysis.
Planning:
- First building commitment by sharing the aim & objectives with the Stakeholders for getting support
- Second determining the details of change by addressing current needs through a survey questionnaire and focused group with A/E nurses.
- Third developing details of training plan: An adopted CPR skills checklist was utilized in the pretest, to be followed by simulating CPR training and posttest skills check
Implementation:
A simulated pre-test was conducted to assess psychomotor skills. After debriefing, an interactive two hours training was given. The unscheduled post-training test was performed four weeks following the training.

Evaluation
Kirkpatrick's model was used to evaluate the training. Twenty-seven nurses working in A/E department were included. The effectiveness of CPR training was shown in the project by an overall improvement in CPR skills and BLS scores post training.

Moreover, there was an improvement in individual CPR skills like optimizing the rate and depth of chest compression.

Figure 3: Comparison of average score of depth and rate of chest compression

Organisational Impact
- Refresher CPR training enhanced retention of skills, ensured safety and augment optimum patient's care
- Improvement of patients' survival and reduction of organizational risk.
- The project will be disseminated to the entire organization in 2016/2017.
- The project helps in establishing a continuous quality improvement of culture in the organization.

Conclusion
BLS simulation training sessions are associated with clear improvement in skills and performance among nurses working in A/E. Refreshment BLS training session for nurses is highly recommended to guarantee nurses' readiness in real CPR cases for improving patients’ outcome.

References