The MED-AUDIT Ontology Version 1: An Ontology for Auditing the Accessibility of Medical Devices
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Abstract
The MED-AUDIT tool uses an electronic questionnaire designed to assess and quantify the accessibility of medical devices. We created the MED-AUDIT ontology to facilitate the auditing of medical devices by applying standard thesaurus construction techniques to concepts and vocabulary extracted from the questionnaire. A key feature of this ontology is that it links concepts between the MED-AUDIT and the International Classification of Functioning, Disability and Health (ICF).

Introduction
The Medical Equipment Device – Accessibility and Universal Design Information Tool (MED-AUDIT) is a tool designed to measure the accessibility of medical equipment for persons with disabilities. [1] It includes an electronic questionnaire and branched scoring system to help medical equipment designers and users identify accessibility problems. The MED-AUDIT consists of 1124 separate questions that rate a medical device based on required user tasks and accessibility features for use of a medical device.

In this paper we describe the MED-AUDIT ontology, which we created by applying standard thesaurus construction techniques to concepts and vocabulary extracted from the MED-AUDIT questionnaire. [2] We focused on MED-AUDIT questions regarding the tasks required of a medical device user, with particular emphasis on communication. A key feature of the MED-AUDIT ontology is that it contains links to concepts contained in the International Classification of Functioning, Disability and Health (ICF). [3]

Methods
For the initial version of the MED-AUDIT ontology, we extracted 48 communication task related verb phrases from the MED-AUDIT questionnaire. We translated the verb phrases to noun phrases and applied other standard term construction techniques to them. We included hierarchical relationships of broader than and narrower than among concepts, based on the hierarchical nesting of questions in the MED-AUDIT questionnaire.

MED-AUDIT links to ICF. We matched MED-AUDIT concepts to ICF concepts using three categories: synonymous match, has as a mode match, or is a mode of match. For example, the MED-AUDIT concept “Communication with practitioner of specific needs” was matched by has as a mode to the ICF concept “Speaking”, since speaking is one mode of realizing the ability of communication with practitioner of specific needs. In some cases, in order to facilitate a less cumbersome matching, MED-AUDIT concepts were “posted up” to broader concepts. For example, “Communication with practitioner of specific attention needs” was posted up to the broader concept “Communication with practitioner of specific needs”.

Results
The initial version of the MED-AUDIT ontology consists of a single tree, “Communication between client and others” which has four hierarchical levels. Thirty-six MED-AUDIT concepts were matched directly to 31 ICF concepts. Twelve MED-AUDIT concepts were each matched to 17 ICF concepts by being posted up. Eight MED-AUDIT concepts were synonyms of 8 ICF concepts. Twenty-four MED-AUDIT concepts had as a mode 18 ICF concepts. Twenty-four MED-AUDIT concepts were a mode of 10 ICF concepts.

Conclusion
Including links to ICF in the MED-AUDIT ontology appears promising because there is good overlap between the task feature section of the MED-AUDIT and the activities and participation section of the ICF. Future versions of the MED-AUDIT ontology will include structures relating concepts for abilities and tasks to concepts for device features that facilitate performance of those tasks.

References