

Concept Mapping in Clinical Nursing: A Meaningful Learning

Hanem F. Moahmed^{1,2}

¹College of Nursing, King Saud Bin Abdul Aziz University for Health Science, Riyadh, KSA

²Faculty of Nursing, Medical Surgical Nursing department, Tanta University, Egypt

hanemfm@hotmail.com

Abstract: Background: Nursing education encounter many challenges and continuously attempt to improve teaching and learning strategies in theory and practice. With the advanced clinical practice and complexity of students' assessment, nursing students who are the future nurses needs to improve their critical thinking and problem solving skills. The role of nurse educators is to develop critical thinking abilities of students through engaging students in active learning and move from the traditional linear way of thinking. Concept mapping (CM) is one strategy that makes learning meaningful. The purpose of this study was to examine the effectiveness of concept mapping as a learning strategy on developing care plan for adult 2 clinical course. Students' attitude and satisfaction toward using CM in clinical nursing education were also assessed. **Method:** Eighteen students enrolled in adult 2 course at College of Nursing, King Saud Bin Abdul Aziz University for Health Sciences, Riyadh, KSA were included in the study. A quasi experimental design, pre and post test with a control group was utilized. The questionnaire developed to measure students' knowledge and attitude toward using CM. A modified version of the satisfaction questionnaire was used to measure the students' satisfaction with CM. Evaluation of submitted CMs was done to assess effectiveness of using CM in developing care plan for adult 2 clinical course. **Results:** Results indicated that students' knowledge about CM was improved in the post test. Students reported a positive attitude toward using CM in nursing courses. The mean score for the set of CMs developed by the students at the end of the course was higher. CMs developed at the end of the course were more comprehensive and creative. In addition, students showed high satisfaction with using CM strategy in nursing education. **Conclusion and Recommendation:** Nursing education requires understanding and should not based on memorization. Concept mapping can enhance students' creative, logical, and critical thinking which improve independent learning. Adopting CM in all nursing courses and non nursing courses were recommended.

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1. Introduction

Nursing education encounter many challenges and continuously attempt to improve teaching and learning strategies in theory and practice. With the advanced clinical practice and complexity of students' assessment, nursing students who are the future nurses needs to be critical thinkers and problem solvers. The role of nurse educators is to develop critical thinking abilities of students through engaging students in active learning and move from the traditional linear way of thinking. Concept mapping (CM) is one strategy that makes learning meaningful (Novak, 2002). Concept mapping has been used widely in mathematical, science and psychology education and recently known in nursing education (All, *et al.*, 2003; Muller *et al.*, 2001; Daley *et al.*, 1999; All & Havens, 1997; Irvine, 1995). Concept mapping was created based on the learning theory. The theory of learning explains that learning takes place when learners organize information and connect them to each other in order to develop a meaning (Ausubel *et al.*, 1986). Meaningful learning then enhances understanding, facilitate critical and

analytical thinking, and lasts longer. The purpose of this study was to examine the effectiveness of concept mapping as a learning strategy on developing care plan for adult 2 courses. Further, students' attitude and satisfaction toward using CM in nursing education were also assessed.

Research questions

1. Is there a difference in CMs developed in the beginning and at the end of the course?
2. Is there a difference between students' knowledge about CM in the beginning and at the end of the course?
3. What are students' attitudes toward using CM in nursing?
4. What is students' satisfaction with using CM for adult 2 course?
5. Is there a difference in the mean score between intervention and control group?

Hypotheses:

1. There will be a differences between CMs developed in the beginning and at the end of the course?

2. There will be an improvement in students' knowledge at the end of the course compared to their knowledge in the beginning?
3. There will be a significance difference in the mean score between intervention and control group.

2. Methods

Sample and setting:

Eighteen students enrolled in adult 2 course for the fall semester 2012 at female College of Nursing, King Saud Bin Abdul Aziz University for Health Sciences, Riyadh, KSA. Adult 2 courses require students to develop a comprehensive nursing care plan for adult patients with medical surgical health problems. Adult 2 students are aware of the traditional nursing care plan and have developed a simple care plan in the previous semester in adult 1 course.

Design:

A quasi experimental design, pre and post test with a control group was utilized to evaluate the effect of using CM as a learning strategy on students' knowledge, attitude, and satisfaction in developing care plan for adult 2 courses.

Questionnaire:

The study questionnaire was developed to measure students' knowledge toward using CM. Three questions were developed to measure students' knowledge about CM. The 3 questions include: definition of concept mapping, the importance of CM in nursing education, and essential steps needed to develop a CM? To measure attitude toward using CM in nursing education, one question was developed. The question asks: Based on your understanding of CM, would you agree to use CMs as a learning strategy for nursing courses? Responses to the question were 5-point Likert scale with (5) Strongly agree, (4) Agree, (3) Neither agree nor disagree, (2) Disagree, and (1) Strongly disagree.

To measure students' satisfaction with using CM in developing care plan for adult 2 course, a modified version of the satisfaction questionnaire (Chiou, 2008) was used. The questionnaire was originally developed for studying effectiveness of using CMs approach for accounting course. The questionnaire consists of 10 items with 4 points Likert scale from strongly agree (4), agree (3), disagree (2) and strongly disagree (1). Questions from 1 to 4 explore whether using CMs would enhance learning and questions from 5 to 10 identify the affective acceptance of CMs. The questionnaire has a Chronbach Alpha coefficient of .85 (Chiou, 2008).

To measure the effectiveness of using CM in developing care plan for adult 2 course, the CMs

submitted at the beginning and at the end of the course were evaluated to assess improvement and were compared to detect score differences.

Preparation

The 18 students enrolled in adult 2 course were divided into 2 groups, 9 students in each group with 2 different instructors. The 2 groups were receiving their clinical training on the same clinical area but in 2 different days. The group instructed by the investigator was the intervention group. The other group utilized the regular nursing care plan and neither the group nor the instructor knows about the study. Comparison between the 2 groups was done to assess differences in scores between CM and the traditional nursing care plan.

Intervention group:

Pre test of students' knowledge of CM was done in the first week of the semester. The test was done to have a base line data about students' knowledge of CM. Through the 16-week adult 2 course, the researcher discussed in the first week the traditional nursing care plan for the students to provide fair opportunity. The researcher provided 2 classes about CM and the uses of CMs in nursing education. In the following 3 weeks, examples utilizing CMs in planning care of different medical diagnoses were provided by the investigator. Students were asked to provide 2 individual nursing care plan utilizing CM and one map in a groups of 3 students throughout the rest of the semester. Grading of these CMs was not calculated for the course evaluation, but was used to assess students' progress and effectiveness of using CMs. The post clinical conference was used weekly for each student to present a case scenario using CM. Each CM presented was evaluated by the instructor (researcher) and students in the section shared discussion and comments. In the last week of the course, each student was asked to provide individual nursing care plan utilizing CM for grading for the course. This CM granted 10 points as discusses in the evaluation part of the syllabus. To ensure reliability and objectivity in grading the CMs, each item of the 10 items guidance awarded 1 point. Large papers, white board, posters, power point presentation and colored pencils were used to illustrate the maps during the course and for the final one. The following 10-items guidance was used during the semester for the students' presentations of their CM and for the final one.

- On a large paper, poster, or power point presentation please develop the CM for your case scenario using the following 10 items as a guide:
 - Choose one diagnosis from the patients you were assigned to care for this week

- Identify reason for hospitalization, main complain and confirmed medical diagnosis
- Provide sufficient assessment
- List procedures, laboratory tests and medication
- Provide 3 nursing diagnoses using priority
- Identify short and long term goal for each nursing diagnosis
- Define nursing intervention for each nursing diagnosis
- Identify expected outcomes for each nursing diagnosis and evaluate your intervention
- Provide related discharge nursing education
- Use lines or arrows to identify relationships between concepts on the map, and use words that identify the relationship such as related to, cause, essential for, lead to and so on.

Post test

The post test was provided in week 16 for the intervention group. The test included same questions of the pre test. These questions were used to evaluate student's knowledge gained about definition of CM, importance of CM in nursing education and steps required in developing a CM. Students' attitude toward using CM as a teaching method was assessed using the question: Based on your understanding of CM, would you agree to use CM as a learning strategy for nursing courses?

Protection of human subjects:

The purpose of the study was explained to the intervention group. Students were told about voluntary participation and withdrawal at any time in the study. All the 9 students agreed to participate in the study and signed a consent form. A color code was used for each CM instead of names to assure confidentiality.

Data analysis:

Each CM developed in the beginning and at the end of the semester was graded by the investigator to assess students' progress in developing CMs. Students' knowledge about CM pre and post and their attitude were interpreted. Data was entered on SPSS version 16 and a paired sample *t*-test was used to detect the differences between mean scores for the submitted CMS and between intervention and control group.

3. Results

All the students in the intervention group were stream 1 students with a mean age of 21.3 (2). All the students reported registering for 4 courses for the current semester.

Knowledge about CM

Knowledge about CM was assessed using 3 questions: definition of CM, purposes of CM in nursing education, and steps needed to develop CM. Regarding definition of CM, in the pre test, 6 out of

the 9 students responded that they do not know what is CM. One student defined CM as "a way to organize thoughts and make it simple". Another student defined CM as: "take important ideas and put them in a tree". One student did not answer this question.

In the post test, 8 out of the 9 students provided a very close definition for CM as follow: "it is a map to present information in a way that is easy to follow and understand", "It is a way of organizing information and thoughts to get a meaning", "Brain storming that is related to specific concept to provide a picture of how information related to each other", "present important ideas in a tree that is easy to understand and memorize".

Regarding the purpose of CM in nursing education, pre test results indicated that 5 students reported do not know, 2 students provided no answer, and 2 students reported that the purpose of CM in nursing is "to help students to memorize information", and "to simplify information". In the post test, students reported that the purpose of CM in nursing education was "to improve the traditional way of teaching", "increase critical thinking ability", "effective use of time and resources", "help students to memorize information easily", "help students to think independently and improve confidence", and "to connect theory with practice."

As regard steps needed to develop a CM, in the pre test 8 students reported I do not know and one student left it with no answer. In the post test, students reported essential steps are: brain storming, identify the concept and related concepts or ideas, and write down all important information then connect them based on relationship.

Attitude:

Attitude of students' toward using CM in developing care plan for adult 2 course was assessed at the end of the semester. The question asks: Based on your understanding of CM, would you agree to use CM as a learning strategy for nursing courses. Seven students reported that they strongly agree and 2 students agree to use CM in all nursing courses.

Satisfaction questionnaire was used to assess students' satisfaction with using CM. The questionnaire revealed that 100% of students' responses were strongly agree on 6 items and 88.8% agree about the other 4 items on the questionnaire. Data on satisfaction is presented in table 1.

To test the effectiveness of utilizing CM, all the CMs submitted by students at the beginning and at the end of the course were evaluate. Comparing results showed that the first set of 9 CMs were less complex, and showed invalid links between concepts. Mean was reported as 6.6 (0.3), and range (6 -10). The second set of CMs included more details, was

more structured and has correct arrows with a mean of 7.8 0(0.5) and a range of (7.2 -10). The third set of CMs was a set of 3 CMs developed in groups of 3 students each. This set was the best among all submitted CMs. It was more integrated, comprehensive and reported the highest score with a mean of 9.3 (0.3) and range of (9 -10). The final individual set of CMs showed a mean of 8.7(0.5), and range (8.6-10). Results of mean scores are presented in table 2.

There was a significance improvement of the CMs over the time ($t = 5.11$, $df = 18$, $p = .03$)

indicating that utilizing CM had significant effect on students' learning. The set of CM submitted in groups had the highest mean score. This could be because of students sharing their ideas and experience to get the best possible CM for their cases. There were no significance differences between the mean scores between control and intervention group ($t = 4.03$, $df = 23$, $p = .19$) meaning that students in intervention and control group have similar knowledge and learning abilities. Results are shown in table 3.

Table1. Students' satisfaction with CM

	Item	Strongly Agree n=9	Agree
1	CM helped me learn nursing problems in my case	100%	0
2	CM helped me integrate and clarify the interrelationship among concepts in my case	88.8%	11.2%%
3	CM helped me to think independently	100%	0
4	CM helped me reduce barriers and enhance my interest in learning	100%	0
5	CM can be a new teaching and learning approach in nursing	88.8%	11.2%
6	I think CM strategy can be easily used in other subjects	100%	0
7	I will consider using CM learning strategy in other subjects	88.8%	11.2%
8	I was satisfied with using CM to learn in adult 2 course	100%	0
9	I liked using CM to assist me to learn about clinical cases in adult 2 course	100%	0
10	I can soon adapt to CM	88.8%	11.2%

Tables 2. Mean score of CMs at the beginning and at the end of the course.

Item	1 st CM	2 nd CM	Group CM	Final CM
Mean(\pm SD)	6.6 (\pm 0.3)	7.8 \pm (0.5)	9.3 (\pm 0.3)	8.7 (\pm 0.5)
Range	6 -10	7.2-10	9-10	8.6-10

Table 3. Differences in mean score between intervention & control group

Group	n	Mean (\pm SD)	df	t-value	p-value
Intervention	9	8.7 (\pm 0.5)	98	3.25	0.13
Control	9	8.5(\pm 0.6)			

4. Discussion

The objective of this study was to examine the effectiveness of using CM strategy in planning of care for adult 2 courses. The study also aimed at studying students' knowledge, attitude and satisfaction regarding CM. In spite of the small sample, results of the present study add to the body of nursing knowledge that CM improve students' learning abilities to think more analytically and non traditionally. Results showed improvement in students' knowledge regarding CM at the end of the semester. Students were able to provide satisfactory knowledge about definition and uses of CM in nursing education. They were also able to develop a more comprehensive and integrated CM at the end of the semester. This finding was in agreement with many findings in different discipline such as nursing (Hinck *et al.*, 2006; Hsu & Hsieh, 2005; Wilhelm, 2012; accounting (Chiou, 2008), English classes (Chulurur, & DeBacker 2004), and science (Ritchie

& Valk, 2000). These findings stress that CM is suitable teaching strategy in many areas of learning. Students in the intervention group in this study reported a positive attitude toward using CM in adult 2 clinical course and recommended using CM in all nursing courses. This was supported by Shakuntala, (2012) and Tseng, *et al.* (2012) who reported that majority of students reported favorable and positive attitude toward CM and suggested using CM in non nursing courses.

Results also showed high level of satisfaction among students regarding their learning experience and affective recognition of CM. This piece of result was in accordance with Tseng *et al.* (2012); Wu *et al.* (2012); Shakuntala, (2012); and Hink *et al.* (2006) who indicated that students in their study mentioned that CM is the best way to develop nursing care plan.

Findings from this study did not capture significance relationship between CM and traditional

care plan. Students on intervention and control group reported similar knowledge and learning abilities. On the other hand, students in the intervention group reported satisfaction with using CM and expanded their range of challenge to acquire a new learning approach. This result was reported by Kostovich *et al.* (2007) who reported no significant differences between learning style preference and CM grades. In addition, qualitative data on their research revealed students insight and preference of using CM.

5. Conclusion and Recommendations:

Using CM as a teaching strategy was incorporated in the clinical part of adult 2 course. This approach was helpful in expanding the students' understanding of patients' care. Students' were able to pull out meaningful concepts from different sources such as textbooks and field experience to develop a CM for patients' care. Results from this

study provide important evidence for nursing education. Nursing education especially clinical education requires understanding and should not be based on memorization. Concept mapping can enhance students' creative, logical, and critical thinking which improve independent learning.

This strategy can be easily extrapolated to other nursing and non nursing courses, and then curriculum development could be established based on evidence. Farther investigation using larger sample size, comparison of learning gains among all nursing courses, and graduate nurses are needed. Further, relationship between CM and critical thinking abilities among students would be helpful.

Limitations:

Small sample size and limited application to only one course would hinder variability and limit randomization of results from this study.

Colon Cancer

Assessment

- 58 years old man admitted to hospital complaining of bowel obstruction, bleeding, easy fatigue. And abdominal pain
- Has a family history
- He looks pale, weak, and upset
- He has a history of hypertension and hypercholesterolemia .
- BP: 122/80 mmHg, P: 88 b/m, Tem. 36.8C, Res.: 20c/m.
- Colonoscopy indicated colon cancer

Nursing Diagnoses

- Altered comfort RT disease process
- Imbalanced nutrition less than body requirements
- High risk for infection RT low immune

Diagnostic tests

- Physical examination
- Colonoscopy
- Fecal occult blood testing
- CBC

Treatment

- IV fluid
- Preoperative care

Short-term goal

- Pain relieve within 30 minutes
- Improve nutritional status as possible
- Limit visits with people who has infectious diseases
- No evidence of injury or fall

Intervention

- Put the patient in comfortable position
- Provide pain medication as ordered
- Frequent pain assessment
- Provide hot drinks
- Small frequent diets rich in vitamin and consider food preference
- Provide quite environment
- Relaxation techniques as possible
- Assist with activity to avoid fall
- Psychological reassurance

Health education

- Diet: rich in protein, and fiber, low in fat.
- Follow up: do not miss an appointment, notify physician if experience bleeding, pain, or more fatigue.
- Check up every one year
- Medication adherence
- Social involvement

Figure 1: Example of student's CM

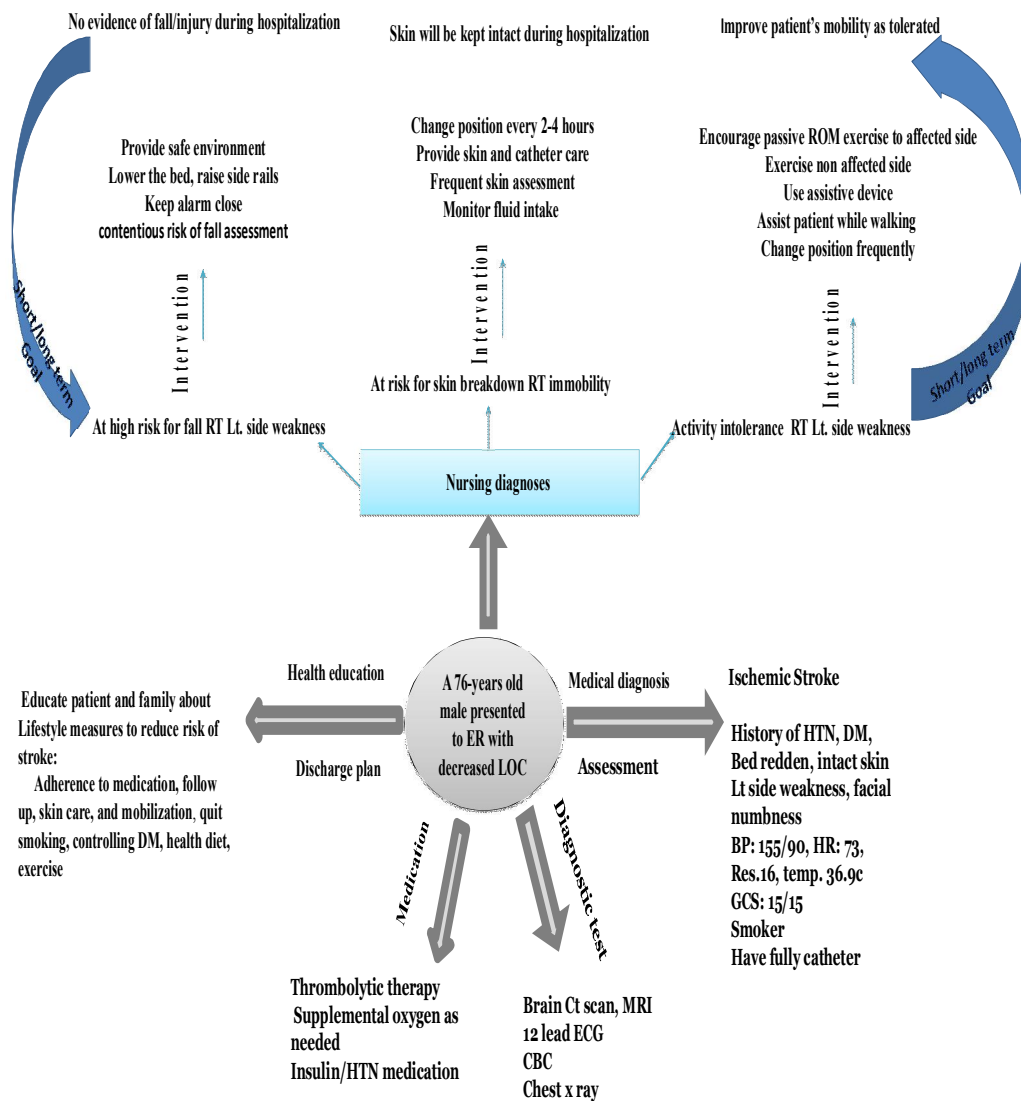


Figure 2: Example of student's CM

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