

## Chapter 2

# Semantic Interoperability: Issue of Standardizing Medical Vocabularies

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### ABSTRACT

*Semantic interoperability is the key to achieving global interoperability in healthcare information technology. The benefits are tremendous – the sharing of clinical data for multiple uses including patient care, research, reimbursement, audit and analyses, education, health surveillance, and many other uses. Patient safety, higher quality healthcare, more effective and efficient healthcare, increased outcomes, and potentially improved performance, higher quality of life and longer lifetimes are potential results. Decision support and the immediate linking of knowledge to the care process become easier. Semantic interoperability is a worthy goal. There are many barriers to achieving semantic interoperability. Key among these is the resolution of the many issues relating to the terminologies used in defining, describing and documenting health care. Each of these controlled terminologies has a reason for being and a following. The terminologies conflict and overlap; the granularity is not sufficiently rich for direct clinical use; there are gaps that prevent an exhaustive set; there are major variances in cost and accessibility; and no one appears eager or willing to make the ultimate decisions required to solve the problem. This chapter defines and describes the purpose and characteristics of the major terminologies in use in healthcare today. Terminology sets are compared in purpose, form and content. Finally, a proposed solution is presented based on a global master metadictionary of data elements with a rich set of attributes including names that may come from existing controlled terminologies, precise definitions to remove ambiguity in use, and complete value sets of possible values. The focus is on data elements because data elements are the basic unit of data interchange.*

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## INTRODUCTION

The most widely used word today in health informatics is “interoperability”, and the most frequently used adjective with that word is “semantic”. Interoperability’s importance results from the current model for the effective use of Health Information Technology (HIT) that requires the aggregation and sharing of health-related data and knowledge. Semantic interoperability requires the ability of both humans and computers to read and understand shared data as it is received (in the sense of knowing what the data represents and how it is to be used). If the sender and receiver know each other, a business agreement as to what data will be exchanged and in what format provides a working solution. The more severe problem, and the one we are trying to solve, requires semantic interoperability among previously unknown exchange partners.

We have been aware of the need for semantic interoperability for over five decades. Even within the same setting, healthcare professionals used different terms to express themselves, and the real meaning is left to the imagination of the receiver. Many medical errors are a direct result of ambiguous or misinterpreted terminologies. Patient care, clinical trials, performance and quality evaluation, and the like depended on an interpretation of the terms used. In some cases, life and death decisions were made on the basis of unclear data. Different groups solved the problem in local settings by developing their own vocabularies. That process worked until the need arose to communicate with an external group. The result was several hundred sets of similar but different, redundant and competing medical vocabularies. Now, as each nation tries to build a national linked network sharing health data, the solution seems costly and overwhelming. A global harmonized solution challenges what is possible.

This chapter addresses what is required to meet this need and where we are along that pathway. Major controlled vocabularies are introduced, including some of their characteristics and what

they represent, and what role they might play in the future. Further, the chapter will discuss both an ideal solution and a workable, though less desirable, solution. The solution moves the focus from vocabulary to data elements.

## BACKGROUND

The need for communication and the ability to communicate among humans is perhaps one of the most important human characteristics that define who and what we are. Without the ability to communicate among like creatures, we would be unable to share experiences and knowledge. The Biblical Book of Genesis makes this point very well. The opening sentence in Chapter 11 states: “Now the whole world had one language and a common speech.” The story goes on to relate that the men of the community decided to build a tower, the Tower of Babel, to reach heaven. God saw this work and said “If as one people speaking the same language have begun to do this, then nothing they plan to do will be impossible for them.” God then confused the language of the people, and they were unable to complete the building. Today’s world of health care uses a confused language and, as a result, we cannot build the best healthcare system.

The evolution of the many different sets of controlled vocabularies is further confounded by the labels attached: vocabulary, terminology, nomenclature, classification, taxonomy, and more recently, ontologies. Are the products of these differently named sets the same or different? Clearly the intent and purposes of each are slightly different. On the other hand, the terms that appear are similar. These terms are defined and discussed below.

### Vocabulary

Vocabulary is perhaps the most frequently used, everyday term to describe the words we use in defining and documenting the health care process.

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