Development of Data Models for Nursing Assessment of Cancer Survivors Using Concept Analysis

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Abstract. The purpose of this study was to develop and validate data models for the nursing assessment of cancer survivors. Data models developed in this study were guided by a modification of the concept analysis developed by Walker and Avant, including determining the purpose of analysis, identifying data elements, defining the data elements and their uses, determining critical attributes, value sets, and optionalities, and constructing data models. The developed data models were examined externally by domain experts. We developed 112 data models with 29 critical attributes, 102 value sets, and 6 data types for the assessment of cancer survivors. External validation revealed that the data elements, critical attributes, and value sets proposed in this study were comprehensive, relevant, and sufficiently useful to encompass the nursing problems of cancer survivors. Data models developed in this study will contribute to ensuring semantic interoperability of data collected from cancer survivors. This in return will improve the quality of nursing assessment.

Keywords. standards, nursing assessment, data model, concept analysis

1. Introduction

The sharing of cancer-related information among healthcare professionals is key to the quality of long-term cancer care for cancer survivors [1]. The cancer-related information can only be shared if they are represented in a way that all healthcare professionals can understand [2]. The ability of all healthcare professionals and multiple systems to understand the clinical data is known as semantic interoperability. One way to ensure semantic interoperability is to model data by specifying the key data elements, the critical attributes of each data element, and possible value set and optionality for each attribute [3]. Ongoing research on data modeling has been underway in various countries. Examples are the openEHR archetype in Australia [4], the detailed clinical model in the Netherlands, HL7 [5], and clinical element models in the USA [6]. Although nurses and physicians handle the same situations, they often view the situations in different ways. It has thus been emphasized over the past few years that the nursing profession should develop its own data models [3]. The purpose of this study was thus to develop and validate data models for the nursing assessment of cancer survivors using concept analysis.

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2. Methods

The development of the data models was guided by a modification of the concept analysis developed by Walker and Avant [7], which was chosen because its process is well suited for the development of data models. Steps include determining the purpose of analysis, identifying data elements, defining the data elements and their uses, determining critical attributes, value sets, and optionality, constructing data models, and validation of data models.

3. Results

In total, 112 data elements were identified. Forty-four data elements (39.3%) were extracted by analyzing the clinical nursing statements. Sixty-four data elements (57.1%) were identified from literature review, and four data elements (3.6%) were identified from the experts’ evaluation. In total, 29 critical attributes were identified to express the data elements. The optionality of the attributes, that is whether the attribute was optional or mandatory, was defined. The data type of each attribute was classified based on the HL7 data type list.

More than 80% of expert panel of clinicians rated the 112 data models using a response of “strongly agree” or “agree” to the questions of “usefulness”, “reusability”, “nonambiguity”, “comprehensiveness”, and “nonredundancy”. Discussion Conclusion

4. Conclusion

Data models developed in this study will contribute to ensuring semantic interoperability of data collected from cancer survivors. This in return will improve the quality of nursing assessment.

References