Implementation and Evaluation of Outcome-Present Test (OPT) - Peer Learning Model to Improve Clinical Reasoning Skill among Nursing Students

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ABSTRACT

Clinical reasoning is the core of nursing education to improve students' knowledge and psychomotor skills in clinical settings so that they are capable of delivering excellent and safe nursing care. OPT model has been widely used as an effective method to improve students' clinical reasoning, but there is still no evidence regarding its implementation through peer learning strategy at intensive care unit (ICU).

This study aims to evaluate the implementation of OPT model through peer learning as a strategy to improve students' skill at the ICU. Mixed method with nonequivalent control group design was chosen to distinguish clinical reasoning capability between 8 students in intervention group that implemented OPT model through peer learning and 8 students in control group that implemented conventional nursing process model. Data collected were analyzed using paired and independent sample t-test. Meanwhile, data from focus group discussion were analyzed using Atlas.Ti version 6.1 software. Results of this study show that OPT model through peer learning improves students' clinical reasoning, develop a framework of critical thinking, and increase their understanding of terminologies used in NANDA, NIC, and NOC, as well as their associations.

Nursing educational institutions and clinical instructors can implement OPT model through peer learning as an effective learning strategy for nursing profession students at the ICU, as well as incorporate it in the development of nursing education.

Keywords: Clinical reasoning, Critical Thinking, Knowledge Skills, OPT model, Peer Learning, Psychomotor Skills.

Introduction

Clinical reasoning is an important component in nursing care and defined as various processes and strategies used by nurses to understand patients' data, identify actual or potential problems, make clinical decisions, help overcome patients' problems, and achieve positive patient outcome (Banning, 2008; Fonteyn & Ritter, 2008; Forsberg et al, 2015).

New nurses should have high clinical reasoning skills through mastering various nursing and medical knowledge, be capable of analyzing clinical data from various resources, as well as constructing intervention plan and evaluating patients' condition. However, evidence shows that they lack the clinical reasoning and critical thinking skills required to deliver safe and competent nursing care (Harjai & Tiwari, 2009; Banning, 2008; Harmon & Thompson, 2015).

Nurses at an ICU do at least 50 important clinical reasoning during an 8-hours shift (Thompson *et al.*, 2004); do assessment and make clinical decisions every 30 seconds. Oftentimes, they experience difficulties in making clinical decisions (Freshwater-Turner *et al.*, 2007).

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One of the known learning methods to improve clinical reasoning skill in nursing education is Outcome-Present Test (OPT) model invented by Pesut & Herman (1998). OPT model is a nursing process model designed to develop clinical reasoning skill of the learners. The model focuses on nursing outcome through backward thinking in order to alter clients' health condition from its present state to the desired outcome.

Implementation of OPT model requires learning environment in groups due to the difficulty in understanding its clinical reasoning web and OPT worksheets. In this situation, peer learning comes forth as the effective method to achive learning objectives (Secomb, 2008; Harmon

& Thompson, 2015). Peer learning also serves as a learning method where students of similar states actively help and support each other in completing assignments, require trust and shared commitment, establish goals and targets, as well as perform observation, reflection, and non-evaluative feedback during learning process (Ladyshewsky, 2006; Topping, 2005). Moreover, this method allows each student to learn from the others, involve themselves in active participation, and take responsibility for their own learning (Secomb, 2008; Parkin, 2005).

Objective

This study aims to evaluate the implementation of OPT model through peer learning in improving clinical reasoning skill among nursing students at the ICU by comparing OPT-peer learning model to nursing process method.

Methods

Research intervention

Intervention group. Students, as well as clinical and academic instructors, were given intervention in the form of implemented OPT-peer learning model module. Eight students in the intervention group were divided further into 4 clusters. Every week, each cluster received 1 case to be managed together using OPT worksheets and clinical reasoning web. Students performed assessment, analyzed data, formulated diagnosis, identified keystone issue and cue logic, constructed clinical reasoning web and framing, formulated judgment based on the OPT model, executed actions, presented the case, and performed critical reflection. Every week, each cluster presented the case they had managed to the other clusters, as well as the clinical and academic instructors. The clinical and academic instructors would then perform counseling and assessment based on the OPT model.

Control group. During clinical practice, students, as well as clinical and academic instructors, were using conventional learning model, namely the nursing process method and worksheets, in order to improve clinical reasoning skill.

Ethical clearance

This study has been approved by Research Ethic Committee Faculty of Medicine Universitas Gadjah Mada. During data collection, all subjects were informed about the objectives of the research and informed consents were obtained verbally and in writing.

Data collection

Research design

Research design used was mixed method. Quasi-experimental type with nonequivalent (pretest and post test) control group design was chosen to distinguish clinical reasoning skills between intervention group and control group. After implementation of the model, students were assessed in FGD, while clinical instructors were undergoing in-depth interview. All participants were asked to fill research consent forms.

Instruments of measurement

OPT model structure and scale assessment. OPT model worksheets and clinical reasoning web from each cluster were assessed by 4 instructors using the instruments of OPT model structure and scale assessment every week in order to evaluate students' progress in performing appraisal (client-in-context), establishing nursing diagnosis (keystone issue and cue logic), formulating framing: present state, outcome state, testing, decision making, and judgment. The results of OPT model structure and scale assessment were categorized as insufficient, sufficient, good, and excellent. To measure homogeneity among evaluators, intraclass correlation coefficients developed by Pearson (1901) were used, from which a value of K=0.717 was obtained as an indication of high interrater consistency for

assessment of OPT model structure, as well as a value of K=0.918 as an indication of high interrater consistency for assessment of OPT model scale.

Clinical reasoning skills. Clinical reasoning skills were evaluated using SCT items, which were a set of written test based on clinical scenarios with answer choices containing uncertainty, as well as the application of professional situation in real

setting. SCT scoring used Likert scale with 5 points, namely -2, -1, 0, 1, and 2. Sixty SCT items developed from 20 cases of ICU patients provided high validity and reliability, with a Cronbach alpha score of 0.76.

Sample

Samples used in this study were collected through purposive sampling. This study was carried out among 16 nursing profession students from Faculty of Nursing and Health Science of Muhammadiyah University Semarang that were undergoing clinical practice at the ICU in a 6-

weeks period between July-September 2014. Students were divided into two group, intervention group (8 students) at Tugurejo General Hospital, Semarang and control group (8 students) at Keraton General Hospital Pekalongan. The distance between the two hospitals was approximately 120 km.

Data analysis

Analysis of the characteristics of age, gender, and cumulative grade point average was carried out using frequency distribution, then tested using independent t-test to determine the homogeneity in the control group and the

intervention group. Meanwhile, dependent t-test was used to determine the improvement of clinical reasoning skill in the intervention group on weekly basis. Two-sided significance level test used p-value = 0.05 for all statistical tests.

OPT model structure and scale assessment. Comparison test of OPT model structure and scale assessment was conducted to determine the difference in data significance on weekly basis. All

data were distributed normally and therefore, tested using Colmogorov-Smirnov before undergoing comparison test using dependent paired t-test.

Script concordance test (SCT). After the development of SCT items, normality test was conducted using Colmogorov-Smirnov. Independent t-test was conducted to determine the

difference in the significance of pretest and posttest data between intervention and control group for data with normal distribution.

Atlas.Ti version 6.1 software. This software was used to analyse FGD data of students' and

instructors' perception regarding their experience with OPT-peer learning model.

Results
Students' characteristics. Characteristics of the students in the intervention group and the control group are presented in table 1. There is no significant difference of age, gender, and

cumulative grade point average. All students were graduated as bachelors from nursing program at Universitas Muhammadiyah Semarang within the same year and are currently taking specialistic program at ICU

Table 1 :   Baseline characteristics of students in intervention and control group

Characteristic	Mean±SD	Min-Max	Percentage (%)	n	*P* value
Age					
Intervention	24.12±1.457	22-27	-	8	0.579
Control	23.75±1.164	23-26	-	8	
Cumulative Grade Point Average					
Intervention	3.06±0.09592	29.4-3.20	-	8	0.824

	Mean±SD	Range	%	n	p value
Control	3.04±0.16071	2.81-3.30	-	8	
Gender					
Intervention					
Male	-	-	37.5	3	
Female			62.5	5	0.626
Control					
Male	-	-	50	4	
Female			50	4	

Quantitative analysis

OPT structure assessment. Weekly OPT structure assessment tend to increase, with its only decrease occuring in the fourth week (figure 1). Results from the comparison test suggested no significant difference in OPT model structure assessment up to the fourth week. Significant differences were only found in the fifth (p 0.005) and sixth (p 0.002) week, as shown in table 2.

Table 2: Results from comparison test analysis of OPT structure assessment and OPT scale in intervention group (n=4)

Weeks	n	p value	
		OPT structure assessment	OPT scale
1st Week dan 2nd Week	4	0.718	0.027
1st Week and 3rd Week	4	0.036	0.004
1st Week and 4th Week	4	0.201	0.092
1st Week and 5th Week	4	0.005	0.001
1st Week and 6th Week	4	0.002	0.000

OPT scale assessment. Similar to the structure, OPT model scale assessment also tend to increase, with a decrease occurring in the fourth week. Significant differences in OPT evaluation scale were found in the third, fifth, and sixth week. Meanwhile, no significant difference was found in the fourth week (table 2).

Script concordance test (SCT). Data in table 3 show that no significant difference was found in average SCT scores between intervention group and control group before intervention, as well as between pre and post test SCT scores in the intervention group.

Table 3: Test analysis of difference between intervention group and control group (n=16)

Variable	Intervention Mean±SD	n	Control Mean±SD	P value
Pretest SCT	32±3.421		30±3.432	0.379
Posttest SCT	39±3.884	16	33±3.422	0.018
P value	0.001		0.148	

Qualitative analysis

Qualitative analysis of students' and instructors' perception regarding their experience with OPT model through peer learning obtained from FGD and in-depth interview shows that OPT model through peer learning is generally more effective in improving clinical reasoning skill compared to the conventional nursing process method widely used in clinical learning.

1. **Facilitates counseling process**
   All clinical instructors stated that OPT-peer learning facilitated counseling process by clinical

instructors, stimulated and directed discussion process, prepared students psychologically prior to discussion, and helped achieve targetted competencies. Although this model required the clinical instructors to spare more time for counseling,

" ... Counseling process is much easier than in conventional model. Psychologically, students are more prepared to meet their peers …" (PK.1)

Similarly, students stated that counseling process was much easier to understand.

"...counseling sessions help us understand better and encourage us to study more." (M.2)

2. **Improves clinical reasoning capability**
Compared to the previously implemented nursing process method, OPT-peer learning model promotes and improves critical thinking and clinical reasoning, as well as constructing students' framework.

"… it makes us think, OPT is more in-depth, meaning we have to construct a pathway first before we can identify the nursing problems. This model requires quasi prior to the use of clinical reasoning web …" (M.2)

3. **Encourages self-directed learning**
In general, OPT-peer learning model increases students' interest in reading and motivation to study, improve patient management, increase self-confidence, increase trust and responsibility.

"… using the OPT model, we only needed to make fewer changes after correction and therefore, it increases our motivation to study." (M.1)

Instructors also believed there was an increase of confidence among these students.

"Yes, it's good. Other places may still not allow this kind of practice. But by doing so, their

Discussion

Factors affecting clinical reasoning

To evaluate the effectiveness of OPT model through peer learning in improving clinical reasoning skill, maximum measures were taken to control confounding factors that might affect the clinical reasoning so that validity of the results could be achieved (Notoatmodjo, 2010).

From the data shown in table 1, no significant difference was found in age, academic achievement, and type of education in both

The use of Script concordance test (SCT) to evaluate clinical reasoning skill

confidence in managing patients would increase." (PA.1)

4. **Promotes group learning**
This model encourages discussion within groups so that students can help one another, complement one another, create a comfortable learning environment, delegate assignments among their friends in the group so that studying becomes easier and more enjoyable.

"It was easier to understand cases because there were two of us and hence, we could have discussions more frequently. I myself felt braver to ask the instructors because I had my partner to complement what I was lacking. We also got better understanding because the knowledge possessed by two people varied. We enriched each other's knowledge." (M.7)

5. **Strengthens understanding of terminologies used in NANDA, NIC, and NOC**
Students were encouraged to learn and understand more about NANDA, NIC, and NOC.

"… by assessing patient's condition and comparing it to the data provided in NANDA, I realized I had to learn more about NANDA." (M.6)

6. **Facilitates documentation**
Documentation system of OPT model through peer learning is simpler, more concise, but still comprehensive, easier to evaluate, does not require too much writing, may be understood more quickly, and allows in-depth assessment.

" … After the implementation of OPT, I was forced to study more from NANDA, so I knew better. For example, now I know the risk factors of brain damage …" (M.8)

intervention group and control group. Additionally, the locations chosen for this study were sufficiently far apart to ensure there was no interaction between the groups during intervention, in which the intervention group was at Tugurejo General Hospital Semarang while the control group was at Keraton General Hospital Pekalongan. This measure was intended to prevent students in both groups from exchanging information and experience that might affect the result of this study.

In this study, SCT was used as the basis for evaluating clinical reasoning skill. According to

Groves *et al.* (2002), in evaluating clinical reasoning skill, especially in clinical environment, clinical cases used should be made as real as possible and allow every answer choice to become a potential response for the given problem.

The main reason for the use of SCT is because many evidences have shown its effectiveness in evaluating clinical reasoning. Findings from Deschenes et al. (2011) proved that SCT was very effective in evaluating clinical reasoning skill among emergency psychiatry residents, in which third year residents were demonstrating better clinical reasoning than second and first year residents, whereas findings from Humbert et al. (2011b) showed that experts scored higher than fourth and second year medical students. Lambert et al. (2009) also found that SCT scores of radiation oncologists were higher than those of medical students and residents, while SCT scores of medical residents were higher than those of medical students. SCT can evaluate a person's skill in accordance with their level of expertise.

OPT model through peer learning improves students' clinical reasoning skill.

In general, students' clinical reasoning skill increased after the implementation of OPT model through peer learning. This conclusion is based on SCT scoring results, OPT scale of evaluation, and OPT structure of evaluation.

1. **SCT score as a basis for evaluating clinical reasoning skill**

SCT as a basis for evaluating OPT model has been used in this study only. In general, OPT model through peer learning plays an important role in distinguishing clinical reasoning capability among students in the ICU, as shown by these data 1) no significant difference was found in average SCT scores in intervention group and control group, with p value of 0.38, but there was a significant difference in average SCT scores between intervention group and control group after intervention was conducted, with a p value of 0.02; 2) there was a significant difference in average SCT scores between pretest and posttest in intervention group with a p value of 0.001, but no difference was found in average SCT pretest and posttest scores in control group with a p value of 0.148.

These findings also support previous studies suggesting OPT as a model designed to develop critical thinking and clinical reasoning skill. The implementation of OPT model with a structured counseling and reflection method can improve the acquisition of clinical reasoning skill. It also proves to be an effective learning strategy (Pesut & Herman, 1999, Kautz et al., 2005, Kautz et al., 2006, Bartlett et al., 2008, Bland et al., 2009, Kuiper et al., 2008).

In general, OPT model gives more benefits than nursing process model, including 1) strengthening the reflective nature of clinical reasoning; 2) improving clinical reasoning concurrently and interactively; 3) producing an optimal outcome that is focused on health service system; 4) constructing and implementing critical thinking; 5) increasing nursing knowledge development activities; 6) implementing different strategies in learning, teaching, and researching (Pesut and Herman, 1999).

2. **OPT scale and structure assessment as a basis for improving clinical reasoning skill**

In this study, OPT scale and structure assessment instruments were used to evaluate students' skills. The original instruments in English were translated by the researcher because the items in the instruments were in the form of simple questionnaires that were easy to understand. After being used by 4 supervisors, the instruments were tested and the evaluation consistency among raters appeared to be high (K=0.918) and fairly high (K=0.717). This showed that the OPT scale and structure assessment instruments were validated already.

While the average increase of OPT scale and structure assessment was fluctuating, in general there was a significant correlation in the average scale and structure assessment between the first and the sixth week, which suggested that OPT model effectively improved clinical reasoning.

The findings in this study support previous studies, as stated by Kautz (2009) that OPT model is very effective in improving students' performance and clinical reasoning skill. Bland *et al*. (2009) also found a significant difference

between students' pretest and posttest ability to identify nursing keystone issue correctly (p<0.5). Students were more capable of identifying keystone issue accurately in the posttest, which suggested the effectiveness of OPT model in helping students organize and evaluate collected data to identify critical problems or patient's needs.

Meanwhile Kautz *et al*. (2005) showed that the use of self-regulated learning in this model encouraged significant improvement in self-observation, self-judgment, working knowledge, and utilisation of human resources during clinical experience. The use of assisted reflection in combination with learning structure and tool from OPT model significantly increased the acquisition of clinical skill, as well as provided evidence regarding the effectivity of more-structured learning strategies..

Conclusions and recommendations

The conclusions of this study are 1) there is a significant difference between average SCT scores of nursing profession students in the intervention group implementing OPT model through peer learning and of those in the control group; 2) there is a significant difference between pretest and posttest average SCT scores of nursing profession students in the intervention group implementing OPT model through peer learning; 3) there is a significant increase in OPT model scale assessment from the first to the sixth week among nursing profession students in the intervention group implementing OPT model through peer learning; 4) there is a significant increase in OPT model structure assessment from the first to the sixth week among nursing profession students in the intervention group implementing OPT model through peer learning.

This study recommends that 1) OPT model through peer learning should be implemented as an effective learning strategy to improve clinical reasoning for students who are taking specialistic program at the ICU; 2) further studies are needed to evaluate the implementation of the model in other units requiring high level of clinical reasoning, such as Pediatric Intensive Care Unit (PICU), Neonatus Intensive Care Unit (NICU), Intensive Coronary Care Unit (ICCU), and Emergency Room (ER) number of patients at the ICU; 3) students' lack of understanding in nursing terminologies used in NANDA, NIC, and NOC, as well as their associations.

Limitations

The limitations in this study include 1) lack of optimal assistance from clinical instructors and the nurses in charge of the patients; 2) imbalanced ratio between the number of students and the

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