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## Editorial

# The Omaha system as an ontology and meta-model for nursing and healthcare in an era of Big Data

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Today's global technology and information transformation presents unprecedented challenges and opportunities in health and health care due to the availability of massive amounts of data being generated by consumers, clinicians, and smart devices [1]. It is incumbent upon nurses to use these data to improve health care quality and population health outcomes. Because of decades of scholarship in both nursing theory and terminology, we are equipped to manage and analyze data [1–11]. Indeed, both theory and terminology are needed to answer the "ontology" question that helps us learn from Big Data in health care: "What are the things that exist or can exist in the world, and what are the relationships among these things?" [7].

This ontology question is both philosophical (understanding the world) and scientific (modeling data). Theory helps us conceptualize health care in a philosophical sense [2–4]. In information science, ontology formally names and defines the types, properties, and interrelationships of these things we understand philosophically for use in electronic information systems [5–8]. Thus a formal ontology serves as a theory-terminology bridge that can link philosophy and science and provide a foundation for Big Data analytics [9].

Clinicians are at the center of the need for ontology in our electronic platforms that provide decision support and enable documentation; which in turn becomes data that feeds into the learning health system [10]. The benefits of ontology in characterizing ***the whole*** of the domain of health and healthcare are several. First, characterizing all of health and health care in a simple ontology creates a knowable information model for information management for clinicians and researchers alike. Second, comprehending the whole leads to identification of gaps in existing data that may be critical for understanding the whole. Using shared ontology can break down the siloes in health care research and practice by providing shared language to bring clarity regarding the meanings of concepts and relationships as operationalized in clinical decision support, documentation, and research [4, 6, 11].

Despite these benefits, theorists, terminologists, researchers, and clinicians rarely recognize or communicate their shared need for a simple, robust ontology for health and health care. Rather, disciplines often remain siloed in their terminologies and efforts to improve health [11]. Unfortunately, most health care terminologies are not true ontologies, even while they may make claims to be so. The most common misconception about terminologies is the notion of high granularity – being able to describe the specific details of all concepts – aids in gleaning meaning from data. This may be true for accuracy in billing or medical diagnosis; however, highly granular data is extremely difficult to interpret unless there is a strong and simple ontology that allows for multi-axial and hierarchical aggregation of the more granular terms. Worse, many terminologies allow for redundant or synonymous terms, which systematically introduces errors and biases inherent within the processes that generate, aggregate, display, and re-use data. Tragically, these biases are common and accepted in health data analytics that were intended to transform data to knowledge, information, and wisdom.

The Omaha System [6] is an example of a robust multi-stakeholder research-based ontology and meta-model for health and health care. Clinicians have long used the Omaha System as a communication tool for clinical decision support and documentation. Theorists have applied the Omaha System to diverse health care quality and outcome

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problems. Researchers have used the Omaha System as a theory-generating tool and have re-used practice data for hundreds of studies. Patients and consumers are the newest contributors to Omaha System terminology development. The Omaha System community of practice enables all stakeholders to communicate, improve practice, aggregate data, and generate new knowledge seamlessly across programs, practices, and populations. The Omaha System should be used as a comparator and exemplar for evaluating other terminologies and theoretical frameworks in generating knowledge from big data to improve practice and population health. We propose further conversations on the value of bridging theory and terminology to support health and health care practice improvement and to provide a robust and rigorous meta-model for knowledge discovery. We can no longer afford to live in siloes as we strive to address the explosion of challenges of health and health care in the era of Big Data.

## Conflict of interests

The author declares no conflict of interests with regard to this article.

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