

Development and validation of a tool to measure safety climate in hospital

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Introduction

- Chemotherapy drugs meet the definition of hazardous drugs (HDs) (NIOSH 2004)
 - Carcinogenicity, teratogenicity, reproductive toxicity, genotoxicity and organ toxicity at low doses.
- Nurses take measures for the safe handling of HDs to reduce exposure to risk (Connor & McDiarmid, 2006).
- Even with clearly defined policies for reducing HD exposure, nurse compliance with safety and protection measures is not ideal (Boiano, Steege, & Sweeney, 2014).
- Nurses perceived safety climate was the factor related to the adoption of precautions (DeJoy et al., 2017; He et al., 2017; Polovich & Clark, 2012).
- But, most safety climate instruments focus on the dimension of safety outcomes for patients. (Lin, Lin, & Lou, 2017)
- One common measuring tool is an employee safety climate test developed by Gershon et al. (2000), and Polovich and Clark (2012) modified the items such that questions were pertinent to HD handling
- Consider cultural and medical environment differences, we develop a tool to measure safety climate in hospital working environment.
- This ongoing project will develop a tool to measure safety climate in hospital working environment and to test its validity to be used for nurses.

Methods

- This study will use a mixed method which combined both qualitative and quantitative designs

- Concept analysis**
- Three attributes to safety climate in healthcare providers
 1. Creation of safe working environment by senior management in healthcare organizations;
 2. Shared perception of healthcare providers about safety of their working environment;
 3. The effective dissemination of safety information.

- Qualitative research**
- Conduct a qualitative study to find out their perceptions and experience of safety climate and develop survey items
 - Semi-structured in-depth interviews were conducted with 11 nurses
 - Content analysis
 - Six dimensions

Generating items

- Based on the results of the qualitative research.
- Drafting individual items avoiding: bias, ambiguity and badly phrased or irrelevant question
- Compare to questionnaire modified by Polovich and Clark (2012) to find out similarity and difference

Response format

- Five-point Likert scale on each statement (1=Strongly Disagree, 2=Disagree, 3=Neutral, 4=Agree, 5=Strong Agree)

Psychometric validation

- Expert consultation
- Face validity
- Construct validity
- Internal consistency
- Test-retest

Results and discussion

• Qualitative research

- This phase work identified six conditions associated with workplace safety climate that influence the nurses' experience of handling chemotherapy (below Table)

• Generating 45 items

Dimension	Item numbers
The perception of creation of safe working environment by the organization manager	7
The perception of creation of safe working environment by their supervisor	8
Interaction between employees and supervisor	7
Interaction with other nurses in their work unit	9
The perception of uses personal protective equipment	9
The perception of clinical situation affect safety performance	5
Total items	45

• Compared to questionnaire of Polovich and Clark (2012)

	Our own	Polovich and Clark (2012)	Item numbers
Section 1	√	√	15
Section 2	√	√	30
Section 3	√	√	6

• Section 1

- We used our own generate items, because participants familiar with the statement. And our own questionnaire items were more specific for handling chemotherapy (See Table 1 for sample items).

Table 1 Sample items of similarity

Our own	Polovich and Clark (2012)
My colleagues could help me with clinical nursing activity.	The members of my work area support one another.
My supervisor could lead the way in discussion the issue of safe handling chemotherapy.	In my work area, there is open communication between supervisors and staff
My supervisor could find a way to help us to implement a policy of safe handling chemotherapy.	Managers on my unit do their part to insure employees' protection from occupational exposure to chemotherapy.

• Section 2

- The main distinguishing feature of our own is under our culture and medical environment (See Table 2 for sample items).

Table 2 Sample items of our own questionnaire

Dimension	Example items
The perception of creation of safe working environment by the organization manager	To comply with safe handling chemotherapy precaution established by our organization can avoid the risk of exposure chemotherapy. I was familiar with safe handling chemotherapy precaution via the internal audit established by our organization. My supervisor make sure employees use personal protective equipment by the internal audit.
The perception of creation of safe working environment by their supervisor	My supervisor could provide employees with practice safe handling chemotherapy precaution. I feel free to express my concerns about exposure chemotherapy issue to my supervisor.
Interaction between employees and supervisor	I am willing to discuss with my supervisor about potential health hazards at work. I always practice what my preached by using personal protective equipment. My colleagues could remind each other of using personal protective equipment.
Interaction with other nurses in their work unit	My colleagues could remind each other of using personal protective equipment. It is easy to wear double gloves. It is comfortable to wear goggles.
The perception of uses personal protective equipment	It is easy to wear double gloves. It is comfortable to wear goggles.
The perception of clinical situation affect safety performance	I can use personal protective equipment even if I am busy at work.

• Section 3

- There were six items in questionnaire of Polovich and Clark (2012), but not in our own (See Table 3).
- We added the six items and submitted to content experts.

Table 3 Items of in questionnaire of Polovich and Clark

In my work area, I have access to policies and procedures regarding safety.
Chemotherapy gloves are readily accessible in my work area.
Chemotherapy gowns are readily available in my work area.
My work area is not crowded
My work area is not cluttered
My work area is kept clean

• Expert consultation

- The five content experts believed the questionnaire to be face-valid and with its comprehensibility, specifically the wording of items, the response format and the instructions. We added **four** items by expert advice.

• Face validity

- The survey (55 items) was examined by 10 nurses who have experience of handling chemotherapy for face validity.
- Feedback from those nurses indicated that the survey addressed issues of importance to workplace safety climate of handling chemotherapy and the instructions and wording were clear.
- Based on the face validity, slight changes were made to improve clarity. The resulting set of **53 items** in six domains.

Conclusion

- The workplace safety climate dimensions derived directly from the findings of qualitative research.
- Most items were not analogous with published tool, in particular the following dimension: interaction with other nurses in their work unit and the perception of uses personal protective equipment.
- Then, we will through rigorous psychometric testing, we will develop a reliable and validated scale for measuring safety climate in hospital.
- The workplace safety climate measurement tool in hospital can be applied to evaluate healthcare providers' work environment. Results of this study can provide recommendations in nursing clinical practice, education, research and policy.

Main Reference

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- Polovich, M., & Clark, P. C. (2012). Factors influencing oncology nurses' use of hazardous drug safe-handling precautions. *Oncology Nursing Forum*, 39(3), E299-309. doi:10.1188/0122.0299.E299