Nursing and Knowledge Work: Issues Regarding Workload Measurement and the Informatics Nurse Specialist

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Abstract

The profession of nursing has been faced with questions concerning workload measurement for decades, and those concerns continue to be relevant today. Traditionally, nursing has turned to time-motion studies to study this, but there is a debate about how relevant time-motion studies are to the profession of nursing when it is viewed as knowledge work.

Healthcare workers, including the nursing profession, may be the single biggest group of knowledge workers. Knowledge workers today represent a significantly different workforce than are the workers of the past. Informatics, as a specialty, is relatively new to the nursing profession and continually evolving. As more nurses enter informatics and function as informatics nurse specialists, they will continue to be in the group of knowledge workers whose observable input and output is difficult to measure. Today’s healthcare leaders, managers, and administrators need to identify an appropriate method of workload measurement for knowledge workers.

Keywords

- Nursing
- Knowledge work
- Informatics
- Workload management

The profession of nursing has been faced with questions concerning workload measurement for decades. The need to measure nursing care systematically in terms of patient care activities has been identified internationally. In the profession of nursing, the specialty of informatics is continually evolving. The American Nurses Association officially recognized this field as a nursing specialty in 1992 and defines nursing informatics as “a specialty that integrates nursing science, computer science, and information science to manage and communicate data, information, and knowledge in nursing practice”. Few differences exist in the goals of nursing and nursing informatics. The core service of
nursing is patient care, and nursing informatics exists to support the highest possible quality of care.\textsuperscript{1}

Nurse informaticians practice in a variety of settings: traditional healthcare organizations, vendor communities, educational or private businesses, and consulting firms.\textsuperscript{2,3} In fact, executives increasingly value clinically-driven technology as a way to improve patient care, while cutting costs.\textsuperscript{4}

As more nurses enter the field of nursing informatics and function as an informatics nurse specialist, or INS, they will find changes in reporting structures. The hierarchical leadership may range from nursing to information technology to corporate and financial executives. With the likelihood that an INS will work for someone who does not have broad knowledge of the nursing process, concerns may arise that the manager does not understand nursing practice and how it applies to the continuum of quality patient care. In addition, other questions can surface regarding the INS role and responsibilities while working in a position within or outside of traditional nursing.

The primary issue is determining how management measures the workload of an INS. While considering this question, it is necessary to identify where and how nursing coexists in the information technology field (see Figure 1). When searching for pertinent and relevant references to answer this question, it became apparent that this topic has not been approached from an informatics viewpoint. Therefore, it was necessary to expand on the relationship of how nursing informatics coexists with nursing and IT. Examination revealed the need to further define IT and how it relates to an INS. Through this, the term “knowledge work” became the common theme that encompassed both IT and the nursing profession (see Figure 2).

**Beginning the Search**

A comprehensive search of the relevant literature was performed using electronic databases, such as those of the Association for Computing Machinery, Academic Search Premier, Business Source Premier, CINAHL, Cochrane, EBSCO host, INSPEC, Lexis Nexis Academic, MEDLINE, and Science Direct; Internet search engines, such as Google and Yahoo; as well as personal and professional contacts.

Keywords used in the literature search focused on the profession of nursing, such as nursing, time and motion study; IT, for example, engineering, system analyst, and operation research; nursing informatics, such as informatics, clinical analyst, role, and competencies; and a combination of all fields, such as workload, staffing, administration, management, productivity, manpower, personnel, and knowledge work. The results are presented as an overview covering the areas of nursing, information technology, and knowledge work.

**Nursing**

The profession of nursing has been faced with questions concerning workload measurement for decades, and it continues to be relevant today.\textsuperscript{7} The tremendous focus from media and government on safety in nursing highlights the need for accurate and objective data to assess nursing workload resources.\textsuperscript{8}
Traditionally, nursing has turned to time-motion studies to answer questions regarding the measurement of job performance. However, many question how relevant time-motion studies are to the profession of nursing when it is viewed as knowledge work. In effect, much of the literature from time-motion studies lacks evidence linking measures of nursing workload to improved patient outcomes.

Developed by Frederick Taylor at the turn of the 20th century, the observational time study was used to increase the efficiency of industrial production. During the same time period, Frank Gilbreth and his wife were conducting similar experiments that focused on motion. In conjunction, time-motion studies seek to determine the average time for a job by using observers to record exactly how much time is being devoted to a particular task, taking into consideration the process and actions needed to complete the task.

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Personnel can be an essential issue to any business, especially nursing, in the face of staffing shortages, which have been experienced in the past and which are being predicted for the future. Assuming that one healthcare management goal is to improve the level of service and, ultimately, patient outcomes, qualitative, and quantitative workload metrics derived from such studies provide a good indication of the amount and kind of service rendered. Therefore, the measurement of workload also can provide information to justify personnel and resource levels required to improve the delivery of patient care.

In addition to time-motion studies, techniques such as self-reporting (in the form of self-administered timesheets), worker sampling, worker recall involving provider interviews, and patient-flow analysis are used within the healthcare setting to measure and analyze clinicians’ use of time. However, many of these techniques have not been validated. The literature supports this claim and further indicates that few studies have compared time-motion studies with other methods. One study comparing time-motion with different workload measurement techniques indicates that high costs and observer-induced bias are limitations that influence administrators away from time-motion studies and toward some of the other approaches. Conversely, accuracy and consistency of all other methods were lower when compared with time-motion studies.

Some contend that the traditional methods of time-motion studies are no longer appropriate in healthcare settings. More than a century of time-motion study use has indicated that although the limitations may be minimized, they can never be eliminated when dealing with human resources. Management must face these issues when considering workload measurement options of the INS.

Information Technology

More intense searching was required in finding resources related to workload measurement in the IT field. Although an abundant amount of information was available regarding companies and their issues with specific job descriptions, such as engineers and system analysts, very little was found on how IT administrators measure workload.

Resources that were available focused on fuzzy logic and long mathematic algorithms designed around prediction models. Other resources focused on issues such as functional job analysis, performance monitoring, performance forecasting, and reliability assessment, but they failed to offer a consistent measurement model. Two studies discussed methodologies of population ratios and constant comparison, both claiming to have a grounded theory framework. Many of the issues regarding workload measurement and the various methods were dealt with by falling back on the same time-motion techniques that have been the staple.

However, it also was acknowledged that managers in these fields tend to reach their level in administration based on their skill and knowledge. Therefore, many managers simply used intuitive reasoning and the situational theory of management to determine the appropriate leadership style to use in a given situation—for example, relating the task at hand to the skill capabilities of the workers. In essence, intuition dictated staff allocations, and adjustments were made as needed in specific instances.

Knowledge Work

Peter Drucker coined the phrase “knowledge worker” more than 30 years ago to describe someone who relies on knowledge rather than skills to perform a job. Drucker proposed that a large number of knowledge workers do both knowledge work and manual work. Terning these workers “technologists,” Drucker indicates that they may be the single biggest group of knowledge workers. Healthcare workers, including those in the nursing profession, are covered in this definition.

For example, a nurse preparing for a cardiac output measurement via a cardiac catheter spends significant time in training and patient assessment before performing the procedure, which requires a great deal of specialized knowledge. In addition, complications may occur during the procedure that demand a great deal of advanced theoretical knowledge and judgment. However, the procedure itself is manual work.

In the past, manual laborers—frequently called blue-collar workers—comprised most of the workforce. Taylor's
time-motion study was modeled for these workers to improve productivity. But today's workforce has changed. In the U.S., only about 20 percent of workers do manual labor, while as many as 80 percent of the total workforce, depending on the job classification, are considered knowledge workers.\(^\text{17,18}\)

According to Drucker, managing workers and measuring workload is no longer covered by the same standards. Today's knowledge workers are part of a workforce that is significantly different than those of the past, when manual work was clear and well-defined.\(^\text{19}\) Scientific management dramatically improved the productivity of manual workers, in part by measuring work and then reorganizing the work. In managing knowledge workers and attempting to apply an approach that is similar to that which was so markedly successful in managing the blue-collar workforce, Drucker\(^\text{20}\) noted that you cannot manage what you cannot measure.

Productivity remains a concept most easily applied to industrial work vs. the nursing profession and healthcare. Business is ruled by concrete assets, such as physical resources and labor measured by product output. Industry continues to count physical products (production) and time spent (labor) as the basis of business value. However, this is not as relevant in healthcare. Often, information or knowledge itself is the output generating improved patient outcome. In the nursing profession and in nursing informatics in particular, there is limited means of recording and measuring outputs, so knowledge productivity is poorly defined at best.

Simply stated, the measurement of productivity is the ratio of output to input consumed to generate that output. While it is relatively easy to identify outputs (or patient outcomes in healthcare), it is considerably more difficult to combine and appropriately weigh the various inputs used by knowledge workers.\(^\text{21}\)

Executives in technically-based companies continually find management of manpower resources a primary challenge.\(^\text{22}\) Workload measurement difficulties exist because such companies rely on the unquantifiable output of knowledge and capabilities of their professional personnel.\(^\text{23}\) Even 20 years ago, the knowledge worker was the highest labor cost component in the petroleum, chemical, aerospace, and healthcare industries.\(^\text{24}\)

While workload measurement, in the form of productivity, has been studied for more than a century, knowledge work now dominates the workforce, and researchers have only recently tried to measure the productivity of knowledge workers.\(^\text{25}\) Many current "knowledge" managers dislike older, traditional, measurement techniques based on time-motion study principles.\(^\text{26}\) Earlier applications of productivity measurement addressed simple, repetitive jobs of short duration, such as those performed on assembly lines. However, time-motion study techniques are not well-suited for knowledge work because such work is not repetitive, but discretionary, transparent and difficult to identify or control.\(^\text{27,28}\)

According to some research, the effect time-motion methods have on knowledge work is virtually the opposite of what is desired—rather than improving performance, these methods often hinder it.\(^\text{29}\) It appears that productivity, for the majority of today's workforce, cannot be measured by traditional methods, and alternatives must be considered.

**Considerations**

On Feb. 2, 2004, a Microsoft-guided Information Work Productivity Council convened to discuss what is known about the contributions of information technologies to productivity.\(^\text{30}\) The council consists of leaders in the IT industry such as Microsoft, Xerox, Cisco Systems, Hewlett Packard, and Intel.\(^\text{31}\) The goal of the coalition, which is based at MIT's Sloan School of Management, is to develop data sets and methodologies for new ways to measure productivity.\(^\text{32}\)

Drucker proposes six factors when considering workload measurement for knowledge workers—identifying the task, assigning responsibility for productivity to the individual knowledge worker, expecting continuing innovation by the knowledge worker, allowing for continuous learning and teaching, focusing on the matter of quality versus quantity, and realizing the knowledge worker is an asset rather than a cost.\(^\text{33}\)

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Another approach is what Peplin\(^\text{34}\) terms "humaneering," which is drawn from many disciplines of science to deal with the complexities of human nature as they affect work performance and productivity. The humaneering approach relies on four principles—aligning work design to enterprise objectives, designing work at the role or job level, improving work designs through joint optimization, which means considering job roles as well as the inherent needs of the people performing them, and aligning human resource practices to support work design.

Throughout the literature, evidence supports the idea that knowledge worker productivity is important, but few have a good definition of what exactly knowledge work is.\(^\text{18,21,26,27,30}\) Today's healthcare leaders, managers, and administration executives need to identify an appropriate method of workload measurement for knowledge workers.
For the INS, Drucker's or Pepitone's processes may be applied through proper identification of the core competencies for informatics roles as indicated by the ANA. Then, the next step is to map out each role with its competencies to better enable effective management techniques in workload measurement.25

Informatics Nurse Specialists, with the knowledge of nursing theory and information technology, can be essential in forging the relationship between nursing and healthcare and IT when lay terminology and colloquialisms differ between professions or specialties. However, the INS will continue to be in the group of knowledge workers whose observable input and output is difficult to measure.

Notes
Special acknowledgment and consideration is expressed to Dr. Kathleen Charters and Dr. Brian Gugerty for their assistance and guidance with the compilation of this manuscript. The views expressed in this article are those of the author and do not reflect the official policy or position of the Department of Defense or the U.S. Government.

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