Evaluation of the draft international standard for a reference terminology model for nursing actions

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Abstract

Purpose: The purpose of this study was to evaluate the draft ISO reference terminology model (RTM) for nursing actions. Nursing RTM models attempt to include concepts that are universally represented in nursing documentation to improve the depiction of nursing practice in computerized systems.

Method: Content analysis was used to decompose interventions into words and phrases, which were then mapped to the six model categories used to represent nursing actions in the draft ISO RTM. The decomposition of interventions was applied to nurses’ documentation of pain interventions entered into a clinical information system.

Findings: Consistent with the ISO standard requirements, all (100.00%) of the interventions contained an (action) word or phrase and a ((target)). Additional findings are discussed in relation to earlier studies of terminology models.

Conclusions: It is recommended that terminology and information system developers consider this model in their ongoing system development, evaluation, maintenance, and revisions. Further evaluation of the ISO RTM for nursing will contribute to the goals of this specific model and the harmonization and integration with other health care models.

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1. Introduction

Health care costs continue to rise along with increased demands from consumers. Increasingly, nurses are being asked to demonstrate how nursing influences the quality and cost of health care. Measurement of nursing outcomes requires the collection of data that accurately represents clinical nursing treatment and care.

For almost 30 years, nurses have been developing classification and terminology systems that represent the diagnoses, interventions, and most recently, outcomes of the professional domain. However, these systems lack the conceptual structure necessary for their direct incorporation in modern object-oriented computer database systems [1]. Moreover, there is the need to aggregate data across time and geography to link process to outcome data [2]. Toward this end, computer-based systems should use terminologies that allow the comparison of data collected using different nursing and health care classifications, and even across different languages [3]. Such terminologies have alternately been referred to as concept-oriented terminologies, reference terminologies, formal terminologies, or third-generation language systems [3]. The phrase “reference terminology” refers to a set of terms representing a system of concepts, formally defined and rendered amenable to computer processing [4]. These terminologies index concepts, and then compose these concepts utilizing explicit rules for fact retrieval and knowledge representation. Concepts are linked according to their valid syntactic and semantic relationships [5]. Development of
concept-oriented terminologies allows: (1) non-ambiguous representation of concepts, (2) lossless data transformation, (3) facilitation of mapping among terminologies, (4) data re-use in different contexts, and (5) automated classification of new concepts [5]. A reference terminology model (RTM) depicts the framework of categories or attributes of terms and the relationships among these attributes that provide a structure for the organization of terms to represent concepts [6]. Theoretically, through the use of a RTM, terms and concepts across different classification systems can be represented and harmonized across computerized databases. Furthermore, it is hypothesized that these terminologies will enable the representation of nursing care in sufficient granularity to depict care processes [7].

The purpose of this study was to evaluate the draft International Standards Organization (ISO) RTM for nursing actions. Specifically, the model was tested according to (a) its ability to accommodate a selected set of nursing interventions and (b) how model categories are represented in nursing documentation. The six semantic domains and categories represented in the ISO RTM are: action, target, recipient of care, means, route, and site [6]. Nursing interventions related to “pain management” were selected as a test set because “pain” has been cited as one of the most frequent patient problems by nurses [8] and “pain control” or “pain management” has been identified as an indicator of the quality of nursing care. In addition, “pain management” has been difficult for health care agencies to analyze [9].

1.1. Research question

The research question was: What percentage of pain interventions, documented by nurses, in the care of adult surgical patients, included attributes of nursing actions as represented in the ISO reference terminology model? The following subset of questions also was tested in this sample:

(a) How is the ISO reference terminology model category, ⟨action⟩, represented in nurses’ documentation of pain interventions for adult surgical patients?
(b) How is the ISO reference terminology model domain, ⟨(means)⟩, represented in nurses’ documentation of pain interventions for adult surgical patients?
(c) How is the ISO reference terminology model category, ⟨route⟩, represented in nurses’ documentation of pain interventions for adult surgical patients?
(d) How is the ISO reference terminology model domain, ⟨(target)⟩, represented in nurses’ documentation of pain interventions for adult surgical patients?
(e) How is the ISO reference terminology model domain, ⟨(site)⟩, represented in nurses’ documentation of pain interventions for adult surgical patients?
(f) How is the ISO reference terminology model domain, ⟨(recipient of care)⟩, represented in nurses’ documentation of pain interventions for adult surgical patients?

2. Background

2.1. Previous efforts

Efforts to design RTMs for nursing practice have been based on previous work to develop nursing practice and administrative classifications and terminologies. A number of standardized nursing classifications, also referred to as interface terminologies, exist for nursing diagnoses, nursing interventions, nursing-sensitive outcomes of care, and patient goals [3]. However, these classifications lack the conceptual structure necessary for their direct incorporation in modern object-oriented computer database systems [1]. Concept-oriented or reference terminologies have the potential to expand the structure needed for documentation in modern computer database systems. Therefore, recent efforts have centered on the development of reference terminologies that can serve as intermediaries between interface terminologies and computer database systems.

Research has primarily been concerned with the evaluation of the conceptual structure of proposed RTMs by testing their ability to represent nursing terms, either nursing problems or nursing interventions. Terminology models evaluated in this way are the International Classification for Nursing Practice (ICNP) [9], the European Committee for Standardization (CEN) Categorical Structure for Nursing [10], the Loose Canon Model for Nursing Interventions [5], the Systematized Nomenclature of Human and Veterinary Medicine—Reference Terminology (SNOMED-RT) [11], and the Logical Observation Identifiers, Names, and Codes (LOINC) [12]. Table 1 provides a comparison of the categorical structures of RTMs for nursing actions.

In common with this study, an evaluation of the Loose Canon Model by Bakken et al. [13] used clinical nursing data from existing health records. Other evaluation studies have used interventions from existing nursing terminology systems to test terminology models [4,14]. The results of both of these types of evaluative studies will be further reviewed and discussed in comparison with the findings from this study.

2.2. Proposed ISO RTM for nursing actions

The need for an international standard for nursing reference terminology models was proposed by the International Medical Informatics Association—Nursing Informatics Special Interest Group (IMIA-NI) and the International Council of Nurses (ICN) and submitted as
a proposed work item to the International Organization for Standardization (ISO) in 2000. IMIA-NI and ICN partnered to lead the project to develop an ISO standard for a RTM for nursing [3]. ISO is a worldwide coalition of national standards bodies. Interested coalition members working in technical committees complete the preparation of standards. Technical committee members may also include members of international, governmental, and non-governmental organizations. The proposed ISO RTM was prepared by Technical Committee ISO/TC215 Health Informatics, Working Group 3.

2.3. Health concept representation

The ISO Committee Draft includes a nursing RTM for nursing actions and nursing diagnoses, along with the relevant terminology and definitions for their implementation. The models were designed and refined through testing and expert consensus by the Work Item Task Group. The potential uses for these reference terminology models are to:

- support the intensional definition of nursing diagnosis and nursing action concepts, facilitating the representation of nursing diagnosis and nursing action concepts and their relationships in a manner suitable for computer processing,
- provide a framework for the generation of compositional expressions from atomic concepts within a reference terminology,
- facilitate the mapping among nursing diagnosis and nursing action concepts from various terminologies including those developed as interface terminologies and statistical classifications,
- enable the systematic evaluation of terminologies and associated terminology models for purposes of harmonization, and provide a language to describe the structure of nursing diagnosis and nursing action concepts in order to enable appropriate integration with information models (e.g., Health Level 7 Reference Information Model) ([6], p. 1).

The Committee Draft of the ISO RTM for nursing actions identifies six semantic domains or categories. For the purposes of this model, semantic categories are enclosed in single angle brackets \((\langle\rangle)\), and semantic domains in double angle brackets \((\langle\langle\rangle)\). A semantic category is a term chosen to represent a set of homogeneous subordinate concepts, such as \(\langle\text{action}\rangle\) or \(\langle\text{route}\rangle\). Semantic domains are a set of semantic categories that take the same role in the concept model. Examples of semantic domains in this model are \(\langle\langle\text{target}\rangle\rangle\), \(\langle\langle\text{means}\rangle\rangle\), and \(\langle\langle\text{recipient of care}\rangle\rangle\). Semantic links are used in the model to denote an associative relation between semantic categories or domains. The ISO RTM uses six semantic links to illustrate these associations: acts on, has recipient of care, has means, has route, has site, and has timing. Fig. 1 illustrates the draft ISO RTM for nursing actions.

3. Method

3.1. Sample

The sample included documented nursing interventions related to management of pain in surgical patients obtained from a 160-bed, non-profit, community hospital in a Mid-Atlantic State, USA. These patients resided on a surgical nursing unit of approximately 26 beds. This hospital setting used an adaptation of the Nursing Intervention Classification (NIC) [15] for nursing intervention documentation in a clinical information system. Over the course of three months, there were a total of 21,065 interventions collected.

<table>
<thead>
<tr>
<th>Attribute</th>
<th>ISO</th>
<th>CEN</th>
<th>ICNP</th>
<th>Loose Canon</th>
</tr>
</thead>
<tbody>
<tr>
<td>Action</td>
<td>Action</td>
<td>Action</td>
<td>Action type</td>
<td>Delivery Mode</td>
</tr>
<tr>
<td>Target</td>
<td>Target</td>
<td>Target</td>
<td>Target</td>
<td>Activity focus</td>
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<td>Means</td>
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<tr>
<td>Site</td>
<td>Site</td>
<td>Site</td>
<td>Topology/location</td>
<td></td>
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<tr>
<td>Route</td>
<td>Route</td>
<td>Route</td>
<td>Routes</td>
<td></td>
</tr>
<tr>
<td>Timing</td>
<td>Time</td>
<td>Time</td>
<td>Time</td>
<td></td>
</tr>
<tr>
<td>Recipient</td>
<td>Recipient of care</td>
<td>Beneficiary</td>
<td>Beneficiary</td>
<td>Recipient</td>
</tr>
</tbody>
</table>

Fig. 1. ISO RTM for nursing actions ([6], p. 6). The terms and definitions taken from ISO/FDIS 18104, Fig. 2—Reference terminology model for nursing actions—are reproduced with the permission of the International Organization for Standardization, ISO. This figure being taken from a draft standard is subject to changes. Copyright remains with ISO.
3.2. Data collection

Nursing actions that were examined in this study were entered into a clinical information system database using an in-house adaptation of NIC. The interventions were entered into the database as documentation of the nursing interventions used in the process of caring for patients in pain. Unfortunately, medication administration documentation was not integrated into this clinical nursing data set. Thus specific information regarding type, dose, and route of medication was not available.

Nurses selected interventions for documentation from a set of 32 nursing activities related to the management of pain. Nursing activities could be selected individually or as a sub-set of the total activities under an intervention label, ‘pain protocol’ for documentation. Of the entries into the clinical information system to document pain, 85% were to document activities individually. However, because multiple activities could be selected with one entry, those selected as a sub-set of the total interventions under an intervention label represented 76% of the interventions in the dataset.

3.3. Analysis

The sample of nursing interventions was decomposed into words and phrases and mapped to the six attributes used to represent nursing action in the proposed ISO RTM. The method used to guide the decomposition and coding of interventions was a variation of content analysis. Coding concept characteristics at the obvious or manifest level of recorded language is referred to as semantic content analysis. Semantic content analysis entails the coding and counting of words or phrases into categories that relate to identified concept characteristics [16].

Pain interventions were decomposed into individual words and phrases and mapped to the six attributes used to represent nursing action in the proposed ISO RTM. ISO model attributes used to represent nursing action are: action, target, recipient of care, means, route, and site. Then, three experts in surgical nursing practice evaluated the proposed decompositions until complete consensus was reached between group members on the final coding scheme. The expert panel used the ISO definitions to guide the mapping of words and phrases to the six attributes in the model. Finally, the resulting coding scheme was applied to the entire patient generated intervention dataset to decompose and map each intervention.

4. Findings

4.1. Description of the dataset

These data represent activities related to pain management, documented on 677 patients admitted to this surgical unit over a 3-month period. All patient identifiers were removed from the documentation prior to analysis. The number of interventions recorded for each patient represented in the dataset ranged from 1 to 1140, with a mean number of activities recorded for each patient of 31. Interventions were entered into the clinical information system for documentation 24 h a day: 50.5% of the interventions were documented between 12:00 am and 8:00 am, 26.3% between 8:00 am and 4:00 pm, and 23.2% of the interventions were documented between the hours of 4:00 pm and 12:00 am. Fig. 2 illustrates the proposed ISO RTM for nursing actions and the percentage of documented interventions containing words or phrases that map to each model category/domain.

4.2. Representation of model categories

All of the interventions documented by nurses contained a word or phrase that described a nursing action. The most frequently occurring word was ‘reassess’ (13.52%), followed by ‘assess’ (12.96%), and ‘document’ (11.83%). In each of the interventions where the nursing action ‘reassess’ occurred, the target of that nursing action was ‘pain’ and the nursing action was accompanied by a word or phrase designating the timing of the action. All of the interventions containing the action ‘assess’ had a recipient of care implicitly identified as ‘patient’ and all of the terms containing the action ‘notify’ had a recipient of care explicitly identified as ‘MD.’

Interventions containing a word or phrase to qualify a nursing action with the timing of that action constituted 25.35% of the total interventions documented, each word or phrase was uniquely associated with one intervention. Words or phrases to describe timing in the documented intervention terms were used to qualify only three nursing actions: ‘reassess’ (53.33%), ‘evaluate’ (35%), and ‘offer’ (11.66%).

All of the documented interventions contained a word or phrase that described the target of the nursing action. The most frequently used word or phrase was
‘pain’ (22.39%), followed by ‘effectiveness of pain medication’ (8.87%), and ‘pain level’ (8.63%). The word ‘pain’ was not consistently associated with any particular nursing action or means. However the word ‘pain’ was always associated with the patient as the recipient of care, either implicitly (85%) or explicitly (15%). On the other hand, the phrase ‘effectiveness of pain medication’ was always associated with the nursing action ‘evaluate’ and ‘pain assessment’ and ‘initial pain assessment note’ were always associated with the nursing action ‘document.’ All other words and phrases used to describe the target of nursing action occurred in only one intervention.

The recipient of care was explicitly described in 37.7% and implicitly described in 62.30% of documented interventions. The patient was identified as the recipient of care (implicitly or explicitly) in 82.86% of all documented interventions. All of the intervention terms documented with the recipient of care as ‘MD’ contained the nursing action ‘notify.’ Where the patient was explicitly identified as the recipient of care, the majority (70.35%) of interventions were related to patient teaching and contained the phrases or words ‘instruct’ or ‘encourage/teach.’ The remainder (29.63%) of documented interventions where the patient was explicitly identified contained the nursing action ‘monitor.’

Of the 21,065 nursing interventions documented, 32% included a phrase or word that indicated the means by which the nursing action occurred. Each word or phrase was represented in only one intervention except ‘0–10/faces scale,’ which was represented in two interventions, or 26.73% of the documented interventions. All of the interventions that included the phrase ‘0–10/faces scale’ were related to patient assessment and included the nursing action ‘assess’ or ‘assessed.’ In addition, 27.49% of the documented terms with a means specifically identified contained the nursing action ‘document’ and 18.3% of the documented terms contained the nursing action ‘offer.’ The vast majority (90.85%) of interventions that contained a word or phrase that identified means also contained the word ‘pain’ within the word or phrase describing the target of the nursing action.

Only 6.4% of the documented interventions included a word that identified the route that the nursing action would take, each word occurred in one intervention. Of these documented interventions, 91.8% were used in terms where the nursing action was ‘evaluate’ and the target of that action was ‘effectiveness of pain medication.’ The remainder of the documented terms that contained a word to describe route were related to patient teaching and contained the nursing action phrases ‘instructed’ and ‘reinforcement given,’ targeting the use of either an epidural or PCA pump.

5. Discussion
5.1. Nursing intervention term decomposition

Panel members had little difficulty identifying words and phrases within the intervention terms that fit the category ⟨action⟩. More discussion was needed to determine which words and phrases should be included into the categories ⟨⟨target⟩⟩, ⟨⟨recipient of care⟩⟩, and ⟨⟨means⟩⟩. Intervention words and phrases that could be included in the category ⟨⟨target⟩⟩ were often found to include descriptors of the phenomena of concern, for example, ‘pain level,’ and ‘effectiveness of pain medication.’ Panel members considered only including ‘pain’ or ‘pain medication’ as the words to describe ⟨⟨target⟩⟩ in these instances. However, after referring to the definition provided by the ISO for the category ⟨⟨target⟩⟩, they decided that the whole phrase, for example ‘effectiveness of pain medication’ better captured the content of the nursing action.

In the ISO RTM for nursing actions, timing is used as a qualifier for the model category ⟨action⟩. None of the intervention terms included specific times. Panel members decided that phrases such as ‘eight hours after medications,’ ‘at time of vital signs,’ and ‘frequently’ were used in the intervention terms to qualify action and included these under the timing qualifier.

While all the intervention terms were documented to reflect the care of patients, the expert panel, again referred to the ISO definition to guide their classification of words and phrases in the model category, ⟨⟨recipient of care⟩⟩. In the definition of the category ⟨⟨recipient of care⟩⟩ the document clearly states that this refers to “to whom the action is delivered” and includes as examples of semantic categories ⟨individual⟩, ⟨group⟩, or ⟨physical environment⟩ [6]. For this reason, the panel categorized the MD as the recipient of care in several intervention terms and the environment as the recipient of care in one intervention term. The panel was guided only by the ISO definition, which did not provide clear direction in actual use. It is the author’s opinion that there is a need for further clarity in the ISO definition of ⟨⟨recipient of care⟩⟩.

The ISO definition for the domain ⟨⟨means⟩⟩ specifies that this be the entity used in performing the nursing action and includes as examples the semantic categories ⟨resource⟩, ⟨device⟩, and ⟨substance⟩ [6]. Some phrases, such as ‘0–10/faces scale’ or ‘describe’ were easily placed in this category; others proved to be more problematic. For some interventions, the panel focused on the semantic category example ⟨resource⟩ and determined that words and phrases such as ‘if ordered PRN’ and ‘ordered’ constituted a resource that the nurse could use as a means to perform the nursing action. Other intervention terms included the word ‘appropriate’ (as in ‘offer non-pharmacological treatment methods as appropriate
or ordered’). After much discussion as to whether these phrases specified the timing or means for an action, the panel agreed that the word ‘appropriate’ implied some means to determine when the nursing action would or would not be ‘appropriate’ and decided to include this term in ⟨⟨means⟩⟩. In addition, similar to ⟨⟨target⟩⟩, there was the problem of more than one concept per one intervention term for ⟨⟨means⟩⟩ (e.g., appropriate and ordered).

All panel members agreed that the ISO RTM would prove useful in writing and evaluating nursing intervention terms. That so few interventions contained terms that explicitly identified a means by which the action would be carried out, was felt to be a particular deficit of these interventions. Panel members agreed that measuring the outcomes associated with these interventions would be extremely difficult without a specific means to evaluate.

Accomplishing the dissection of these terms required an understanding of the clinical process being described and terminology model attributes. An understanding of the clinical process and the context in which it occurs has been cited as essential to the meaningful dissection and mapping of terms in several other studies [8,17–19]. In this study, attribute definitions used to guide term dissection and mapping became the most important factor in consistently mapping words and phrases to their appropriate model attribute.

The importance of maintaining conceptual consistency between definitions for categories and intervention terms has been cited as crucial in other studies of nursing term mapping [8,18,20]. While the ISO model attributes contained some examples of how an attribute may be represented in nursing terms, team members in this study would have benefited from more examples under each category. For example, the problem with ISO model definition for ⟨⟨recipient of care⟩⟩ was noted in this study findings. There are no examples other than “client” in the ISO proposal. The model authors specifically point out that an exhaustive list of examples were beyond the scope of the proposed RTM standard [6]. Another team could easily interpret the model attribute definitions differently and therefore have mapped the words and phrases in the intervention terms differently. Unfortunately, multiple interpretations and the resulting differences in database construction, limits the reliability of data analysis across various clinical settings.

5.2. ISO RTM for nursing action

Using 1039 nursing activity terms derived from the health records of patients hospitalized for an AIDS-related condition, Bakken et al. [13] evaluated the Loose Canon Model attributes’ ability to accommodate the terms. The Loose Canon Model of Nursing Interventions has three conceptual attributes: delivery mode, activity focus, and recipient. The delivery mode is the manner in which the activity is applied to the recipient (e.g., assess, coordinate, and teach [18]) and is equivalent to the ISO model category (action). Activity focus is the phenomenon on which the activity is centered and is equivalent to the ISO model domain ⟨⟨target⟩⟩. Finally, the Loose Canon Model attribute, recipient, is the person, family, organization, or aggregate to whom the activity is delivered and is equivalent to the ISO model domain ⟨⟨recipient of care⟩⟩. All three elements of the model were included in 73.9% of the nursing activity terms.

Bakken et al. [4] also studied intervention terms derived from the Home Health Care Classification (HHCC) [21] and the Omaha System (OS) [22]. Delivery mode, activity focus, and recipient (explicitly or implicitly) were found to be present in 91.3% of the HHCC terms, and 63.5% of the OS intervention terms. In this study, the equivalent attribute categories, action; target; and recipient of care (explicitly or implicitly), were found to be present in 100% of the intervention terms from HHCC and OS.

In contrast, the intervention terms, from Bakken et al., that were composed and charted by nurses caring for patients with an AIDS-related disorder, were less likely to contain a word or phrase describing the delivery mode or action and activity focus or target of the nursing action [13]. In Table 2 the frequencies of intervention terms reported for each attribute category in the Loose Canon Model studies and in the data set of intervention terms used in this study are displayed.

The intervention terms derived from the HHCC, OS, and this study meet the ISO model standard requirement that all intervention terms contain an ‘action’ and a ‘target.’ Perhaps, this is due to the fact that these intervention terms were composed prior to documentation, with perhaps more attention to their structure. That the intervention terms composed by nurses at the time of documentation do not all contain a word or phrase to describe the nursing action and target of that action, could have important consequences for the use of natural language system databases.

<table>
<thead>
<tr>
<th>Table 2</th>
<th>Comparison of Loose Canon Model attributes in previous and current study</th>
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<tbody>
<tr>
<td><strong>Model attribute</strong></td>
<td><strong>DB</strong></td>
</tr>
<tr>
<td>Delivery mode/action</td>
<td>82%</td>
</tr>
<tr>
<td>Activity focus/target</td>
<td>95.1%</td>
</tr>
<tr>
<td>Recipient/recipient of care</td>
<td></td>
</tr>
<tr>
<td>Explicit</td>
<td>19.2%</td>
</tr>
<tr>
<td>Implicit</td>
<td>75.9%</td>
</tr>
</tbody>
</table>

DB: charted terms from Bakken et al. [18]; HHCC: from Bakken et al. [4]; OS: from Bakken et al. [4]; CS: current study intervention terms.
Another study evaluated the intervention axes of the International Classification for Nursing Practice (ICNP) as terminology model components, using intervention terms derived from the HHCC and the Patient Care Data Set (PCDS) [14,23]. ICNP intervention axes are very similar to the attributes in the proposed ISO RTM for nursing action [24]. In the ISO model, the ICNP axes ‘topology’ and ‘location’ have been replaced with one domain ⟨(site)⟩ and the ICNP axis ‘time’ is used to qualify the attribute ⟨(action)⟩ in the ISO model. In addition, the ICNP intervention axes ‘beneficiary’ is renamed ⟨(recipient of care)⟩ in the ISO RTM. Nevertheless, the definitions of each are similar enough to allow some meaningful comparison between the two. In the ICNP ‘beneficiary’ is defined as “the entity to whose advantage a nursing action is performed” [24] and in the ISO RTM ⟨(recipient of care)⟩ is defined as “the person, family, group, or other aggregate to whom the action is delivered” [6]. The distinction between “beneficiary” and “recipient” is important and should be clarified in further development of these models.

The researchers reported that all of the ICNP axes were represented in at least some of the PCDS intervention terms, however, only three ICNP axes: action type, beneficiary, and target were represented in the set of HHCC terms. Terms that contained an explicit or implicit beneficiary of care were grouped together and reported as one result, therefore terms in this study that contained an implicit or explicit recipient of care are also grouped together for illustration in the following table. Table 3 displays the comparison of ICNP intervention axes represented in the PCDS, HHCC, and the intervention terms analyzed in this study.

In this study, content analysis and mapping of pain interventions to the ISO RTM involved nurse experts. The process required that the experts reach complete consensus in coding decisions. This approach has been used in other studies [17] to increase reliability. In studies with larger data sets, the use of expert consensus may not be feasible and alternative approaches to increasing reliability may be used (e.g., expected measure of inter-modeler reliability).

6. Summary

The purpose of this study was to evaluate the draft ISO RTM for nursing action in accommodating nursing intervention terms and to determine how the model categories are represented in nursing documentation. Examination of the 21,065 intervention terms for pain management documented by nurses on this surgical unit, supported the categorical structure of the draft ISO RTM for Nursing Actions. Consistent with the ISO standard requirements, all (100.00%) of the interventions contained an ⟨(action)⟩ word or phrase and a ⟨(target)⟩.

In this study, two ISO model elements, ⟨(site)⟩ and ⟨(route)⟩ were identified as areas of documentation that could have been augmented with additional data concerning medication administration. In the study setting, medication administration data was not included in the nursing interventions data set. Including or linking medication administration data in intervention databases is recommended to provide a more complete depiction of nursing practice and allow nursing researchers, administrators, and practitioners a means to evaluate the treatment of pain in adult surgical patients.

The members of the expert panel had some difficulty agreeing on the meaning of the ISO RTM semantic categories based on the current definitions. Specifically, it is recommended that the definition of ⟨(recipient of care)⟩ be examined in relation to the ICNP definition of ‘beneficiary.’

The potential value of using RTMs for the examination of nursing practice and documentation was demonstrated in this study. Mapping documented interventions to RTMs could be used to evaluate documentation compliance to professional or governmental standards of care across practice settings. Finally, an examination of nurses’ documentation of nursing process was possible. The results of this study identified that the majority of documented interventions were related to the assessment and monitoring of pain in adult surgical patients with relatively few documented interventions regarding the treatment of pain.

This evaluation demonstrated that the draft ISO RTM for nursing actions could be used to code decomposed nursing intervention terms, in a particular practice setting. It is recommended that terminology and information system developers consider this model in their ongoing system development, evaluation, maintenance, and revisions. Further evaluation of the ISO RTM for nursing will contribute to the goals of this

Table 3: Comparison of ICNP attributes represented in previous [19] and current study

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<tr>
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</thead>
<tbody>
<tr>
<td>Action type/action</td>
<td>100%</td>
<td>100%</td>
<td>100%</td>
<td>100%</td>
</tr>
<tr>
<td>Beneficiary/recipient</td>
<td>98%</td>
<td>90%</td>
<td>100%</td>
<td>100%</td>
</tr>
<tr>
<td>Target</td>
<td>95%</td>
<td>100%</td>
<td>100%</td>
<td>100%</td>
</tr>
</tbody>
</table>
| Means                      | 52%       | 0%        | 28% | 32.2%
| Time                       | 12%       | 0%        | 25.3%| 21.8%
| Route                      | 4%        | 0%        | 6.4%| 12.5%
| Location/site              | 12%       | 0%        | 0%  | 0%
| Topology                   | 3%        | 0%        | N/A | N/A*|


* Attribute category not included in ISO RTM.
specific model and the harmonization and integration with other health care models.

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References