

## **Strengthening of Knowledge and Skills on Patient Safety of Nursing Officers' in a Teaching Hospital in Sri-Lanka**

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### **Abstract**

*The purpose of this study is to strengthen knowledge and skills on patient safety of Nursing Officers' in a Teaching Hospital as they are in direct contact with patients throughout the day. The study was carried out in Colombo South Teaching Hospital in three phases. In the first phase (pre-intervention), the existing/baselines knowledge and skills were assessed, training need was analyzed and designed and the training module was developed. In the second phase (intervention), a training course was designed and implemented. In the third phase (post-intervention), the change of knowledge and skills and the feedback assessment was carried out in order to find out whether any adjustments are necessary for the designed module were done. The Analysis, Design, Development, Implementation and Evaluation (ADDIE) model was used as the tool in this regard. The information gathered was incorporated in to the training programme with the guidance and direction of a working committee comprising experts. Self-Administered Questionnaire (SAQ) and Objective Structured Clinical Examination (OSCE) were used to assess the knowledge and skills respectively, during both pre and post interventions. The Nursing Officers in surgical and surgical related wards, performing 24 hours duty/ shift basis are considered as the total population. A convenient sample of 50 Nursing Officers was recruited for the study considering the number of Nursing Officers working in each ward, in order to minimize service interruptions in the ward. The results of pre-intervention were considered as the baselines of knowledge and skills. In the first phase the training need was assessed, and the blue print of the course was designed. At the end of second phase the training programmes was successfully conducted to the target group. During post intervention phase, the improvement in knowledge and skills were assessed. There were significant improvements in knowledge, in "ward environment and systems safety", "adverse events and near misses", "medication safety and "communication". There were significant improvements in skills in "risk and prevention", "adverse events and near misses", "infection control", "medication safety" and certain aspects of "communication" such as "receipt calls "and "admission". This project revealed that this training course is very much effective in strengthening knowledge and skills on patient safety of Nursing Officers.*

**Keywords:** Patient safety, Nursing Officers, Training, ADDIE model

## Introduction

Patient-safety is defined as actions undertaken, by individuals and organizations to protect health care recipients from being harmed by the effects of healthcare-services” (Spath, 2009). In health sector, chances of being harmed are one in 300 whilst the risk run by a traveler in an aircraft is one in 1,000,000, indicates that a patient is at a great risk when he/she gains admission to a hospital (WHO, 2004). In 1999, “Institute-of-Medicine” report indicated an occurrence of 44,000 to 98,000 deaths/annually in hospitals/United States of America, due to preventable Medical-Errors (MEs) (Makary, 2016).

It was also revealed that 2.5% (Thomas, et al., 2000) to 3.7% (Brennan, et al., 1991),10.8% (Vincent, 2001) and 16.6% (Wilson, *et al.*, 1995) were affected by preventable AEs in USA, United Kingdom (UK) and Australia respectively. In a Teaching Hospital in Canada 64 patients out of randomly selected 502 adults were affected by adverse events over a period of one year, and most of the preventable adverse events were due to drug treatment, operative complications or nosocomial infections (Alan, et al., 2004). National Hospital Service revealed that less than 20% of preventable adverse events, were directly related to surgical operations/procedures and less than 10% to misdiagnoses (Neale, *et al.*, 2001). Though, majority of Medical Errors cause no serious harm, those which do, lead to serious harm, putting patients and the provider into an unnecessary expense, revealing that two out of every 100 admissions are affected by preventable adverse drug events, costing the hospital \$4700 per admission (David, et al., 1998).

Health Care Professionals (HCPs) from varied categories, are involved in treatment of patients (MoH, 2013). They differed in their approach with adverse consequences during patient care, inclusive of handing-over, care of a patient (Elaine, *et al.*, 2008). The book “To Err is Human” highlights, that patients are not always safe in the health care setting and “First do no harm” is the basic principle that has to be followed by all HCPs (IOM, 1999). A study on “certified-nursing-assistants” perceptions of “nursing-homes-safety-culture” shows that a relationship exists between “patient-safety-culture” and clinical-outcomes (Bonner, et al, 2009). Therefore, HCPs should have knowledge of “safety-culture” and “system-vulnerabilities” in order to achieve safer care for patients.

Joint Commission International (JCI) has introduced a very high rigorous standard in HCS, with a view to transforming health care in to a high reliability industry. It has set forth six goals i.e. International Patient Safety Goals (IPSG) found to be most problematic frequently occurring in HCIs. They are identifying patients correctly, improving effective communication, improving safety of High-Alert Medications (HAM), ensuring correct-site, and correct-procedure, correct-patient surgery, reducing risk of Health Care-Associated Infections (HCAIs) and reducing risk of patient harm resulting from falls (JCI, 2016).

It is now time to transform the existing traditional Organization Culture to promote safer patient care culture. Prior to this, HCPs must be made more knowledgeable as to what Patient Safety means, to maintain safe ward environment, systems, risk and prevention, adverse events and near misses, medication safety, infection control and communication aspects, which are also identified as the important areas in the “typical assessment formats on Patient Safety, in World Health Organization (WHO) PS curriculum guide, multi-professional edition”. The skills too need to be strengthened related to these aspects in order to have a better clinical outcome (WHO, 2011). To build a “safety-culture”, HCPs should realize the importance of “incident-reporting”, importance of “learning-culture” and “no-blame-culture” (Hoffmann & Rohe, 2010). Since patient-safety is not in curriculum-of-basic-training/Nursing Officers

(NOs), a necessity for NOs who are currently employed to be provided in-service-training to improve “knowledge-and-skills” on “patient-safety”. This would lessen the occurrence of “adverse-events” and improve overall effectiveness of healthcare delivery and its outcome.

Presently training on “patient-safety” is based on ad hoc training-programmes, leading to inordinate expenditure, time and wastage of resources with no benefits to patient. The purpose of this study is to strengthen “knowledge-and-skills” on “patient-safety” of NOs by developing a “training-module” based on a Training Needs Analysis (TNA).

If HCPs are poorly versed in safety-practices the patients are in danger. It is mostly, NOs, who are in direct contact with patients throughout the day, they should have sufficient “knowledge-and-skills” to maintain patient-safety in the ward. Currently in most healthcare institutions, number of NOs available is far below the required number, with extended work-shifts. When work-shifts were longer than 12 hours/40 hours per week at a stretch, the risk of Medical Errors would be significantly high (Oldsa, et al; 2010).

Continous Medical Education (CME) refers to a specific form of continuing education for HCPs to maintain competence and learn about new and developing areas of their field. (Armstrong, 2010). In a study reveals that the education and training have helped to increase the awareness on PS (Blake, *et al.*, 2006). In-service-training of HCPs should be done in a planned manner on a regular basis. A preparation of a training-module prior to training is the best way to get the optimum benefits. In this study “ADDIE/Analysis-Design-Development-Implementation-Evaluation” model was adopted (Dick, et al; 2005). “The ADDIE model is an approach used by instructional designers and content developers to create instructional course materials”. The flexibility is the advantage of the model. In ADDIE, each step has an outcome that feeds into the subsequent step until the Training Module is designed (Dick, *et al.*, 2005).

OSCE (Objective Structured Clinical Examination) is a versatile and multipurpose evaluation tool which has as its purpose, assessment of knowledge of HCPs, their competency based on direct observation and objective testing. This would facilitate uniform testing of students with a wide range of clinical skills (Zayyan, 2011).

## **Research Problem**

Maintaining Patient Safety is a critical issue encountered in the Sri-Lankan health care system. Nursing Officers are indispensable in providing safe patient care. The inadequacy of required “knowledge-and-skills” to maintain appropriate standards on Patient Safety while performing activities in the ward is an issue in most of the healthcare institutions in Sri-Lanka.

## **Research Objectives**

The main objective of the study is to understand the knowledge and skills on Patient Safety of Nursing Officers in a Teaching Hospital.

The Specific objectives of the study are:

1. To assess the existing “knowledge-and-skills” on “patient-safety” among Nursing Officers (NOs) in a teaching-hospital
2. To analyse the training needs on “patient-safety” of Nursing Officers in a teaching-hospital

3. To develop a “training-module” on “patient-safety” for Nursing Officers
4. To implement a “training-programme” on “patient-safety” to Nursing Officers in a teaching-hospital
5. To assess the effectiveness of the training-programme

## **Methodology**

The study setting was a teaching-hospital/tertiary-care-hospital/Sri-Lanka with 1092 beds. Hospital offers specialty-and-subspecialty services. Health workforce is 2000. The average number of NOs in each ward is 8-18. Although, cadre required is 1100 NOs, the number available is only 710 (CSTH, 2014).

An interventional study carried out in three phases, using modified version of ADDIE model i.e. TNA, design and development of training-module, implementation and evaluation was applied. An Expert-Working-Committee was appointed to advise Principal Investigator, to finalize information gathered during each step of ADDIE-model.

### **Phase One -*Assessing existing knowledge-and-skills/patient-safety among NOs***

A convenient sample of 50 NOs selected to assess (baselines/existing) “knowledge-and-skills/patient-safety”, of the study population of 200. This is the total number of NOs working in 13 surgical/surgical-related-wards/CSTH performing 24hour duty/ shift basis. SAQ was prepared with “Multiple-Choice-Questions” to assess knowledge of NOs based on thematic-areas in “typical-assessment-formats on “patient-safety”, in WHO patient-safety-curriculum-guide, multi-professional-edition”. They are,

1. Ward-environment-and-systems-safety
2. Risk-and-prevention
3. Adverse-Event-and-Near-Misses
4. Infection-control
5. Medication-safety
6. Communication

During the preparation referred to International-Patient-Safety-Goals (IPSG), Joint-Commission-International accreditation standards and World-Health-Organization (WHO) standards and adapted same to the local setting and finalized. The number of questions prepared for each thematic-area was based on the premise, that the said number of questions covered the entire area concern.

To assess skills considering limited time an Objective-Structured-Clinical-Examination (OSCE)/scenario-building-stations was conducted. OSCE consisted 10 main questions based on thematic-areas. They were also focused on common incidents occurring in wards which were also considered in IPSG. The observation-checklist was drafted for each station based on standards adaptable to local setting, having considered the “nurses’-procedure-manual” and JCI-accredited Lanka/Hospitals guidelines etc. This was presented in consultative meetings and finalized. The stations were set up using role players and doctors were appointed to assess skills based on “observation-checklist”. It included all important steps and each step carried equal marks.

When assessing skills, a person is considered as possessing skills only if all the steps had been correctly achieved and a percentage analysis was taken. Accordingly, to assess ward-environment-and-systems-safety (one Scenario-Building-Station), risk-and-prevention/one

Scenario-Building-Station, adverse events and near misses/one Scenario-Building-Station, infection-control/one Scenario-Building-Station, medication-safety/two Scenario-Building-Station and communication/four Scenario-Building-Station were arranged. Finally, knowledge-and-skills based on six main areas were analyzed.

Group Discussions and Key-Informant-Interviews were carried out with randomly selected nursing-sister/in-charge and those non-participants at CSTH respectively. The information was collected during Group Discussions and Key-Informant-Interviews based on six thematic-areas. A literature search and secondary data was reviewed such as fall-register, incidents-reporting books, blood reactions register, patient complaint books, litigations in order to gather information for TNA. The information was presented at a consultative meeting to obtain their observations for TNA and was made in a form of summary and was used in preparing training-module on “patient-safety”.

### ***Designing and developing of training-module/patient-safety” for NOs***

The steps taken were as follows.

1. Broader outcomes and within each outcome a few competencies were identified based on TNA
2. Based on identified competencies relevant content area was identified. Though in certain areas performances were good Expert Working Committee unanimously decided to include all six areas as the course-content, as in almost all areas there was a need to improve skills.
3. Identified teaching-learning-methods and time-duration was identified i.e. Demonstrations, simulator-training-session, practical-sessions and a discussion were held after each lecture to clarify doubts related to “patient-safety”. The course duration (13-hours), course-structure, time-schedules, resource-persons, facilities and venue were finalized.
4. The most appropriate method to assess students was identified.
5. “Blueprint-of-course” summarizing all the information was designed.

### **Phase Two - Intervention**

Training-programme was arranged for the same group of NOs/47, participated in pre-intervention.

### **Phase Three (Post intervention)- *Assessment of change of “knowledge-and-skills”/patient-safety” of NOs***

The same group was assessed after a comprehensive training-programme to measure changes in “knowledge-and-skills/patient-safety” using Self-Administered Questionnaire (SAQ) (to-assess-knowledge/patient-safety) and OSCE (to-assess-skills/patient-safety), both of which were used during pre-intervention. In SAQ, right answer and wrong answer were given one and zero respectively. Both SAQ and OSCE were analyzed using SPSS, based on six thematic-areas. Pre-and-post-intervention results were compared using “Student T test” to see any improvement in “knowledge-and-skills/patient-safety” after training-programme.

## ***Feedback assessment of course to assess effectiveness of training-programme***

A Semi-Structured-Questionnaire (SSQ) was administered to randomly selected 15 NOs, for feedback on overall performance of training-programme, resource-person's competency, training-methods-and-material, content of training-module, time-duration and willingness to share knowledge. Ethical clearance was obtained from University of Colombo, Sri-Lanka.

### **Findings and Results**

This project was carried out in three phases to strengthen knowledge and skills on patient safety of NOs/CSTH. The ADDIE model was used as the tool in this regard. During pre-intervention existing knowledge and skills were assessed, TNA was identified and a Training Module was designed and developed. During intervention phase designed course was implemented and during post-intervention improvement of knowledge and skills on patient safety was assessed.

#### **Pre-intervention results**

There were 47 participants out of 50 NOs.

#### ***Training Need Analysis***

The information gathered through all the tools and techniques was summarized to analyse the TNA.

#### ***Assessing baseline knowledge and skills***

Baseline knowledge, NOs possess prior to intervention was identified using a SAQ and skills through OSCE.

**Table 1:** Baselines Knowledge/Skills Possess by Nursing Officers on Patient Safety during Pre-assessment (n=47)

<b>Areas based on the WHO patient safety guide</b>	<b>Mean</b>	<b>Percentage (%)</b>	<b>Standard deviation</b>
<b>Baseline knowledge</b>			
Ward environment and systems safety (Q=9)	6.383	70.9%	1.622
Risk and prevention(Q=8)	6.766	84.6%	1.447
Adverse events and near misses(Q=5)	3.276	65.5%	1.447
Infection control(Q=4)	3.383	84.56%	1.015
Medication safety(Q=6)	4.404	73.4%	1.154
Communication(Q=7)	5.319	76.0%	1.708

<b>Baseline skills</b>			
Ward environment and systems safety (SBS-1)	3.489	58.15%	1.613
Risk and prevention (SBS-1)	4.000	57.14%	1.888
Adverse events and near misses (SBS-1)	0.127	6.35%	0.396
Infection control (SBS-1)	5.851	83.59%	1.933
Medication safety (Total SBS-2)	3.957	49.46%	1.864
Correctly identifying drugs(SBS-1)	0.872	43.60%	0.612
CPR(SBS-1)	3.085	51.42%	1.599
Communication (Total SBS-4)	9.617	60.11%	3.417
Receipt of calls(SBS-1)	0.255	12.75%	0.530
Handing over taking over(SBS-1)	1.638	54.6%	0.818
Admission(SBS-1)	2.148	53.7%	1.122
Discharge(SBS-1)	5.574	79.62	1.964

Q=No of questions in each thematic area SBS=No of Scenario Building Stations

Table 1, (sub title knowledge) shows, majority, 84.56% (mean 3.38, SD=1.01) and 84.60% (mean 6.77, SD=1.45) had satisfactory knowledge on infection control and risk and prevention respectively. Data revealed that more than 65% have answered correctly in all the thematic areas out of which lowest percentage 65.5% (3.28, SD=1.45) was answered in respect to questions relating to adverse events and near misses.

Table 1, (subtitle skill) summarizes that 83.59% (mean 5.85, SD=1.93) NOs performed very good skills in infection control. There was only a very minimum percentage of NOs i.e. 6.35% (mean 0.12, SD 0.39), who had good skills with regard to adverse events and near misses. There were 49.46%, 57.14% and 58.15% NOs have correctly performed the skills on areas such as medication, risk and prevention and ward environment and systems safety respectively.

Table 1, under medication safety, the percentage of NOs, skills in two sub areas “identification of High Alert Medications (HAM) and its storage” and “to assess Cardio Pulmonary Resuscitation (CPR)” were 43.6% and 51.4% respectively. The results obtained in the pre-intervention are summarized below.

**Figure 1:** Comparison of Baselines/Knowledge and Skills during Pre Intervention Assessment as a Percentage

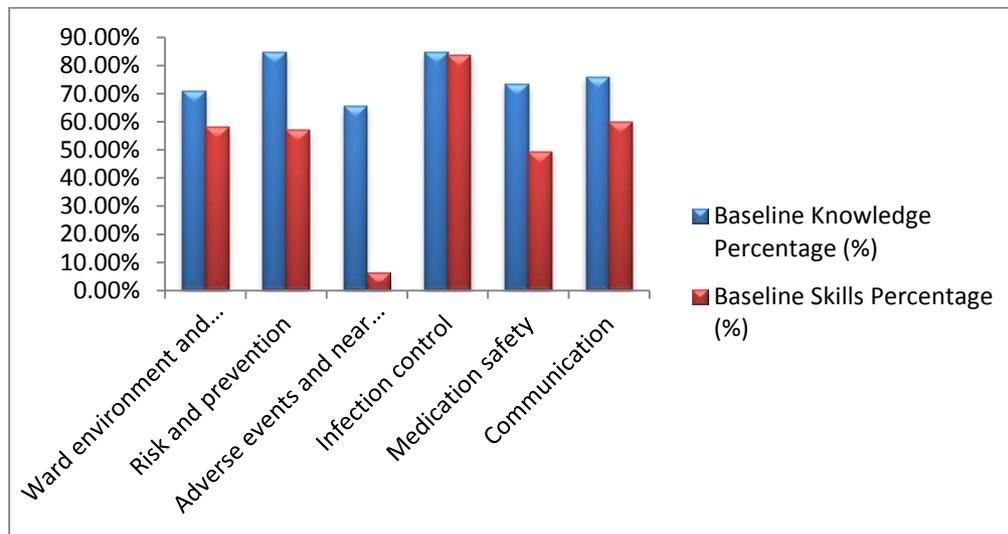


Figure 1, shows that when knowledge and skills are compared, the total number of NOs performing right skill is always lower than knowledge, especially skills performance of adverse events and near misses is very low. However, except in infection control there was a wide difference in all the other areas.

### *Design and development of the training module*

As described in methodology, five steps were followed in designing the course module. At the end of designing and development phase the blue print of the course was designed.

### **Intervention**

Based on the blueprint, Training Programme was conducted as per the time schedule.

### **Post intervention results**

During this phase, quantitative assessment was done to assess the improvement of knowledge and skills and feedback was obtained in order to assess the effectiveness of Training Programme.

### *Quantitative assessment to assess the improvement of knowledge and skills*

Table 2 indicates, that there is a significant improvement in areas of knowledge such as ward environment and systems safety (P=0.000), adverse events and near misses (P=0.000), medication safety (P=0.000) and communication safety (P=0.021). There was no significant improvement in areas related to knowledge in risk and prevention and infection control. There is a significant improvement in areas in skills such as risk and prevention (P=0.001), AE and NM (P=0.001) and infection control (P=0.024). Also skills related to overall medication safety have been significantly improved (P=0.000) which included identifying drugs correctly (P=0.000) and CPR (P=0.000).

**Table 2:** Change of Knowledge and Skills of Nursing Officers on Patient Safety after Implementation of Training Programme; Pre and Post Assessments Comparison (n=47)

Areas based on the WHO patient safety guide	Mean		Significance
	Pre	Post	
<b>Change of Knowledge</b>			
Ward environment and systems safety	6.383	8.021	0.000*
Risk and prevention	6.766	7.212	0.134
Adverse events and near misses	3.276	4.638	0.000*
Infection control	3.383	3.723	0.066
Medication safety	4.404	5.489	0.000*
Communication	5.319	6.148	0.021*
<b>Change of Skills</b>			
Ward environment and systems safety	3.489	3.638	0.164
Risk and prevention	4.000	4.659	0.001*
Adverse events and near misses	0.1277	0.4681	0.001*
Infection control	5.851	5.957	0.024*
Medication safety	3.957	5.212	0.000*
Correctly identifying drugs	0.872	1.212	0.000*
CPR	3.085	4.000	0.000*
Communication	9.617	9.978	0.166
Receipt of calls	0.255	0.595	0.003*
Handing over taking over	1.638	1.659	0.767
Admission	2.148	2.404	0.044*
Discharge	5.574	5.319	0.090

\*Significant at 0.05 confidence interval.

Though there is no significant improvement in overall communication skill, and there is a significant improvement in “receipt of calls” (P=0.003) and “admissions” (P=0.044). However, there is no significant improvement in “handing over taking over” and “discharge”.

### ***Feedback assessment using a semi structured questionnaire (SSQ)***

The results of the feedback obtained from randomly selected 15 NOs who participated in the Training Programme are given below. Except for two, the rest were fully satisfied with the overall performance of the course. Ten out of the fifteen participants commented that the resource person who delivered the lecture/practical on medication safety attached to private sector were not aware of procedures and other things in government healthcare institutions. Participants commented positively about the resource person who presented communication lecture/practical but requested extra practical sessions on communication and CPR. All the respondents were highly satisfied with “CPR” and “hand washing” demonstrations. All of them unanimously said that the content met their expectations and they would share knowledge and skills with others in the ward. And they never indicated that this training programme was a waste of time.

### **Discussion**

In spite of realizing the importance and taking steps for improvement of Patient Safety in Sri-Lanka, the system still needs further improvements as it is felt that the patients are not always safe in healthcare setting (IOM, 1999). In order to create a Safety Culture, HCPs require strengthening and updating their knowledge and skills on patient safety. Education and training play a major role in this regard (Rajhkumar, 2012). The strategy of this project was to introduce

it as an in-service Training Programme. NOs were selected as they are the persons who are directly in contact with patients most of the time.

The objectives of the project were to undertake training needs assessment regarding knowledge and skills on patient safety of NOs, develop a Training Module, conduct an in-service Training Programme for NOs and assess effectiveness of the programme. The 47 NOs participated in the study, and three could not participate as they were unable to adjust duties due to the limited number available in the ward and the busy work shift and inability to find time for updating their knowledge and skills. Unlike in Sri-Lanka in Australia opportunity is provided HCPs to follow training for a few hours every week, as Continuous Professional Development/CPD which is mandatory for registered nurses (20 CPD hours) to maintain registration (AHPRA, 2016).

### *Assessing existing/baselines knowledge and skills on patient safety among Nursing Officers*

Figure 1, shows baseline/skills were always lower than the baseline/knowledge. The reason may be during most of Training Programmes, what was taught may have been only theory and no simulator training or practical sessions had not been conducted. Those with a good knowledge are not found to be equally skilled. Therefore, practical sessions, and simulator training programmes were included as training methods in addition to lecture discussions.

The information gathered through various tools and techniques were analyzed and summarized under the six main themes. It was also found that the WHO curriculum guide could be made use of for the purpose of identifying knowledge and skills with regard Patient Safety in Csth. Therefore, to design the module, the six areas were considered as the broad outcomes expected in the Training Programme. Finally, under each broad outcome the training need was summarized.

### *Designing and developing of training module on Patient Safety for Nursing Officers*

Based on the findings and outcome of the TNA with the advice from experts and trainers, the blue print for the Training Programme was designed. This was forwarded to the Expert Working Committee and finalized. This kind of preparation of training modules and utilizing them for continuous training of HCPs is very important to maintain competence by improving knowledge and skills (Armstrong, 2010).

### *Assessment of change of knowledge and skills on patient safety of Nursing Officers*

The willingness of NOs towards organizational learning, continuous improvement and how their knowledge has improved with training was discussed (Amarapathy et al., 2013). This project too has revealed the very same fact that **knowledge**/work environment and systems safety have been further strengthened after the Training Programme, which is obvious from the significant difference between pre and post interventions ( $P= 0.00$ , Table 2).

As in Table 2, there is no significant improvement in **skills**/ work environment and systems safety.  $P=0.164$ . This may be due to the fact that ward environment in the hospital setting had not been arranged in a manner which is very safe to the patient and the non-availability of checklists in certain wards. A study done in four university hospitals revealed that introduction of checklists increases the operation room teams' awareness of patient related issues, procedures, expected risks, team work and prevention of failure (Takala, et al., 2011). In this study it was found that though the checklists were introduced by the government, the

same were not in use in some wards, resulting in the NOs not following the standards set by the checklist.

Though a high percentage of NOs have answered correctly during baseline assessment on knowledge/risk and prevention, there was no significant difference after the Training Programme (Table 2). The reason for this is on account of the fact that the number of NOs who performed was also equally high both in pre and post intervention i.e. though the increase of percentage is noticeable, it is not a significant increase. However, there was a significant increase of the number of NOs who performed skills/risk and prevention correctly and this was noticeable after the Training Programme ( $P=0.001$ ) (Table 2). Improvement would have been due to implementation of Training Programme, inclusive of simulation training sessions. Simulation is a very important aspect in every form of Training Programmes especially creating and maintaining Safety Culture (Gaba, 2004).

With the Training Programme there was a significant improvement of the number of NOs who had acquired a good knowledge/ an adverse events and near misses ( $P=0.000$ ) and skills/ an adverse events and near misses inclusive of theory and practice there has been a significant improvement ( $P=0.001$ ) (Table2) in fall risk assessment too. The reason would be non-introduction of falls risk assessment formats, NOs being not aware and had never been taught about interventions to be taken for each risk category (low risk/moderate risk/high risk).

After Training Programme, in knowledge/infection control though no significant improvement ( $P=0.006$ ) was noticeable, initial number of NOs who correctly answered the questions is indicative of a good percentage. After Training Programme there was a significant improvement in skills/infection control which may be due to the individual practical session conducted by Senior Registrar Microbiology. **A study revealed that hand washing compliance which is of paramount importance in infection control varies from person to person, and occasional educational interventions have a very short-term influence on hand washing behaviour. Hand washing compliance can be improved through** multifaceted approaches which include combination of lectures/ feedback on performance and education/written material can even reduce the HCAs (Naikoba & Hayward, 2001).

A significant improvement could be seen in knowledge and skills/medication safety ( $P=0.000$ ) after Training Programme. This shows the importance of conducting awareness or learning programmes by competent trainers. Comparison of normal educational lectures and simulation-based training revealed that remarkable improvements could be achieved i.e. reduction of medication administration errors through simulator training (Ford, *et al.*, 2010). The trainer was a full-fledged clinical pharmacist in the private sector, in JCI accredited Lanka/Hospitals and has a good capacity to train on medication safety. However, in the feedback assessment it was revealed that though she is a full-fledged clinical pharmacist in the private sector she was unaware of certain areas which are found in the government sector.

In order to handle a cardiac arrest in the ward NOs should be competent enough to meet the emergency. Therefore, a Senior Registrar Anaesthesiology and a Consultant Anaesthetist who covered theory/practical session/CPR conducted a good training session. In a study it was found that repetitive periodic CPR training courses are a dire necessity to make the NOs competent, knowledgeable and confident in meeting an emergency (Nori, *et al.*, 2012)

As in Table 2, with Training Programme there is a significant improvement in knowledge/communication ( $P=0.021$ ). After the Training Programme, number of NOs that have performed (skills/communication) in “receipt calls” and “admissions” skills have significantly improved  $P=0.003$  and  $P= 0.044$  respectively. The reason for poor performance in

the past was because the right method was not known by the group. When assessed skills on “handing over taking over” and “discharge” 54.6% and 79.62% have performed there was no significant improvement after the Training Programme, due to the reason that though handing over takes place, it has not been done in the right manner. More practical sessions in communication would be required because individual attention was lacking unlike in CPR or infection control where individuals from each group was taken for this purpose further supported by the feedback assessment. Although there is a checklist available for admission there are no checklists available for discharge, which is indicative that this culture is not very well established in CSTH. This type of Training Programmes would not be adequate and in addition frequent demonstrations would be very necessary.

However, comparing both pre/post assessments it was revealed that Training Module was highly effective as in most areas there were significant improvements after Training Programme, in knowledge related to ward environment and systems safety, medication safety, adverse events and near misses and communication (Table 2). Also after Training Programme there was a significant improvement in skills on risk and prevention, adverse events and near misses, medication safety, infection control. This shows that the Training Programme was very effective in that knowledge and skills of NOs have tremendously improved. These findings are further strengthened by NOs statement saying that the overall performance of the course was good. This is further proven by the study done to assess the factors affecting patient safety culture in tertiary care hospital where one of the recommendations is to conduct training programmes to educate HCPs on Patient Safety and it was further found that inadequate knowledge was causing resistance to most of the best practices (Amarapathy et al., 2013)

## **Conclusions and Recommendations**

Conducting training needs assessment and developing a training module based on the findings and using competent experts to develop lessons plans and using trained trainers to conduct the in-service training programme including OSCE for skills assessment was the key to the success of this project. Specially designed, training module using the technique of OSCE can be used to assess improvements in skills after an in-service training programme.

Final assessment of the project revealed, that this project was successful, as most of the areas in knowledge and skills on Patient Safety of NOs had been significantly improved after the Training Programme. Currently there were no studies done in Sri Lanka to explore the existing knowledge and skills on Patient Safety of NOs in Sri-Lanka. Therefore, based on the results of this project the following recommendations are suggested;

1. According to the results of the study, this successfully conducted training programme, henceforth should be conducted to NOs working in other wards in CSTH in batches. To create a safety culture all NOs should be trained as training one group of NOs would not be sufficient.
2. The module developed could be used for training of NOs in other teaching hospitals as in-service training programmes
3. During the project the ADDIE model was successfully adopted. Therefore, the conceptual framework adopted from ADDIE model and the mechanism followed for conducting in-service training programmes can be utilized by any HCI to develop any other training programme for other HCPs
4. Resource pool should be identified within the institution itself, for in-service training programmes as NOs should be continuously updated on knowledge and skills, as arranging resource persons from other institutions would cause delay in achieving the

expected results with regard to establishing safety culture. Training of Trainers Programmes should be organized at the central level by Directorate/Health Care Quality and Safety at the Ministry of Health to train those resource personnel.

5. It is also recommended that, an alliance and partnership between hospitals should be organized and encouraged, by which, skilled technical personnel could be exchanged, to make these training programmes a success (bi-directional patient safety learning).

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**Annexure I:** Figure shows the application of ADDIE model to this project

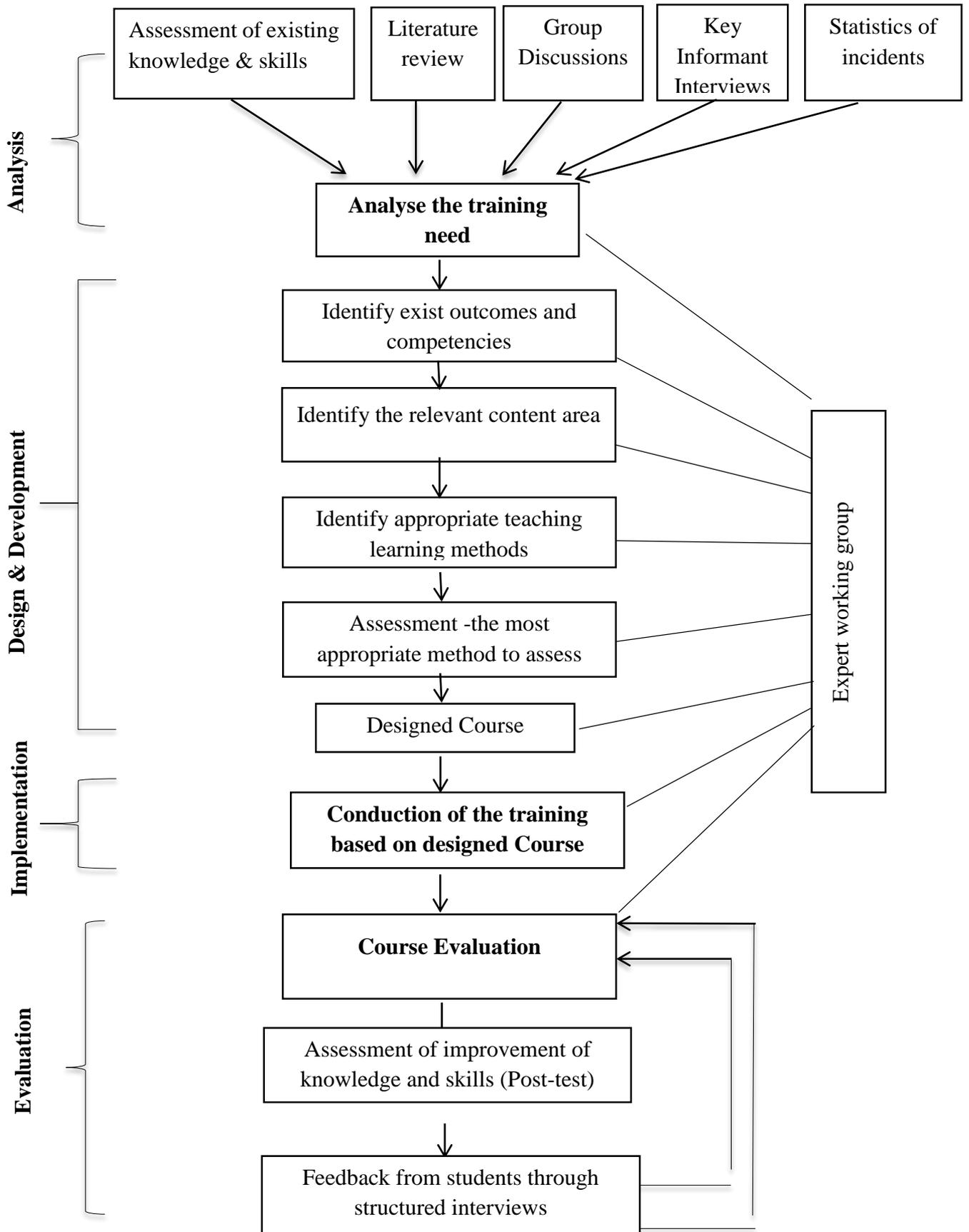


Figure 1: Conceptual Framework