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## The Development and the Content Validation of the Oncology Nurses Health Behaviors Determinants Scale

**Dania Abu-Alhaija, PhD, RN [Assistant Professor],**

University of Cincinnati College of Nursing, 3110 Vine Street, Cincinnati, OH 45221

**Elaine Miller, PhD, RN, CRRN, FAAN, FAHA [Professor of Nursing],**

University of Cincinnati College of Nursing, Cincinnati, Ohio

**Tamilyn Bakas, PhD, RN, FAHA, FAAN [Professor of Nursing and Jane E. Proctor Endowed Chair],**

University of Cincinnati College of Nursing, Cincinnati, Ohio

**Elizabeth Shaughnessy, MD, PhD, FACS, FSSO [Professor of Surgery]**

College of Medicine/ University of Cincinnati Medical Center, Cincinnati Ohio

### Abstract

**Objective:** Chemotherapy exposure is an occupational hazard affecting oncology nurses. The adherence to chemotherapy handling guidelines is essential to prevent the exposure to these drugs. Oncology nurses' health beliefs and the cues in the environment are factors influencing the adherence to these guidelines. There is a lack of instruments with evidence of reliability and validity in the literature that address these factors. The purpose of this paper is to describe the development and the content validation of the Oncology Nurses' Health Behaviors' Determinants Scale relative to adherence to chemotherapy handling guidelines.

**Data Sources:** This study was conducted in two phases; item development, then, content validation using a quantitative cross-sectional design with an exploratory part. A convenience sample of seven experts reviewed the items for relevance, wording, and comprehensiveness. The initial version of the scale that was sent to experts contained 65 items.

**Conclusion:** The Oncology Nurses' Health Behaviors Determinants' Scale has evidence of content validity. Twenty-eight items in the final instrument met the required level of content validity (item content validity index = 0.83). Four additional items were retained due to conceptual significance. Two items were added. The final scale contains 34 items with a total scale content validity index = 0.90.

**Implications for Nursing Practice:** This newly developed instrument could be used to assess the factors that influence chemotherapy exposure among oncology nurses in the light of the Health Belief Model. Following that, interventions can be developed and implemented to foster greater adherence to safe chemotherapy handling guidelines.

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corresponding author Dania Abu-Alhaija, [danialhaija@uc.edu](mailto:danialhaija@uc.edu).

Conflict of Interest:

None Declared

## Keywords

Oncology nurse; chemotherapy; drug; exposure; health belief; scale

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## Introduction

Chemotherapy exposure is an occupational hazard affecting healthcare workers including nurses.<sup>1</sup> Exposure to chemotherapy occurs when there is direct contact with these drugs through mucous membrane or skin absorption, ingestion, inhalation, or injection through a sharp object.<sup>2</sup> Chemotherapy exposure could result in several health complications among healthcare workers.

## Background

An estimated eight million health care workers in the United States were exposed to hazardous drugs including chemotherapy.<sup>1</sup> Studies on the prevalence of chemotherapy exposure show that nurses are exposed to chemotherapy in high rates. According to DeJoy et al,<sup>3</sup> 14% of 1,814 nurse respondents to a survey indicated that they had been exposed to chemotherapy or experienced chemotherapy spills in the past seven days preceding the survey. Additionally, in the study by Friese and colleagues, 51 nurses across 12 oncology settings reported 61 incidents of chemotherapy spills and 11 incidents of chemotherapy exposure in a two-year period.<sup>4</sup>

The reported health complications of chemotherapy exposure among healthcare workers in oncology settings are serious, and they include infertility, miscarriages, congenital abnormalities, low birth weight, genotoxicity, and the increased risk to develop cancer.<sup>5,6</sup> Chemotherapy exposure is particularly a significant occupational hazard among oncology nurses because oncology nurses handle several types of chemotherapy drugs on regular basis at work.

The National Institute for Occupational Safety and Health published guidelines to prevent the exposure to chemotherapy among healthcare workers.<sup>2</sup> Although these handling guidelines are available, oncology nurses still report exposure to chemotherapy. One of the factors that could contribute to this is the inconsistent adherence to these guidelines when handling chemotherapy. Evidence from the literature indicates that nurses' adherence to safe chemotherapy handling guidelines is inadequate<sup>7,8</sup> For example, nurses do not use all the required personal protective equipment when handling chemotherapy (e.g., eye protection, chemotherapy-specific gowns, and respiratory protection).<sup>7,8</sup> Barriers to adherence to safe chemotherapy handling guidelines among oncology nurses are many, and they include knowledge on the safe handling guidelines, workload, interpersonal influences, and managerial support in the workplace.<sup>7,9</sup> Additionally, an important factor affecting nurses' adherence to the guidelines when handling chemotherapy is nurses' individual health beliefs. Indeed, nurses' health beliefs regarding chemotherapy exposure have greater influence on nurses' adherence to guidelines than nurses' knowledge on chemotherapy exposure.<sup>9</sup>

The relationship between an individual's health beliefs and his or her health behaviors is often explained using the Health Belief Model. According to this model, an individual's health beliefs and cues to action influence the likelihood to perform health behaviors.<sup>10–12</sup> Therefore, oncology nurses' health behaviors with regard to adherence to the guidelines when handling chemotherapy could be explained if oncology nurses' health beliefs pertaining to chemotherapy safe handling practices and the cues to action in their working environment are identified. In fact, findings from the literature show that nurses' health beliefs (nurses perceived barriers to using the PPE when handling chemotherapy and nurses perceived self-efficacy to adhere to the safe chemotherapy handling guidelines) are important factors influencing nurses' adherence to the safe chemotherapy handling guidelines.<sup>9,13</sup> Therefore, if these factors are measured, interventions to foster the adherence to guidelines could be developed accordingly.

Indeed, there are instruments that were constructed to measure concepts mentioned in the Health Belief Model such as the instrument developed by Champion<sup>14</sup> to measure the perceived susceptibility, perceived benefits, and perceived barriers to performing mammography test among women. The Champion instrument has evidence of internal consistency reliability, test-retest reliability, and construct validity.<sup>14</sup> Another instrument is a scale developed by Etter and colleagues to measure the perceived self-efficacy to abstain from smoking.<sup>15</sup> This instrument has evidence of internal consistency reliability, discriminant validity, predictive validity, and criterion related validity.<sup>15</sup> Unfortunately, the mentioned two instruments could not be used in the context of oncology nurses who handle chemotherapy, as they are highly specific to their original context.

On the other hand, Polovich and Clark adapted two instruments measuring two of the concepts in the Health Belief Model (nurses perceived barriers to using the PPE when handling chemotherapy and nurses perceived self-efficacy to adhere to the safe chemotherapy handling guidelines) in the context of oncology nurses who handle chemotherapy.<sup>9</sup> These instruments showed evidence of internal consistency reliability and content validity. However, they measure two of the health behaviors' determinants mentioned in the Health Belief Model. Still, in order to interpret oncology nurses' health behaviors in the light of the Health Belief Model, it is essential to consider all the health behaviors' determinants mentioned in the model.

After an extensive review of the literature, no instrument has been found to measure the cues to adhere to safe chemotherapy handling guidelines in the work environment in the context of oncology nurses who handle chemotherapy. As a result, there is a need to develop an instrument with evidence of reliability and validity and measuring all of the oncology nurses' health behaviors' determinants when handling chemotherapy based on the Health Belief Model.

## Purpose and Hypothesis

This paper presents the procedures and the results of the item development phase and the content validation phase pertaining to the Oncology Nurses' Health Behaviors' Determinants Scale with regard to chemotherapy handling practices. The content validation

phase was conducted to test if the Oncology Nurses Health Behaviors Determinants Scale has evidence of content validity in which each item content validity index and the total scale content validity index are at least 0.83.<sup>16</sup>

## Theoretical Framework

The Oncology Nurses' Health Behaviors' Determinants Scale is based on the Health Belief Model. According to the Health Belief Model, an individual's health beliefs and cues to action influence the possibility to perform health behaviors.<sup>10-12</sup> The health beliefs are the perceived severity of a disease or a condition, the perceived susceptibility to acquire the disease or the condition, the perceived benefits of a health behavior, the perceived barriers to execute the behavior, and the perceived self-efficacy to carry out the behavior. In the context of nurses who handle chemotherapy, the health beliefs regarding chemotherapy exposure (the perceived severity of chemotherapy exposure health complications, the perceived susceptibility to acquire these complications, the perceived barriers to adhere to safe chemotherapy handling guidelines, the perceived benefits of adhering to these guidelines, and the perceived self-efficacy to adhere to the guidelines) as well as the cues to action influence the likelihood that a nurse adheres to the guidelines when handling chemotherapy as preventive health behaviors. Table 1 presents the conceptual definitions of the concepts in the Health Belief Model and how they were defined in this study.<sup>10-12</sup>

## Methods

This study was conducted in two phases. The first phase is the development of the new scale's items and the second is the content validation of the developed items.

### Item Development

The Oncology Nurses' Health Behaviors' Determinants Scale was developed based on the Health Belief Model. The scale contains six subscales measuring the health behaviors' determinants specified in the Health Belief Model; five of these subscales are for the oncology nurses' health beliefs with regard to adhering to the guidelines when handling chemotherapy, and one subscale is for the cues in the work environment to adhere to the guidelines when handling chemotherapy. The health beliefs subscales measure the perceived susceptibility to the health complications of chemotherapy exposure, the perceived severity of chemotherapy exposure health complications, the perceived benefits of adhering to the guidelines, the perceived barriers to adhere to the guidelines, and the perceived self-efficacy to adhere to the guidelines.

Initially, a pool of 10-12 items for each subscale was developed by the principal investigator. The items for the Perceived Severity, the Perceived Susceptibility, and Perceived Self-Efficacy subscales were generated based on the conceptual definitions of the concepts in the Health Beliefs Model,<sup>10-12</sup> while the items for Perceived Benefits, Perceived Barriers, and the Cues to Action subscales were developed from factors mentioned in the literature and relevant to the concepts based on the conceptual definitions of the concepts in the Health Beliefs Model.<sup>9,13,17,18</sup> Following that, the newly developed items were revised by the co-investigators. As a result, the first draft of the scale included 65 items. The

response scale for the instrument is a 5- point Likert-type scale ranging from (1) strongly disagree to (5) strongly agree.

### Content Validation

Content validation of an instrument is the process of evaluating the representativeness of the instruments' items to the content domain the instrument is supposed to measure.<sup>16</sup> A quantitative cross-sectional design with an exploratory part was used to conduct this phase of the study. The Institutional Review Board approved the study and determined it as a non-human subject research. Seven experts in the topic (four PhD-prepared nurse researchers, one master-prepared nurse researcher, and two oncology nurse clinicians) were selected to review the developed items.<sup>16,19</sup>

An e-package was sent to the experts through email. The e-package contained a cover letter describing the topic of the instrument, the conceptual definitions of the instrument's subscale concepts, as well as instructions on how to judge the instrument's content validity. The experts were asked to review the wording, comprehensiveness, and the relevance of each item to the concept it is supposed to measure on a scale from 1–4; where 1= not relevant; 2= somewhat relevant, needs major revision; 3= relevant, but needs minor revision; 4= very relevant and succinct.<sup>16,19</sup> Additionally, the items for the six subscales were ordered randomly and the experts were asked to identify the concept each item belongs to.<sup>19–21</sup> Also, the experts were asked to provide their feedback on the appropriateness of the response scale which will be used when administering the instrument to the intended participants.

To quantify the content validity of the Oncology Nurses' Health Behaviors' Determinants Scale, content validity indices at the item, subscale, and scale levels were calculated. Each item content validity index (I-CVI) was calculated by dividing the number of experts who assigned the item to the correct conceptual category and gave the item 3 or 4 in terms of relevance by the total number of experts. The item which had an I-CVI less than 0.83 was deleted. However, some items with CVI less than 0.83 were retained because they are conceptually important. The subscales' content validity indices and the total Scale Content Validity Index (S-CVI) were computed by calculating the average of the items' content validity indices for the subscales and the whole scale.<sup>22</sup> According to Lynn,<sup>16</sup> the minimum desired value for the S-CVI is 0.83.

### Results

As a result of experts' review, the number of items in the final instrument with I-CVI at least 0.83 was 28. Three items with I-CVI=0.71 and one item with I-CVI=0.57 were retained as they are conceptually important. These items belong to the Perceived Susceptibility, the Perceived Benefits and the Perceived Barriers subscales. The contents of these items were identified in the literature as important factors influencing nurses' adherence to the guidelines when handling chemotherapy and nurses' exposure to chemotherapy.<sup>9,13</sup> Additionally, one item was added based on an expert recommendation. Another item which is conceptually important and did not achieve the required level of content validity was significantly reworded then added. Both items were added to the Perceived Barriers subscale in the final instrument. The wording of several items was slightly modified according to

the recommendations. As a result, the final instrument contained 34 items with a total S-CVI=0.90.

The subscales content validity indices were as follows: the Perceived Susceptibility subscale CVI=0.83, the Perceived Severity subscale CVI=0.91, the Perceived Benefits subscale CVI=0.86, the Perceived Barriers subscale CVI=0.84, the Perceived Self-Efficacy subscale CVI=0.97, and the Cues to Action subscale CVI=0.98. More details on the subscales' content validity results are in Table 2. Six experts indicated that the response scale of the instrument is appropriate when administering it to the intended participants.

## Discussion

The Oncology Nurses' Health Behaviors' Determinants Scale includes 34 items with six subscales; five subscales for the health beliefs and one subscale for the cues to action. Compared to the previously developed instruments which measure concepts in the Health Belief Model,<sup>14,15</sup> this instrument can be used in the context of oncology nurses who handle chemotherapy. Further, in contrast with the instruments designed by Polovich and Clark<sup>9</sup> to assess the factors that influence chemotherapy exposure among oncology nurses, this newly developed instrument includes all the health beliefs concepts in the Health Belief Model in addition to the cues to action concept.

According to the findings of this study, the Oncology Nurses Health Behaviors Determinants Scale demonstrates evidence of content validity from seven experts. The total scale CVI=0.90, and items CVIs range between 0.57–1.0. Moreover, all the subscales in the instrument achieved the minimum level of content validity (0.83). The instrument includes four items which did not achieve the minimum level of content validity. These items were retained due to conceptual significance.

Of note, the experts' feedback revealed possible conceptual dimensionality overlapping between the perceived susceptibility and the perceived severity concepts, as most of the categories' mismatch were between these two concepts. This conceptual overlap is supported by a proposed relationship in the Health Belief Model between these two concepts; according to the model, these two concepts combined represent the perceived threat from a disease or condition.<sup>11,12</sup>

Content validation is an important step in the instrument development process. It verifies whether the developed items adequately reflect the conceptual dimensions of the concepts underlying the instrument for the population of interest in a specific context.<sup>20</sup> However, additional testing of this instrument with a sample of oncology nurses is needed to assess the conceptual structure of the instrument through factor analysis, and to gather more evidence of other types of validity. Moreover, the internal consistency reliability indices for the whole instrument and for each subscale are needed to be calculated to assess the reliability of the instrument and each of the subscales.

Future research should be directed to investigate ways to influence more adherence to the guidelines when handling chemotherapy among oncology nurses based on the identified

needs. Also, further factors that affect nurses' adherence to the guidelines when handling chemotherapy and measures to assess these factors should be studied.

### Limitations

The main limitation of this study is related to the sampling procedure. The sample was a convenient sample and included only seven experts. This limited the comprehensiveness and the depth of the feedback; however, a panel of seven experts is considered appropriate to provide judgement on the content validity of an instrument.<sup>16</sup> Furthermore, the instrument includes four items that do not meet the minimum level of content validity, but they have been kept due to conceptual importance. These items, along with the others, will be tested for further psychometric evidence in the next phase.

### Implications for Practice

This newly developed instrument could be used to assess the factors that influence chemotherapy exposure among oncology nurses in the light of the Health Belief Model. Then, interventions can be developed to address these factors if needed. As a result, more adherence to the safe chemotherapy handling guidelines would be fostered among oncology nurses. Thus, protecting oncology nurses from the hazard of chemotherapy exposure. In turn, this would improve the quality of nursing care, as nurses are at a better position to provide high quality care when being in good health and protected from occupational hazards. This instrument has the potential to foster more adherence to safe chemotherapy handling guidelines as it measures important determinants of oncology nurses' behaviors when handling chemotherapy (i.e. nurses' health beliefs and cues to action). Several studies focusing on oncology nurses' exposure to chemotherapy underscore the importance of these factors on influencing the adherence to safe chemotherapy handling guidelines.<sup>9,13,23,24</sup>

### Conclusion

Oncology nurses' health beliefs and the cues action to action in the environment are important determinants for nurses' adherence to the guidelines when handling chemotherapy. The Oncology Nurses' Health Behaviors' Determinants Scale is an instrument that has evidence of content validity and measures the factors that influence chemotherapy exposure among oncology nurses in the light of the Health Belief Model. The rigorous theoretically based procedures for this instrument's item development and content validity testing have provided a promising tool designed to assess oncology nurses' health behaviors determinants when handling chemotherapy. Further psychometric testing will produce a valuable measure that can be used as an assessment tool in practice, as well as an outcome measure for future research on oncology nurses' health behaviors when handling chemotherapy.

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**Table (1):**

The conceptual definitions of the concepts in the Health Belief Model and how they were defined in this study

The Concept	The Conceptual Definition	How It Is Defined in This Study
Perceived susceptibility	The individual belief on the likelihood to develop a disease or condition	An oncology nurse’s belief on the likelihood that he/she will develop health complications, such as, cancer and genotoxicity, if they exposed to chemotherapy.
Perceived severity	The individual belief on the severity of the disease or condition if acquired	An oncology nurse’s belief on the severity of chemotherapy exposure health complications, such as cancer and genotoxicity
Perceived benefits	The individual belief on the positive effects of the advised action on health.	An oncology nurse’s beliefs on the positive effects of adhering to the guidelines when handling chemotherapy, such as, protecting self from health problems like cancer and genotoxicity.
Perceived barriers	The individual belief of the difficulties of performing the advised action.	An oncology nurse’s beliefs regarding the difficulties of adhering to the guidelines when handling chemotherapy, such as, unavailability of the PPE and high workload.
Perceived self-efficacy	The individual’s confidence in his/her ability to perform the action that produces the desired outcome.	An oncology nurse’s confidence in his/her success to adhere to the guidelines when handling chemotherapy to protect self from chemotherapy exposure complications.
Cues to action	Strategies on how to influence the readiness to perform the health behavior.	The events occurred, strategies implemented, or polices adopted that influence oncology nurses to adhere to the guidelines when handling chemotherapy.

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**Table (2):**

The Content Validity Results of the Oncology Nurses' Health Behaviors Determinants Scale

Subscale	Subscale CVI	Number of Items in the Original Instrument	Number of Valid Items in the Final Instrument CVI 0.83	Number of retained Items with CVI < 0.83	Number of Added Items	Number of Items in the Final Instrument
Perceived Susceptibility	0.83	12	3	2	0	5
Perceived Severity	0.91	10	3	0	0	3
Perceived Benefits	0.86	12	3	1	0	4
Perceived Barriers	0.84	11	7	1	2	10
Perceived Self-Efficacy	0.97	10	5	0	0	5
Cues to Action	0.98	10	7	0	0	7

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