FACTORS AFFECTING KNOWLEDGE AND SKILLS RETAINED AMONG NURSES AFTER A NEONATE RESUSCITATION TRAINING PROGRAMME

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ABSTRACT

Neonate Resuscitation Program, NRP training is given to nurses in batches. Such programs are vital because neonate resuscitation procedure or aid given to new born during delivery, help them begin breathing on their own, which can save many lives. Although such training is given to the nurses, no assessment has been done on the effectiveness of such training with regard to knowledge retention and transfer of training among the trainees.

This study is retrospective in nature; it evaluates the level of knowledge and the confidence in carrying out the neonate resuscitation procedure among 91 nurses involved such training. Besides that, the study ascertains their preparedness before undergoing the training and the opportunities provided to them to practice the skills learnt from the training at their work place. Factors that influence both their knowledge and skills after the training are also indentified.

Study sample consist of 51 nurses from hospitals and 40 nurses from health clinics. Results show that skills acquired from training as measured by their confidence at carrying out the learnt skill deteriorate faster than knowledge. Level of knowledge retained, confidence at carrying out the neonate resuscitation procedure and opportunities for practicing the skill are all significantly higher for the nurses at the hospitals compared to their counterparts in the health clinics at the 95 percent level.

The recent trainees (2009) scored higher compared to the old trainees (2007 and 2008) with regard to their preparedness or motivation before the training although memory factor could play a part here. Confidence at carrying out the neonate resuscitation procedure at the work place is a measure of the effectiveness of the NRP training because it constitutes transfer of training. Level of knowledge retained and opportunities for practicing skill at work place after the training, together with trainees' preparedness and motivation before the NRP training, all three contribute 35.7% towards trainees' confidence in carrying out the NRP procedure at their work place. Contribution of these three variables is significant at the 95% level or $p < 0.05$. Findings are consistent with the Model of factors that affect Learning Outcomes and Transfer of Training by Goldstein and Ford (2002)

INTRODUCTION

In-house training plays an important role in every organisation and is a high-cost investment. The main concern of training is to enable the transfer of learning outcomes to job situation, that is transfer of training. Transfer of learning is defined as the level whereby knowledge, skills and abilities obtained from training can be applied, generalized and retained in a specific period (Baldwin and Ford, 1988). During NRP training, it is not sufficient to just impart specific knowledge and skills in handling problematic babies, self confidence has a role to play in such urgent situation. According to the Report from NRP instructor 2007, several strategies were employed during NRP training to increase the confidence of the trainees. NRP is a training that introduces the basic concepts and skills relating to neonate resusitation. Neonate resusitation is a complex procedure that requires specific knowledge and skills in an emotionally charged, urgent and stressful situation. However, research and related literatures have shown that nurses have varying levels of competence in NRP

and that NRP skills deteriorate over time (Alspach, 2005). NRP in the state of Kelantan is carried out both at the district and state levels, and are handled by paedriatrics. Instructors are given the responsibility of training health workers involved with obstetrics. This study intends to assess the level of knowledge retained by the nurses and their confidence in carrying out neonate resusitation six months after NRP training.

STATEMENT OF THE PROBLEM

Past studies showed that there exists a problem with transfer of training. Trainees performing great improvement during the training session did not portray any significant transfer after the training was over. This study intend to address the issues related to transfer of training. Three main factors investigated are related to the trainee characteristics, structure of the training program and work place (Goldstein and Ford, 2002). The relationship between these three factors is as follows:

1. Trainee characteristics include preparedness and motivation to learn before training. Structure of the training program includes mode of instruction, objective, instructional plan and learning theories employed. Both factors will influence the learning outcomes in the form of knowledge, skills and attitudes. Both will indirectly affect transfer of training.

2. Transfer of learning also depends on the work place.
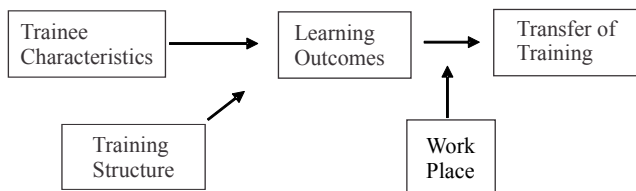
Figure 1: Model of factors that affect Learning Outcomes and Transfer of Training (Goldstein and Ford, 2002).

This study will not deal with the training structure because it is beyond our control. Only learning outcomes and their correlates above will be investigated. Aspects of concern in this study are as follow:

1. Level of knowledge concerning neonate resusitation retained among nurses who have undergone the NRP training.

2. Level of confidence to carry out neonate resusitation among nurses who have undergone the NRP training.

3. Trainee characteristics such as preparedness and motivation to attend the NRP training.

4. Characteristics of work place which include support and opportunities for practising knowledge and skills acquired from training.

5. Contribution of knowledge, trainee characteristics and opportunities to practise in work place towards nurses' confidence in carrying out the neonate resusitation procedure.

The aim of this study is to evaluate the level of knowledge among nurses attending the NRP training and to ascertain how level of knowledge, their preparedness and their opportunities to practise the skill contribute towards their confidence in carrying out neonate resusitation in their work place. This study is carried out with 91 nurses who have attended NRP training in the district of Tanah Merah, Kelantan.

RELATED STUDIES

Trainees' readiness for change and their understanding that they are required to transfer the skills after training is of utmost importance. Personality trait such as locus of control and attitude towards work are related to motivation towards training (Salas, 2001). Trainees who lack motivation or have a negative attitude will give all sorts of excuses to avoid transfer of training such as time constraint and lack of self confidence. Trainees need to be retrained, especially for difficult and complex knowledge and skills.

Holton, Bates and Ruona (2000) proposed that organisation that wants the optimum benefits from their training programs need to understand factors influencing transfer of training and take steps against factors that are obstacles of transfer. In addition, the main step towards promoting transfer of training is to identify the hindering factors. In their study, a system of concept transfer is called the Learning Transfer System Inventory Evaluation model (LTSI) that includes trainee factors, training and organisation that can influence transfer of training was introduced. In this concept, three learning outcomes were identified, that is learning, individual achievement and organisational performance. Learning is defined as the achievement of the learning outcomes required as a result of intervention while individual achievement is the

application of learning outcomes at their work place. Organisational performance is the result of individual achievement. A high level of confidence amongst trainees during and after training results in trainees performing their tasks well, seek opportunities for practice and try out difficult tasks (Gibson, 2001).

Although many studies had been carried out on the effect of self confidence on transfer of training, none were on the effect of self confidence on the motivation for transfer. This is why in this study; self confidence is used as the secondary influence on motivation for transfer because trainees with high self confidence are more motivated to apply what they have learnt. As a conclusion, aspects of trainee characteristics that influence transfer of training studied include four variables that is readiness or preparedness, motivation for learning, learning outcomes and self confidence. Apart from trainee characteristics, structure of training program and characteristics of work place also influences transfer of training.

METHODOLOGY

Study Design

This retrospective study evaluates the level of knowledge and self confidence of health workers who have attended the NRP training in different years in Kelantan. This study intends to ascertain the factors that contribute to the retention of learning outcomes and transfer of training after a six month period by measuring their level of knowledge and their confidence in carrying out the neonate resusitation procedure. Factors that are investigated include the preparedness and motivation before the training and opportunities for practise at their work place after the training.

Research Instrument

The questionnaire and its items are adapted from Hopstock (2008), referred from the CPR guide 5th edition and SARCH MARCH 2008. The questionnaire consists of several sections. Section A collects the demographic data of respondents including their opportunities for practise after NRP training and their preparedness before training. Section B evaluates the level of knowledge relating to NRP or the retention of learning outcomes. Section C evaluates their self confidence in carrying out the NRP procedure after training.

Population and Sample

Population of study includes the trainees of NRP training sponsored by Paedriatic Department, Hospital

Raja Perempuan Zainab II. Throughout the year 2008 as many as 245 health workers have been trained at different times of the year. Trainees were from district hospitals and health offices. The hospitals involved were Hospital Kuala Krai (28 personnel), Hospital Machang (24 personnel), Hospital Tengku Anis (23 personnel), Hospital Tumpat (24 personnel), Hospital Tanah Merah (18 personnel), personnel dari Health Office involved were from Pejabat Kesihatan Tumpat (24 personnel), Pejabat Kesihatan Kota Bharu (58 personnel held in two sessions), Pejabat kesihatan Bachok (23 personnel) and Pejabat Kesihatan Tanah Merah (23 personnel).

A total of 350-450 health workers were trained each year. According to the NRP training report for the year 2008, 131 health workers were trained by in-house training while 269 health workers were trained outside Hospital Raja Perempuan Zainab II.

Samples from all hospital and health offices involved were included in the selection. Sample size depends on the number of trainees in a training session. In accordance to the above data, one training session consist of 18 to 29 trainees. Sample size should be 50% of population. Sample is chosen at random; the subjects are chosen alternately from the name list given and a total of 91 subjects were selected.

Pilot Study

A pilot study is carried out using 30 health workers not involved in the final sample. The aim of this study is to ensure the clarity of the questionnaire items.

Opportunities for practising skills learnt after training is measured using eight items in the first section of the questionnaire. Cronbach Alpha obtained using the eight items is 0.956. Cronbach Alpha values obtain if each of the eight items are deleted one by one remain high so all the items are retained in the final questionnaire. Trainee preparedness before the NRP training is measured using 10 items in Section A of the questionnaire. Cronbach Alpha obtained with these 10 items is valued at 0.869. Cronbach Alpha values obtained when each of the 10 items were deleted one by one remain high so all the 10 items are retained in the final questionnaire. Trainees' self confidence in carrying out the neonate resusitation procedure is measured using 20 items in Section C. Cronbach Alpha obtained using these 20 items in the pilot study is 0.946. Cronbach Alpha values obtained when each of the 20 items were deleted one by one remain high so all the 20 items are retained in the final questionnaire.

Data Collection

Approval was obtained from the state Director of Health, Head of Department, Paediatric Department, Hospital Director and District Health Officer to carry out this study. After which the questionnaire is sent through proper channels and administered with the cooperation from the supervising officers. Self-addressed envelopes with stamps affixed were given to ensure a high rate of return.

DATA ANALYSIS AND DISCUSSION OF RESULTS

Four important aspects of NRP training were measured; trainees' preparedness PRE before embarking on the NRP, FRE is the opportunities to practise the NRP procedure at their work place, KNO is the knowledge retained after NRP and CON refers to their confidence in carrying out the NRP. Their descriptive statistics are shown in Table 1.

Table 1: Mean Scores of NRP variables

	PRE	FRE	KNO	CON
N	91	91	91	91
Mean	37.01	19.47	16.29	67.16
Median	38.00	20.00	16.00	70.00
Mode	38.00	8.00	16.00	76.00
Standard Deviation	5.50	8.11	1.80	13.78
Variance	30.25	65.78	3.25	190.16
Skewness	-.149	.03	-.37	-.85
Range	28	30	9	95
Minimum	22	8	11	20
Maximum	50	38	20	115

Transfer of Learning

Level of knowledge, KNO is used as a measure of knowledge retention after NRP training. Scores obtained from the sample of 91 nurses range from 11 to 20 which is the total score. Mean value of 16.29 with standard deviation of 1.80, so 68% of the sample obtained scores between 15.1 and 18.09. Median and mode are the same at 16.00. Mean 16.29 exceeded median dan mode. Cheng and Ho (2001) found that only 10% training are transferred to work place. CON, confidence of nurses when carrying out the neonate resuscitation procedure at their work place is an indication of their skills. Scores obtained from the sample of 91 nurses ranged from 20 to 115. Mean value

of 67.16 with standard deviation 13.78, so 68% of the sample obtained a score between 53.38 and 80.94. Median 70.00 and mode 76.00 exceed mean 67.17.

Sample performed better at knowledge retention than skills as measured by their confidence in carrying out the NRP procedure. Results suggested that the deterioration of skills is faster than knowledge after a training session.

FACTORS AFFECTING TRANSFER OF TRAINING:

Work Place

Nurses selected for this study either work in the hospitals or in health clinics. Study sample consist of 51 nurses from hospitals and 40 nurses from health clinics. The mean scores obtained for the two work places are scrutinised and compared using *t* test (Independent Samples Test). See Tables 2. The mean scores are higher for nurses working at the hospitals as opposed to those from health clinics for all four variables PRE, FRE, KNO and CON.

Mean scores between the two types of work place differ significantly for three aspects of NRP training namely FRE, KNO and CON. FRE is the opportunities to practise NRP at work place. KNO is the knowledge retained after the NRP training and CON is their confidence at carrying out the NRP procedure at their work place. All three variables are significantly different between the two work place at 95% level (p<0.05). No significant difference exists between the two types of work place with regard to PRE, the trainees' preparedness before NRP training.

Nurses in the hospitals are exposed to more challenges, with more cases to handle and thus more opportunies for practise. In the hospitals these nurses have access to expertise around them to guide and support them. The conditions in the hospitals are more condusive to learning and retention of knowledge. According to Hamilton (2005), Nurses in clinical areas, who rarely see cardiac arrests, should receive automated external defibrillation training.

Year of NRP training

Due to the fact that the number of trainees for each year is less than 25 except for the year 2009, ANOVA cannot be used to compare mean scores of variables between the years attended. However if the years are reclassified as Recent (2009) and Old (2006, 2007 and

2008) then t test can be used to compare year. See Tables 3.

Table 3: Mean Scores of NRP variables according to Year of Training

	Year	N	Mean	Standard Deviation	Std. Error Mean
PRE	Old	46	35.89	5.53	0.81
	Recent	45	38.15	5.27	0.78
FRE	Old	46	19.47	8.25	1.21
	Recent	45	19.46	8.05	1.20
KNO	Old	46	16.15	1.86	0.27
	Recent	45	16.44	1.75	0.26
CON	Old	46	65.54	14.82	2.18
	Recent	45	68.82	12.59	1.87

Only PRE or the trainees' preparedness before NRP training differs significantly between old trainees (year 2006, 2007 and 2008) and recent trainees (year 2009). Recent trainees were found to be more prepared and motivated to attend the NRP training as opposed to old trainees. See Table 4.

Table 4: t tests to compare mean scores of variables between Year of Training

Variable	t value	p value
PRE	-1.996	0.049*
FRE	0.007	0.995
KNO	-0.771	0.443
CON	-1.136	0.259

*Difference significant at $p<0.05$

Relative Contribution of NRP variables

Linear regression is used to identify factors contributing to transfer of learning as measured by CON, confidence of nurses in carrying out the neonate resusitation procedure in their work place after undergoing the NRP training. The different factors and variables relating to NRP are entered stepwise. See Table 5.

KNO which is the level of knowledge retained after attending the NRP training contributed 21.6 percent towards CON. KNO and FRE or opportunities to practise the NRP procedure at work place contributed 30.5 percent towards CON.

KNO, FRE together with PRE or trainees' preparedness and motivation before the NRP training constitutes 35.7 percent towards trainees' confidence in carrying out the NRP procedure at their work place. Contribution of these three variables relating to NRP towards trainees' confidence in carrying out the NRP procedure at their work place is significant at the 95 percent level or $p<0.05$. See Table 5.

Table 5: Linear Regression

Model	R	R^2	Adjusted R^2	Std. Error of the Estimate
1	0.465(a)	0.216	0.207	12.27907
2	0.552(b)	0.305	0.289	11.62628
3	0.597(c)	0.357	0.335	11.24916

a) Predictors: (Constant), KNO

b) Predictors: (Constant), KNO, FRE

c) Predictors: (Constant), KNO, FRE, PRE

CONCLUSION

Knowledge and confidence deteriorated with time after NRP training. The present finding shows that knowledge retention is at an acceptable level unlike confidence levels that are low. Several factors were found to contribute towards self confidence like preparedness, opportunities for practice and knowledge. These three factors gave different effects and when in combination gave a bigger impact. Matured nurses were less prepared and motivated to learn, compared to their younger counterparts. Both preparedness and motivation are related to transfer of training.

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