การพัฒนาและประเมินผลแนวปฏิบัติการพยาบาลการให้อาหารทางสายยางผ่านทางเดินอาหารในผู้ป่วยวิกฤต

The development and evaluation of clinical nursing practice guidelines for enteral feeding in critically ill patients

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บทคัดย่อ

การศึกษาครั้งนี้มีวัตถุประสงค์เพื่อพัฒนาและประเมินผลการใช้แนวปฏิบัติการให้อาหารทางสายยางผ่านทางเดินอาหารในผู้ป่วยวิกฤต โดยประยุกต์ใช้กรอบแนวคิดและขั้นตอนการพัฒนาแนวปฏิบัติทางคลินิกของการพัฒนาแนวปฏิบัติการพยาบาลของสภาวิจัยการแพทย์และสุขภาพแห่งประเทศออสเตรเลียประกอบด้วย 3 ระยะ คือ ระยะพัฒนาแนวปฏิบัติ ระยะเผยแพร่และนำไปใช้ และระยะประเมินผล แนวปฏิบัติการพยาบาลที่พัฒนาขึ้นได้ผ่านการตรวจสอบจากผู้ทรงคุณวุฒิจำนวน 3 ท่าน ผลการพัฒนาแนวปฏิบัติการพยาบาลทั้งหมด 5 ขั้นตอน ได้แก่ 1) ประเมินความพร้อมของผู้ป่วยวิกฤตก่อนการรับอาหารทางสายยาง 2) ประเมินความต้องการพลังงานตามกำหนดเป้าหมาย 3) วิธีการให้อาหารทางสายยาง 4) การป้องกันภาวะแทรกซ้อนในขณะให้อาหารทางสายยาง และ 5) การประเมินผลลัพธ์ภายหลังการได้รับอาหารทางสายยางผลการวิจัย พบว่า สามารถประยุกต์ใช้ในการให้อาหารทางสายยางในผู้ป่วยวิกฤต ความเป็นไปได้ในการใช้แนวปฏิบัติและความพึงพอใจของพยาบาลอยู่ในระดับมาก

คำสำคัญ: อาหารทางสายยาง แนวปฏิบัติพยาบาล ผู้ป่วยวิกฤต

Abstract

The purpose of this study was to develop a clinical nursing practice guideline (CNPG) for enteral feeding in critically ill patients. The Australian National Health and Medical Research Council (NHMRC) was applied as a conceptual framework. It was comprised of three phases: 1) Determining the need for and scope of the guidelines 2) Implementation of enteral feeding guideline and 3) Guideline assessment. The content of this CNPG was validated by 3 experts. The results of CNPG included 5 steps; 1) Assessment for readiness of the critically ill patients before enteral nutrition, 2) Calculation of the recommended daily energy intake, 3) Enteral nutrition procedure, 4) Prevention of enteral nutrition complication and 5) Outcome evaluation after receiving enteral nutrition. The results revealed that CNPG can be possibly applied for enteral feeding in critical ill patients. High feasibility and satisfaction were found after the CNPG implementation.

keywords: enteral feeding, clinical nursing practice guidelines, critically ill patients

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Introduction

"Critically ill patients" are patients with serious, life-threatening illnesses and high morbidity[1]. They usually have major organ failure, dysfunctional respiratory systems, or circulation systems[2]. In life-threatening condition, a body would respond by stimulating several systems, resulting in hypermetabolic response and hypercatabolism[3]. Impacts of this condition includes loss of lean body mass; paralysis; fatigue; continual and severe weight loss (over 10 kilograms of the original body weight)[4]; and malnutrition, which could be found in over 40% of the patients[5]. Malnutrition affects muscle structure throughout the body, especially respiratory muscle[6], leading to reduce ability to wean from mechanical ventilation and increase admission time to over 5 days. Malnutrition survival rate relates to many factors, such as age, severity of illness, underlying disease, digestive system, medication, clinical treatment, and other therapies. Patients should receive more than 80% of energy and protein intake within 72 hours[7], however, 60% receive late nutritional treatment[8] and 42% of them have malnutrition[9]. Heyland et al.[10] indicated that critically ill patients who received care using guidelines were fed faster than those that received care without guideline: 15.9% received food within 48 hours and 68% received adequate calories.

Main factors related to late nutritional care are lack of knowledge, understanding, and nutritional assessment skills[11]. Furthermore, there is no clear, standardized enteral feeding guideline. Lack of such guideline leads to delayed enteral feeding for critical patients more than 24 hours after being admitted to the critical care unit, resulting in inadequate energy intake and complications, such as nausea, flatulence, dyspepsia, gastrointestinal hemorrhage, diarrhea, hyperglycemia[12]. Nurse is the closest care provider and has a crucial role in nutritional care, including nutrition assessment, assessment of energy and nutritional requirements, pre-feeding readiness assessment, and the execution of enteral feeding[13]. However, enteral feeding in critically ill patient is highly complicated and diverse. Most nurses rely on enteral feeding guidelines for general patients instead of the guideline specifically for critical patients[14].

The American Society of Parenteral and Enteral Nutrition (ASPEN) provided some tips on enteral feeding to start within 24-48 hours[15]. Likewise, Jacob et al.[16] suggested that enteral feeding time should be within 48 hours[17]. The guideline that has been developed systematically based on reliable empirical evidence would assist practitioners to make decision on treatment. Implementation of clinical practices would lead to changes in overall practice, reduction in cost and improvement in treatment quality[18]. Enteral nutrition standard practice guidelines have been developed continually by physicians. These guidelines aim to standardize and automate the provision of enteral nutrition, enabling bedside nurses to initiate, monitor, and alter the administration of feeding without direct orders from the attending physician. However, the guidelines create variances in nursing practice and have not been updated with evidence-based clinical practice guidelines from the actual problems.

A clinical nursing practice guideline (CNPG) developed from evidence-based practice is suitable for the problem, beneficial to the patient, and helps improve enteral feeding service quality. With

such practice, complications from enteral feeding can be avoided and managed. Development of a comprehensive, standardized practice also provides clear roles for the interdisciplinary team[19]. The researcher, therefore, has an awareness and interest in using empirical evidence to develop a CNPG for enteral feeding in critically ill patients, applying the Australian National Health and Medical Research Council (NHMRC)[20]. This systematic and standardized development of nursing practice development would allow feeding for critical patients within suitable time as well as obtain participation of practitioners, that foster a sense of responsibility and willingness to follow the guideline[15].

Objective

To develop and evaluate an enteral feeding guideline for critically ill patients.

Methods

This study applies the scope used in the development of nursing practices by the Australian NHMRC[20], which is comprised of 3 phases: Determining the need for and scope of the guidelines, Implementation of enteral feeding guideline, and Guideline evaluation.

Phase 1: Determining the need for and scope of the guidelines:

1. Determining the need for and scope of guidelines. Critically ill patients were patients with serious and life-threatening illnesses. There was no dedicated and standardized guideline for enteral feeding for this group of patients. They did not receive enteral feeding within the first 24 hours of being admitted to the critical care unit[5]. Delayed enteral feeding led to inadequate energy intake[2], slow recovery, and complications, such as flatulence, diarrhea[18].

2. Convene a multidisciplinary panel to oversee the development of the guidelines: The team comprised critical care nurse, physician nutrition specialist, critical care nurse specialist, and nutrition nurse specialist.

3. Define the purpose of and target audience for the guidelines: Objective of this study was to develop and evaluate an enteral feeding guideline in the critical care unit.

4. Review the scientific evidence: Empirical evidence related to the problem was searched in medline, cinhal, scopus, pubmed, and Science Direct. Searching terms included enteral nutrition, enteral feeding, guideline, protocol, critically ill patients, and critical patients. Inclusion criteria were research studies published during 2008-2016. Sixteen from 30 articles matched the research objective. They were then categorized according to the criteria of the Royal College of Physicians of Thailand[21]. There were 11 Quasi-experimental studies (level B) and 5 Operational studies (level C).

5. Propose the validated evidence to the guideline development team and formulate the actual guideline. The guideline was validated by experts and users. Revised was made according to their comments. After revision, the CNPG was comprise of 5 steps as follows (Figure 1):

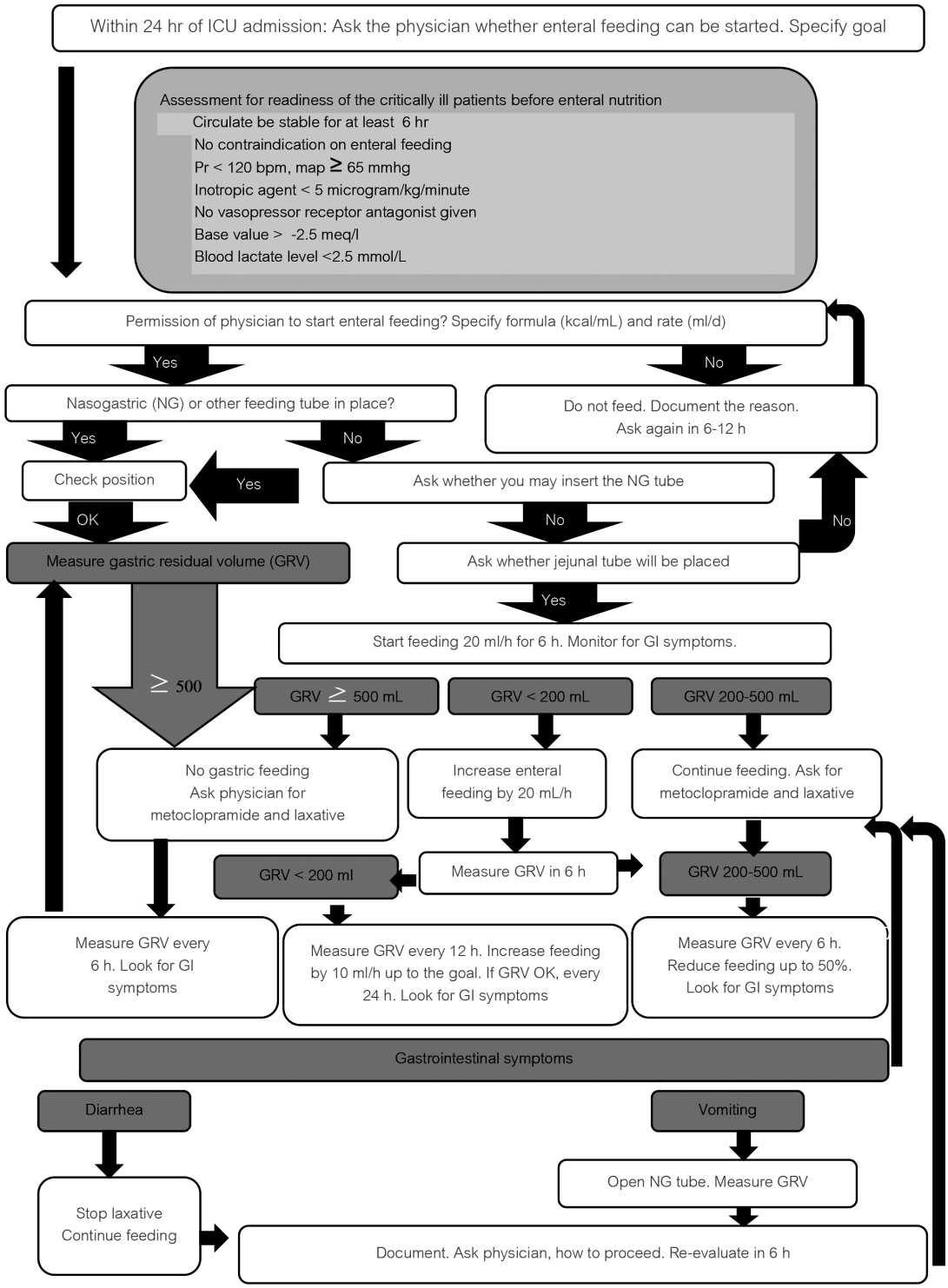

Figure 1: CNPG for enteral feeding in critically ill patients

5.1 Assessment for readiness of the critically ill patients before enteral nutrition. The assessment required that the patient's circulation be stable for at least 6 hours, no contraindication on enteral feeding, pulse lower than 120 beat per minute (BPM), and median blood pressure equal or higher than 65 mmHg. Inotropic agent given to the patient must be less than 5 microgram/kg/minute and no vasopressor receptor antagonist given to the patient. Base value must be over -2.5 mEq/L. Blood lactate level must be less than 2.5 mmol/L[16].

5.2 Calculation of the recommended daily energy intake. The recommended daily energy intake for critically ill patients should be calculated in co-ordination with the primary doctor, which is 25 calories/kg body weight/day for the first 7-10 days[16,18].

5.3 Enteral nutrition procedure. Enteral feeding procedure included 3 steps: Check position of the feeding tube, determine the feeding rate, and preparation of food and enteral feeding equipment.

5.3.1 Check position of the feeding tube. Position of the feeding tube should be checked by looking at the visible part of the tube. The tube must not be bent or folded inside the mouth. Air auscultation method can be used by feeding 10-20 ml of air into the feeding tube, or observation of fluid in the tube[4-5,8,16,18].

5.3.2 Determine the feeding rate. Feeding rate could be increased for meals, continuously, or occasional drip. In this study, the continuous feeding method was used, with the starting rate of 20 ml/hour for 6 hours. Gastrointestinal (GI) symptoms, such as diarrhea or vomiting, were also monitored. If gastric residual volume (GRV) was less than 200 ml, GRV should be measured every 12 hours and feeding rate should be increased by 10 ml/hr up to the goal. If GRV was between 200-500ml, GRV should be measured every 6 hours and feeding rate should be reduced up to 50%. If GRV was greater than 500ml, enteral feeding should not be provided [22,23].

5.3.3 Preparation of food and enteral feeding equipment. Food and enteral feeding equipment must be decontaminated. Hands must be watched before preparation and feeding. The prepared food should be stored in the refrigerator for not more than 24 hours, and must be served immediately after preparation or no later than 4 hours. After feeding, the equipment must be washed and air-dried before the next use[4-5,8,16,18,24].

5.4 Prevention of enteral nutrition complication. Complications during enteral feeding should be prevented and managed properly. If the patient was in the state of shock or need inotropic agent for vasoconstriction, enteral feeding should be temporarily suspended until the patient's circulation was stabilized. Then the feeder should consult the doctor in reducing enteral feeding rate to the starting rate. To prevent choking, head of bed should be elevated to 30-45 degrees, or in case of contraindication for head elevation (such as spinal injury), the patient should be set in the reverse Trendelenburg position. Gastric residuals should be assessed every 4 hours for continuous feeding or before each feeding for occasional feeding. The endotracheal cuff pressure

should be between 20-25 cmH_2O and sputum aspiration should be executed prior to feeding[2-5,24].

5.5 Outcome evaluation after receiving enteral nutrition. Patient outcomes were measured and recorded after giving enteral nutrition. This included time receiving enteral feeding (hours after admission), proportion of received energy intake to required energy intake in the first 72 hours of enteral feeding, GRV, and complications arising from enteral feeding, such as flatulence.

Phase 2 Implementation of enteral feeding guideline

6. Formulate a dissemination and implementation strategy:

After revision, the guideline was used to guide enteral feeding for critically ill patients in the critical care unit (CCU), Kuchinarai Crown Prince Hospital, on a trial basis for 1 month.

Sample: The participants are 13 CCU nurses with at least 2 years of experience.

Instruments: Instruments of the study consist of: 1) CNPG for enteral feeding for critically-ill patients and patient outcomes of the CNPG implementation in the critical care unit, 2) Demographic questionnaire for nurses with items about gender, age, education, and experience in the critical care unit 3) Feasibility questionnaire consisted of 5 questions on implementation of the CNPG for enteral feeding. Two answers for this dichotomous questionnaire were feasible and infeasible.

Content validity index (CVI) of the instrument were 0.90, 0.93, and 0.98, respectively. Cronbach's alpha coefficient was 0.95.

Ethical Consideration: This study was approved by the Research Ethics Committee on Human, Suan Sunandha Rajabhat University (COA. 59-043-1-3) and Kuchinarai Crown Prince Hospital.

Phase 3 Guideline evaluation

7. Formulate an evaluation and revision strategy: The data from the CNPG implementation in the critical care unit were analyzed using descriptive statistics.

Presentation of the results is divided into 3 parts: Patient outcomes after the CNPG implementation, feasibility of the CNPG, and satisfaction with the CNPG.

1) Patient outcomes after the CNPG implementation: Thirty patients were divided into 2 groups: those who admitted to the CCU before and those who admitted to CCU after the CNPG implementation. The former received usual care and the latter received care under the CNPG. There was no difference between the two groups in regards to the patient age, sex, severity of the disease, and frequency of inotropic therapy at admission. Proportion of patients who received enteral feeding within 48 hours of admission to the CCU increased from 53.33% before to 60% after the CNPG implementation. Proportion of patients who received 60% of the required energy intake within the first 72 hours of enteral feeding increased and complications from enteral feeding decreased after the CNPG implementation (Table 1).

Table1. The patient outcomes of the CNPG implementation

Patient outcomes	Usual care (N=15)	Under the CNPG (N=15)
1. The patient receives enteral feeding within 48 hours of admission to the CCU.	8 (53.33)	9 (60.0)
2. The patient receives 60% of the required energy intake within the first 72 hours of enteral feeding.	6 (40.0)	8 (53.33)
3. Complications arising from enteral feeding		
- Gastric residual volume (GRV) > 500 ml	1 (6.67)	-
- Gastric residual volume (GRV) 200-500 ml	2(13.33)	1(6.67)
- Flatulence - Low	-	1(6.67)
- Flatulence - High	1(6.67)	-

2) Feasibility of the CNPG: After the CNPG implementation, feasibility of the CNPG was assessed in overall and for each step. All nurses (100%) ranked high feasibility for overall and three steps, including enteral feeding method, enteral feeding complication prevention and management, and post-feeding assessment. More than half expressed high feasibility for steps of enteral feeding complication prevention and management and post-feeding assessment (53.84%, and 61.54%, respectively) (Table 2).

3) Satisfaction with the CNPG: Thirteen nurses who participated in the study were asked torate their satisfaction towards the CNPG. Ten nurses (76.9%) expressed high satisfaction while three (23.07%) expressed moderate satisfaction in benefits of the CNPG. Most nurses were aware of the guideline's usefulness, especially on patient safety. In addition, as the nurses also participated in every phase of the development process, they were more likely to accept the guideline. All nurses reported that the guideline was easy, convenient and able to assist in making decision to provide enteral feeding.

Table 2. Feasibility of the CNPG

Steps	Rating	
	High Feasibility (Percentage)	Moderate Feasibility (Percentage)
Overall	13 (100)	-
1. Pre-feeding critical patient readiness assessment	7 (53.84)	6 (46.15)
2. Assessment of caloric and nutritional needs	8 (61.54)	5 (38.5)
3. Enteral feeding method	13 (100)	-
4.Enteral feeding complication prevention and management	13 (100)	-
5. Post-feeding assessment	13 (100)	-

Discussions

This CNPG was designed for nurses, focusing on the importance of feeding practices. After the CNPG implementation, higher and earlier achievement of nutritional goals had been reached. In the first week in CCU, the cumulative amount of energy intake increased after implementing the CNPG. Recording of energy intake for every meal revealed that most of the critical patients met the energy intake requirement. They received an average of 800 calories (SD=219.22) within the first 24 hours and 6,316.67 calories (SD=1,096.10) within the first 7 days. After the CNPG implementation, 60% of the critical patients received enteral feeding within the first 48 hours. Also, 53.33% received 60% of the energy requirements within the first 72 hours. The CNPG also led to decrease of gastric residual volume with less than one tenth (6.67%) had gastric residual of 200-500 ml or flatulence. This consistent with the studied by Barr et al[22] that indicated an increase in the cumulative enteral caloric intake on days 3 and 7 in the ICU after implementation of a feeding protocol. Patients who received enteral nutrition had shorter hospital stay and lower mortality[23].

Regarding the feasibility of the CNPG implementation, all nurses (100%) reported that the guideline was highly feasible. In addition, most nurses reported high feasibility on all five steps (pre-feeding critical patient readiness assessment, assessment of caloric and nutritional needs, enteral feeding method, complication prevention, and post-feeding assessment). Moreover, Thongchai suggested that guideline could increase nurse's confidence and interdisciplinary communication, as well as reduced deviation and conflict in practice[15].

Approximately three quarter of nurses (76.9%) expressed high satisfaction and one quarter (23.07%) expressed moderate satisfaction in benefits of the guideline. This consistent with the study by Suwanyaet al[25], which also found high levels of overall satisfaction among nurses who used guideline.

In conclusion, the CNPG showed the benefit for providing enteral feeding within 24 hours. Starting enteral nutrition as soon as possible without contraindication after resuscitation or with stable circulation[22] helped provide targeted calories to the patients[11]. It was also beneficial for restoration of organs to function normally. Another study showed that critically ill patients who had enteral nutrition within 6 hours after admission, displayed improved intestinal absorption and assisted in preventing intestinal atrophy[7]. The patients would receive targeted calories and protein during the first 7 days of hospitalization[12] and their respiratory muscle function showed improvement, which would increase the ability to wean off the mechanical ventilator[16].

Research limitations

This study focused on critical patients with purposive sampling and small sample size. Therefore, usefulness for the larger population is limited.

Suggestions

1. The staff should be thoroughly trained and informed of this guideline for enteral feeding in critically ill patients in order to promote coordination and systematic use. In addition, personnel, location, and environmental contexts should be taken into consideration

2. The guideline should be updated, revised, and follow-up continually.

3. This guideline for enteral feeding in critical patients is developed for Kuchinarai Crown Prince Hospital, which is a secondary hospital. Other level of medical care settings should review and modify the guideline to be suitable to their contexts.

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