

The Effect of Educational Intervention on Intensive Care Nurses' knowledge and practice with regard to Enteral Feeding administration

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ABSTRACT

Purpose: The purpose of this study was to evaluate the effectiveness of an educational intervention program on the knowledge and practice of Intensive Care Nurses with regard to Enteral Feeding administration.

Methods: In this Quasi-Experimental study of one group of subjects, pre-test and post-test design was used and the data was compared pre- and post-intervention. Sixty-five ICU nurses in the Intensive Care Unit responded to a questionnaire, with a response rate 91.4%. Observations of ICU nurses' practice were carried out after the implementation of educational intervention for all ICU staff nurses.

Results: Before the study was carried out, the nurses revealed that their primary source of knowledge was consultation with their colleagues. Comparison of nurses' knowledge scores before and after the implementation of educational intervention revealed significant differences in the level of knowledge, which increased significantly after participation in the educational program. Observation of nurses' practice also revealed improvements in Enteral Feeding administration after the implementation of educational intervention using evidence-based guidelines. No significant association was found between the nurses' knowledge level and demographic characteristics such as age, education level and working experience.

Conclusions: The results of this study indicate that a structured educational program on evidence-based Enteral Feeding guidelines has a significant, positive effect on nurses' knowledge and improves their practices. The educational program in this study significantly increased the Intensive Care Nurses' knowledge and practice scores on Enteral Feeding administration in the Intensive Care Unit.

*Key Words:*Enteral Feeding, Intensive Care Unit, Evidence-based EF guideline,nursing knowledge,nursing practice.

Introduction

Provision of efficient nutrition support in Critical Care Units is an essential element of patient management. For patients who are unable to have oral intake of food, nutritional support is an important issue and providing functioning gastrointestinal tract must be the main choice for critically ill patients (Mossberg, 2000). Feeding is less important in comparison with other Intensive Care Unit (ICU) procedures. In addition, malnutrition is very common among patients in Critical Care Units and feeding in ICUs is known to differ between units and can be insufficient. (Harrington, 2004). Enteral Feeding (EF) helps ICU patients by reducing catabolic response to injury, retaining bowel mucosal integrity, decreasing translocation of gut bacteria, improving wound healing and reducing infective complications (Cerra et al., 1997; Galban et al., 2000). Critically ill patients who do not receive proper EF, may have bacterial translocation and correlated endotoxin release that activate inflammatory pathways, which can result in multisystem organ failure (Hale, 2002). In addition, the poor administration of EF by critical care nurses is an important factor in under-feeding of patients, which may lead to malnutrition, gastrointestinal disorders, higher probability of aspiration pneumonia, longer hospitalization periods, as well as higher health care costs and mortality rate among critically ill patients. Some previous studies have demonstrated that nurses have misconceptions about appropriate EF administration, lack of knowledge about the prevention of complications, and are unaware of the amount, type, and rate of Enteral Feeding and administration of medication through Naso-Gastric tube for ICU patients (Kennedy, 1997; Shaw, 1994). Also, nursing care of patients with EF tubes has often been based on customary practices and opinions from colleagues rather than evidence-based researches guidelines, while the effective establishment of EF is often hindered by the nurses' lack of knowledge (Booker et al., 2000; Edwards & Metheny, 2000). The

development and implementation of evidence-based guidelines has significantly improved both patient outcomes and the nurses' skill sets (Hutchinson & Johnston, 2006; Newell- Stokes, 2004). Some studies indicate that the successful implementation of Enteral Feeding guidelines is also associated with weaning from mechanical ventilation, administration and adjustment of sedatives and analgesics, and titration of insulin to control blood sugars in patients (Heyland, 2010).

In addition, Kenny (2010), in an interventional study, found that the performance gaps and high differences in practices related to the management of enteral tube feedings demonstrate the lack of standardization and use of evidence in the provision of suitable and effective patient care. It was also found that educational programs for critical care nurses using evidence-based guidelines have significantly increased the nurses' knowledge scores on EF administration in ICU settings. Therefore, the development and implementation of evidence-based guidelines is considered a significant step towards changing practices (Bourgault and Ipe, 2011). There was a need to conduct this study in Malaysia as there are currently no Enteral Feeding guidelines for Intensive Care Units Nurses. Furthermore, nurses administer EF inappropriately and complications, such as aspiration pneumonia, occur among critically ill patients in ICU due to these inappropriate practices.

Methods

Study design and data source

A quasi-experimental study of one group of subjects, involving an educational intervention, was carried out, using pre-test and post-test design. Data was compared at pre- and post – intervention. Data was collected using a questionnaire that was distributed to all General ICU

nurses (n= 65) at University Malaya Medical Centre (UMMC). In this study, only one group of nurses was compared before and after the implementation of an educational intervention program. The study included a pre-test measure of nurses' knowledge on Enteral Feeding administration; implementation of an educational program using evidence- based EF guidelines and followed by observation of nursing practice regarding EF administration, which was carried out one week after the educational program for a single group of ICU staff nurses. Post-test measurement of nursing knowledge was conducted one month after the implementation of educational intervention to assess the nurses' knowledge on EF administration.

Sample and data collection procedure of the study

The sample for the pre- and post-test questionnaire, as well as bedside observations, in this study was obtained through universal sampling, which included all General ICU nurses. Nurses who had undergone a 3-year diploma program, obtained a post-basic certificate or degree program in nursing science, and were working in the General ICU to take care of critically ill patients, were included in this study. Data was initially collected through the distribution of pre-test questionnaires to evaluate the level of intensive care nurses' knowledge regarding EF administration before the educational intervention sessions were conducted. Following that, the educational program on EF administration, consisting of 10 educational sessions, was conducted for all intensive care nurses. Each session lasted 30 minutes and was related to issues covered in evidence-based EF guidelines, such as what is EF, different kinds of EF, time to start EF, confirmation of tube placement, avoidance of bacterial contamination during EF administration, formula and medication administration, change of feeding tube, gastric motility and risk of aspiration, gastric residual volume measurement, gastric versus small-bowel tube placement,

body positioning, intolerance to EF, prevention of feeding tube occlusions, treating feeding tube occlusions, administration rate, continuous versus intermittent EF, tube flushes, interruption in feeding and nursing documentation of EF administration. After the educational intervention, observation of nurses' practice was carried out a week later in order to evaluate their practical skills in EF administration in the ICU. The observation was done according to an observation checklist that was developed based on the items in the evidence-based EF guideline.

Finally, a post-test exercise was conducted one month after implementation of the educational intervention in order to evaluate their level of knowledge after participating in the educational program on evidence-based EF guideline in ICU.

Instruments

Data on the ICU staff nurses' knowledge was collected using pre-and post- test questionnaires. The questionnaire was developed by Persenius (2006) and ethical permission was obtained from her. In addition, this questionnaire was modified for the local setting through discussions with ICU experts and a dietitian. The reliability of the test questions were tested in a pilot study with 20 staff nurses who were working in the Cardiac Intensive Care Unit of University Malaya Medical Centre. Data from the pilot study was not included in this study. The questionnaire consists of 3 parts, with a total of 8 questions. Part A consists of three questions regarding the nurses' age, education level and work experience. Part B consists of 3 questions concerning their sources of knowledge related to EF administration in ICU. Part C consists of 2 questions with Likert scales and dichotomous questions related to the nurses' knowledge on EF administration in ICU. One week after the implementation of the educational program for all ICU nurses, their practical skills in EF administration were observed according to an observational checklist that

was developed based on the 15 items in the evidence-based EF guidelines, which was then validated by nursing supervisors, a dietitian and ICU experts.

Statistical analysis

The data collected was analyzed using SPSS version 17. Descriptive statistical tests were used to describe the intensive care nurses' demographic characteristics and their sources of knowledge on EF administration, as well as evaluate the nurses' practice in carrying out Enteral Feeding administration after implementation of the educational intervention program. In addition, Wilcoxon Signed Rank test was used to compare the nurses' knowledge scores regarding Enteral Feeding administration before and after the educational program, while chi-square was used to examine the association of the nurses' demographic characteristics with their level of knowledge on EF administration in ICU.

Ethical aspects

All participants provided informed consent for their participation in the pre- and post-intervention evaluation, as well as in the educational program. The permission to conduct this study was granted by the Ethics Committee of the University Malaya Medical Centre (UMMC) in Malaysia. The participation of all ICU staff nurses in this study was voluntary, all the responses were anonymous and all data was treated with confidentiality. Moreover, all the participants were treated in accordance with ethical principles of human research and all results from this study were reported as statistical summaries only.

Results

The ages of the intensive care nurses varied between 21 and 50, with 69.2% of the ICU nurses in the 21-28 years age group. Of all the subjects, 76.9% had a diploma in nursing science, while 52.3% of them had between 1-5 years of work experience in the ICU (Table 1).

Table 1 Distribution of demographic characteristics of the intensive care nurses.

Variable	N	%
Age		
21-28	45	69.2%
29-36	15	23.1%
37 and above	5	7.7%
Education		
Diploma	50	76.9%
Advanced Diploma	11	16.9%
Degree	4	6.2%
Working Experience		
Less than 1 year	5	7.7%
1-5 years	34	52.3%
6-10 years	20	30.8%
More than 10 years	6	9.2%

The minimum age of the Intensive Care Nurses was 21 and maximum age was 50, with range of 29 (Mean± SD; 27.40±5.49). In addition, the majority of the nurses (n=49, 75.4%) reported that they are not responsible for nutrition in ICU while a minority (n=14, 21.5%) reported that intensive care nurses are responsible for nutrition. Thirty-four (52.3%) of the nurses mentioned that there was a nutrition team in ICU while 30 reported that they did not have any nutrition teams in their ICU. Furthermore, the majority of the intensive care nurses (n=55, 84.6%) reported that there was a nutrition team at the hospital while a small number (n=8, 12.3%) said there was no nutrition team in the hospital. The majority of the nurses reported that they knew about key personnel whom they could consult about EF administration in the hospital (n=44, 67.7%), while a handful reported that they don't know who to consult about EF (n=5, 7.7%).

The majority of the intensive care nurses received a great extent of their knowledge about EF by consulting with their colleagues (n=29, 43.9%) while only 12 of the ICU nurses gained their knowledge via scientific journals (18.2%). The majority of the nurses had poor knowledge before the educational intervention program (89.4%). However, most of them gained good knowledge after participation in the education program (87.9%). (Table 2).

Table 2.The level of intensive care nurses’ knowledge on EFadministration before and after educational intervention

	Poor Knowledge	Good Knowledge
Pre-Intervention	59(89.4%)	6(9.1%)
Post-Intervention	7(10.6%)	58(87.9%)

Moreover, Wilcoxon Signed Rank test was conducted to compare the mean ranking of the pre-intervention- total scores of knowledge and post-intervention scores as the total score of knowledge in pre- and post-intervention weren’t normally distributed (as the Kolmogorov-Smirnov test of normality gave a p-value < 0.05). According to the Wilcoxon Signed Rank test, the 2-tailed significance indicates that p-value < 0.05. Therefore, there is a significant difference in the mean ranking of total scores of knowledge on EF administration before and after the intervention ($Z=-5.044, p< 0.05$, Mean Rank=928.11). Also, Wilcoxon Signed Rank test was conducted to compare the mean ranking of the total scores of knowledge on practice of EF administration before and after intervention. The 2-tailed significance indicates that p-value < 0.05, therefore, there is a significant difference in mean ranking of total scores of knowledge on practice between pre- and post-intervention ($Z=-2.980, p< 0.05$, Mean Rank=30.95). In addition, this study also indicated that there was improvement in the practice of the majority (75.4%) of intensive

care nurses after implementation of the educational program, while only 24.6% of the nurses' practice did not improve after participation in the educational program (Table 3).

Table 3: Evaluation of the nurses' practice of Enteral Feeding administration after implementation of an educational intervention

Variables	n	%
Practice not according to evidence-based guidelines	16	24.6%
Practice according to evidence-based guidelines	49	75.4%
Total	65	100%

Chi-square test was also conducted to explore the association between ICU nurses' demographic characteristics and their level of knowledge on EF administration. According to Chi-square test, the 2-tailed significance indicates that $p\text{-value} > 0.05$; thus, there is no significant association between the age of the participants and their level of knowledge on EF administration ($p > 0.05$, $\chi^2 = 1.894$). The association between the nurses' educational level and their level of knowledge on EF administration was also explored with chi-square test. The 2-tailed significance indicates that $p\text{-value} > 0.05$, meaning that there was no significant association between the participants' education level and their level of knowledge ($P > 0.05$, $\chi^2 = 1.279$). Finally, Chi-square was used to look at the association between participants' working experience and their level of knowledge

on EF administration. The 2-tailed significance indicates that $p\text{-value} > 0.05$, with no significant association between working experience and the level of knowledge ($P > 0.05$, $\chi^2=3.784$).

Discussion

The findings of this study indicated that the majority of the participants (87.9%) gained good knowledge in the post-intervention test while 89.4% of the participants had poor knowledge in the pre-intervention test. The educational program on evidence-based EF guidelines significantly increased the ICU nurses' knowledge on EF administration. The results of this study indicated that a structured educational program can have a significant, positive effect on nurses' knowledge and improve their practices.

The findings of this study are supported by previous studies. An interventional study conducted by Kenny and Goodman (2010) found that an educational session had significantly increased the critical care nurses' knowledge test scores on EF administration ($p=0.05$). Similarly, Fulbrook(2006)found that implementation of an educational program on EF administration could increase the total knowledge scores among nurses. These previous studies support the findings that critical care nurses do not have enough knowledge on proper EF administration, but their overall knowledge on EF administration significantly improves after undergoing an educational program on evidence-based guidelines. In addition, the findings of this study showed that there is no significant association between the nurses' knowledge scores and their demographic characteristics, age, working experience or educational level. However, these particular findings were not supported by previous studies. For example, a descriptive study using a survey to evaluate nurses' knowledge on EF administration (Persenius ,2006) found that years of experience in ICU was associated with an increase in total scores of knowledge($p <$

0.05). However, there has been no association reported between the age and educational level of the ICU nurses with total scores of knowledge on EF administration. Furthermore, the majority of the intensive care nurses (75.4%) in this study showed that their practice of EF administration improved after their participation in the educational program. Therefore; it can be concluded that the educational intervention was effective in improving the nurses' total practice scores on EF administration in the ICU. These results were supported by some other previous studies; for instance, in an interventional study on the care of patients with EF feeding (Kenny and Goodman, 2010), it was found that implementation of evidence-based guidelines significantly improved the compliance of intensive care nurses ($p = 0.05$). A descriptive study on nurses' perceptions and bedside observations of EF administration (Persenius, 2006) found that the nurses' practice improved significantly after educational intervention with evidence-based EF guidelines ($p = 0.016$). Another survey on EF of critically ill patients (Marshall and West, 2006) found that the nurses' practice according to EF guidelines contributed to the management of feeding complications and offered some benefits to the critically ill patients as well. In addition, a randomized controlled trial (Kreymanna, Bergerb, Deutzc, 2006) found that there was a significant difference in the mortality rate, and length of ICU stay, as well as the rate of infection complications such as bacteraemia in critically ill patients when they were administered EF according to the evidence-based guidelines ($P = 0.01$).

Similarly, an intervention study on the care of patients with EF feeding (Kenny and Goodman, 2010), reported that the implementation of an evidence-based practice greatly enhances uptake and sustainability of changes in nursing practice. Additionally, the implementation of evidence-based guidelines contributed to improvements in the nutritional status of patients and also led to significant improvements in nurses' compliance with evidence-

based processes and proper nutritional assessment of the patients, while nurturing a culture of evidence-based practice within the organization. The results of this study indicated improvement in the intensive care nurses' total practice scores after participation in the educational program. However, in this study it was impossible to explore the association between the intensive care nurses' knowledge and practice scores on EF administration as the level of knowledge was assessed on two different occasions i.e., before and after implementation of the educational program, while, their practice was only explored only post-educational program. The reason for this is that there are no evidence-based EF guidelines in the current setting; therefore the pre-intervention practice assessment was impossible to perform. However, some past studies have indicated a positive relationship between knowledge and practice in EF administration; for instance, a descriptive study (Roberts and Kennerly, 2003) which found a strong positive relationship between the nurses' knowledge scores and their practice scores on EF administration ($p= 0.016$). In addition, a study on the development of evidence-based guidelines and critical care nurses' knowledge of EF reported that EF practices in the ICU are directly influenced by nurses' level of knowledge on EF administration (Bourgault, 2011). Thus, it can be concluded that improvement in ICU nurses' practice of EF administration may be due to the improvement in their knowledge of EF administration. There is a need to conduct a study to identify the exact association between nurses' knowledge and practice scores in the ICU setting.

Conclusion

The results of this quasi-experimental study indicate the importance and the need for nursing education in order to improve their knowledge and practice based on evidence-based guidelines. The findings of this study also indicate the improvement in intensive care nurses' practice according to evidence-

based EF guidelines. The practice of intensive care nursing should be continually assessed and evaluated, with the inclusion of evidence-based practices, in order to maintain the standard of care. In addition, the verification of these research findings by previous studies reported in the literature support the recommendation that educational programs on EF guidelines should be implemented for improvements in quality critical care. This study demonstrates that educational programs must be adopted as part of continuing nursing education for critical care nurses. In addition, nursing management should provide proper education in order to ensure sustainable improvements in nursing practices. The results of this study indicate that local critical care nursing practices need to be changed, so that the delivery and quality of care, as well as patient safety, can be improved based on sound evidence from research findings. Moreover, the findings of this study recommend the setting up of a multidisciplinary committee to provide proper EF administration and also improve the patients' safety.

The results of this study also suggest the importance of teaching evidence-based practices in critical care nursing curriculum. It is recommended that more research be conducted in order to get more in-depth information, especially at the patient-care level. In addition, future studies must be conducted to explore the effect of nurses' knowledge and evidence-based practices on the prevention of complications, such as aspiration pneumonia in critical care units. It is also recommended to investigate and evaluate other elements such as patients' nutritional needs, diet, and calorie intake in order to improve and expand the evidence-based EF guidelines which were used in this study.

Limitations

There are some limitations to this study, namely: (a) the results of this study are not representative and cannot be generalized to other health care organizations' ICUs, as only one-group of non-randomized sample was obtained in this study; (b) the small sample size of the study,(c) bias in the observation of ICU nurses' practice; (d) the probability of the leakage of research questions and educational program content, which would affect the validity of knowledge test findings.

Conflict of Interest

Authors have declared no conflict of interest in this study.

References

Adam S., Batson S.(1997). A study of problems associated with the delivery of enteral feed in critically ill patients in five ICUs in the UK. *Intensive Care Med* , 23(3), 261—6.

American Association of Critical Care Nurses.(2005, May)..Practice alert: verification of feeding tube placement Retrieved May 2,2007,.From <http://www.aacn.org>.

American Gastroenterological Association. (1995).Technical review on tube feeding for enteral nutrition *Gastroenterology*, 108(4), 1282-1301.

Artinian V., Krayem H., DiGiovine B.(2006).Effects of early enteral feeding on the outcome of critically ill mechanically ventilated medical patients *Chest*, 129(4), 960-967.

Binnenkade J.M., Tepaske R., Bruynzeel P., Mathus-Vliegen E.M.H. de Hann R.J.(2005).Daily enteral feeding practice on the ICU: attainment of goals and interfering factors. *Critical Care*, 9, 218–225.

Bourgault A.M., Heyland D.K., Drover J.W., Keefe L., Newman P., Day A.G.(2003). Prophylactic pancreatic enzymes to reduce feeding tube occlusions. *Nutr Clin Pract*, 18(5), 398-401.

Bourgault, A.M. Ipe L. (2007). Development of Evidence-Based Guidelines and Critical Care Nurses' Knowledge of Enteral Feeding. *Critical Care Nurse*, 27(4),17-28.

De Beaux I., Chapman M., Fraser R., Finnis M., De Keulenaer B., Liberali D., et al. (2001).

Enteral nutrition in the critically ill: a prospective survey in an Australian intensive care unit. *Anaesthesia and Intensive Care*, 29, 619–622.

De Jonghe B., Appere-De-Vechi C., Fournier M., Tran B., Merrer J., Melchior JC, et al.(2001).

A prospective survey of nutritional support practices in intensive care unit patients: What is prescribed? What is delivered? *Crit. Care Med*, 29(1), 8—12.

DiSario J.A. (2002).Future considerations in aspiration pneumonia in the critically ill patient.

JPEN JPARENTE Enteral Nutr, 26(6 suppl), S75-S79.

Drakulovic M.B., Torres A., Bauer T.T., Nicolas J.M., Nogue S., Ferrer M. (1999).Supine body

Position as a risk factor for nosocomial pneumonia in mechanically ventilated patients: a randomised trial *.Lancet*, 354(9193), 1851-1858.

Elpern E.H., Stutz L., Peterson S., Gurka D.P., SkipperA. (2004).Outcomes associated with

enteral tube feedings in a medical intensive care unit. *Am J Crit. Care*, 13(3), 221-227.

Feinstein L., Sabates R.,(2006) What are the effects of education on health? *Educational Research and Innovation* (CERI), 173-313.

Grap M.J., Cantley M., Munro C.L., Corley M.C. (1999).Use of backrest elevation in critical care, a pilot study. *Am J Crit. Care*, 8(1), 475—80.

Greenwood J.(2003). Enteral nutrition (EN) in the critically ill adult: practice guidelines. *Critical Care Nutrition*. Retrieved May 2, 2007,from:<http://ccn.cissec.com>.

Heyland D.K., Dhaliwal R., Day A., Jain M., Drover J. (2004). Validation of the Canadian Clinical Practice guidelines for nutrition support in mechanically ventilated, critically ill adult patients: results of a prospective observational study. *Crit. Care Med*, 32(11), 2260-2266.

Icek A., (2006).Behavioral Interventions Based on the Theory of Planned Behavior *Sociometry*, 34, 263-280.

Ista P., Jassin S., Noel F., Preiser J. (2002). Management and knowledge of enteral nutrition in intensive care units in a city in Belgium. *Nutr Clin Pract*, 17(1), 32—7.

Jolliet P., Pichard C. (1998). Enteral nutrition in intensive care patients: a practical approach. *Intensive Care Med*, 24, 848-859.

Kirkland L.L. (1999).Factors impeding enteral feedings (Editorial) *Crit. Care Med*, 27(7), 1383-1384.

Kreymanna, M., Berger .M.(2006). ESPEN Guidelines on Enteral Nutrition: Intensive care. *Clinical Nutrition*, 25,210-223.

McClave S.A., Sexton L.K., Spain D.A., et al. (1999). Enteral tube feeding in the intensive care unit: Factor impeding adequate delivery. *Crit. Care Med*, 27(7), 1252-1256.

McClave SA, Snider H.L.,(2002).Clinical use of gastric residual volumes as a monitor for Patients on enteral tube feeding. *JParenter Enteral Nutr*, 26(6 suppl), S43-S50.

Metheny N.A., Schallom M.F., Edwards SJ.(2004). Effect of gastrointestinal motility and Feeding tube site on aspiration risk in critically ill patients: a review *Heart Lung*, 33(3), 131-145.

Metheny N.A., Titler M.G.,(2001). Assessing placement of feeding tubes. *Am J Nurs*, 101(5), 36-45.

Persenius M.W., Larsson B.W. (2006).Enteral nutrition in Intensive CareNurses' perceptions and bedside observations.*Intensive and Critical Care Nursing*, 22, 82-94.

Roberts S.R., Kennerly D.A., Keane D., George C. (2003). Nutrition support in the intensive care unit: adequacy, timeliness, and outcomes. *Critical Care Nurse*, 23(6), 49-57.

Serpa L.F., Kimura M., Faintuch J., Ceconello I.(2003). Effects of continuous versus bolus infusion of enteral nutrition in critical patients (Abstract). *Revista do Hospital das Clinicas*, 58(1):9-14.

Stroud M., Duncan H., J Nightingale J.(2003). Guidelines for enteral feeding in adult hospital Patients. *Group.bmj. com*, 52,vii 1- vii 12.