Workload and the Changing Health Care Environment

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Changes in the health care environment have impacted nursing workload, quality of care, and patient safety. Nurses per-ceive that the quality of their work has diminished. Traditional nursing workload measures do not guarantee efficiency and do not adequately capture the complexity of nursing workload. Studies have identified tasks associated with nursing work but not the perception of the nurse about the mental work required to meet the demands. Human factors research examines cognitive and perceptual abilities needed to perform tasks in a reasonable time without error. Researchers us-ing a human factors framework have focused on mental processing to understand why some demands are handled easily and others lead to signs of mental overload and decreased performance. Studies have investigated the multiple, complex dimensions of mental workload from the subjective perception of the worker. Findings indicate that human beings have the ability to attend to multiple details simultaneously. This review identifies the current state of nursing workload research and the need to include a subjective perception of the nurse as part of any workload measure.

Keywords: Nursing Workload; Human Factors; Subjective Mental Workload; Cognitive Workload

Over the last two decades many changes have occurred in health services delivery and, as a result, the way that nursing care is provided has changed. Many of these changes highlighted in the Institute of Medicine report series indicate the need for examining the workload and work environment of the nurse. At the same time, nurse researchers have begun focusing on nurse workload from a human factors framework in an effort to improve the quality and safety of the care provided to patients. However, little attention has been given to the contribution of nursing knowledge, intellectual capital, and mental workload demands for productivity, quality care, and patient safety (Aiken, Clarke, & Sloane., 2002; Carayon & Gürses, 2005).

Traditional nursing workload measures do not guarantee efficiency nor do these measures adequately capture the complexity of nursing workload (Beaudoin & Edgar, 2003; Morris, MacNeely, Scott, Treacy & Hyde, 2007; Weydt, 2009), especially as the measures relate to the least studied aspect of nursing workload, the work environment. Hu-man factors research approaches workload by examining mental processing in an attempt to understand the human information processing system and why demands are handled differently by people. Human factors research tries to address the multiple and complex dimensions of mental workload from the worker's subjective perception (Haga, Shinoda, & Kokubun, 2002; Luximon & Goonetilleke, 2001).

Conceptualization of Subjective Mental Workload

Subjective mental workload, the amount of work the worker perceives is needed to meet a demand, is influ-enced by numerous factors pertaining to the worker, the environment, and the task. Mental workload techniques have been grouped into three broad measures: psychophysical, performance, and subjective (Veltman, 2002). Atten-tion theories point to limits in the human ability to process information. There is a presumption that humans possess a limited capacity central processing system (Kerr, 1973) and that humans must often choose where to focus their attention when faced with competing options (Navon, 1985).

Mental workload perception is determined by the individual's processing capacity and the requirements of the task. Processing capacity is influenced by individual characteristics, performance circumstances, activity complexity, and indirect influences. Working memory is another limiting factor in processing stimuli and meeting mental work-load demands for safe, quality patient care. Time-pressure is an important determinant of the total effort associated with mental work (Kahneman, 1973). The complexity of mental workload is enhanced by individual differences that

make adequate measurement using a single instrument difficult (Haga, Shinoda, & Kokubun, 2002; Tomporowski, 2003; Veltman, 2002). Understanding concepts that contribute to decreased performance and to errors is critical to improving quality and safety in patient care.

The concept of subjective mental workload was operationalized as the individual's ability to estimate the mental workload experienced at a given time (Luximon & Goonetilleke, 2001). Two major rating scales were used for estimating subjective mental workload: the NASA-Task Load Index (NASA-TLX) and the Subjective Workload Assessment Technique (SWAT). The NASA-TLX, developed in 1988 for use with military pilots, is the most widely accepted subjective measure of human workload and has been utilized in research with adults of all ages and both genders in aeronautics, psychology, computer systems, transportation, and the health professions (Haga, et al., 2002; Tomporowski, 2003; Young, Zavelina, & Hooper, 2008).

Measurement of and Influences on Nursing Workload

Lack of a clear definition is one of the major problems with understanding and measuring nursing workload. There is the tendency to use the concepts of nursing work and nursing workload interchangeably. Nursing work describes the functional tasks such as assessment or medication administration that the nurse carries out to benefit the patient. In contrast, nursing workload is best described as "the amount of performance required to carry out those nursing activities in a specified time period" (Morris, MacNeely, Scott, Treacy, & Hyde, 2007, p. 464).

There is a growing body of literature supporting the conclusion that nurse staffing and workload affect nurse satisfaction (Beaudoin & Edgar, 2003), nurse turnover (Allen & Mellor, 2002), and patient outcomes (McLennan, 2005; Ramanujam, et al., 2008). High workload levels have been associated with suboptimal patient care and are one of the most identified job stressors (Aiken et al., 2002; Carayon & Gürses, 2005). Using typical workload measures in nursing such as the number of patients, the number of care hours per patient, or by applying a patient acuity system based on medical diagnosis and care activities is fraught with problems (Gregg, 1993; Walsh, 2003). A key problem is that these measures do not account for many of the activities involved in actual patient care, such as educating family, coordination of care activities with other health care team members, and unanticipated changes in the patient's condition (Walsh, 2003). Besides using incomplete data, acuity system measurements lack the ability to measure mental demands placed on nurses (Gregg, 1993; Yamase, 2003) and situation-level variability (Carayon & Gürses, 2005) because such measures do not take into account the mental demands and stresses of workload (Schneider, 1994).

Nurse Working Conditions and Outcomes

Staffing factors related to patient safety outcomes include a link between fewer years of experience in the clinical unit and patient mortality, and the development of infection at higher rates for new admissions cared for by agency or "pool" nurses than with permanently assigned intensive care unit staff. High nursing workload has been shown to be related to suboptimal patient care and nurse burnout (Aiken et al., 2002). Staffing variables are one aspect of nursing practice environments that may affect outcomes not only for patients, but also for nurses and organizations (Stone et al., 2003). Staffing effectiveness indicators adopted by The Joint Commission Accreditation of Hospitals (JCAH) in July 2002 and patient outcomes are two commonly used measures to evaluate nursing workload (McLennan, 2005; Stone et al., 2003). Staffing effectiveness measures require that workload measurement goes beyond patient diagnosis and nurse patient ratios to uncover the care hours needed to meet a specific patient population's needs (Walsh, 2003). Until the composition of nurse work and factors affecting nurses' work lives are understood, the quality of nurse work cannot be enhanced (Beaudoin & Edgar, 2003).

Nursing Workload and the Human Factors (Subjective Measure) Approach

Many measures of workload in nursing are designed based on the needs and condition of the patient. Since measures that are based on the patient's condition are not particularly helpful in understanding the impact of situations on nursing workload, Carayon and Gürses (2005) proposed using human factors approaches to evaluate workload by identifying both the contextual factors of the environment and patient demands and the individual attri

butes of nurses to establish a direction for interventions for improving the quality of the nurses work life and patient care outcomes.

In the earliest subjective mental workload study identified in nursing, Gregg (1993) developed the Nursing Task Load Index (Nursing TLX) to examine cardiovascular critical care unit nurses' subjective mental workload in relation to specialty and general experience and education. The Nursing TLX, based on the NASA Task Load Index, consists of both scales that measure work demand and scales that measure responses to those demands. Gregg found no significant relationships between mental workload and nurse characteristics, work environment, or work schedule variables. Findings revealed a significant relationship between subjective mental workload and the volume of patients cared for and the diagnoses of the assigned patients. There may be a relationship between traditional nursing workload and subjective workload measures on the variables "patient volume" and "diagnoses" suggesting that current nursing workload measures may address the mental demands of patient care more than nurses think. Findings also revealed a positive association between subjective mental workload and the number of days that a nurse had been off prior to participating in the study but only if a nurse had been off at least five days. Gregg suggested that a reason for this finding might be that, as the number of days off increased, the likelihood of being assigned all new patients increased. Additional study and expanded conceptual thinking related to nursing workload "may lead to improved administrative systems for nurses and better nursing care for patients" (Gregg, 1993, p. 114).

Conclusion

Nursing workload involves attention to multiple complex phenomena that often occur simultaneously and traditional methodologies have yielded results that do not adequately explain the complex phenomena involved. Subjective measures may provide a more accurate measure of a worker's perception of the effort being expended than do traditional measures. A second important factor in utilizing subjective workload measures is that they are more directly related to the mental demand concept than are physiological measures and behavioral measures. When measuring workload, there is a need to recognize the critical link between the characteristics of the nurse and of the work environment and the impact of these personal and environmental factors on patients, nurses, and the system as a whole. While some attempts have been made to determine the impact of personal characteristics and environmental factors, the conceptual and empirical support, as well as a generally accepted definition of mental workload, has remained elusive.

A review of the literature identifies very few nursing workload studies that have been conducted using human factors approaches. Adequate workload measurement tools are necessary to gain insight into nurses' mental workload as they provide care in today's complex health care environment. There is a need for a valid and reliable instrument using human factors engineering measurement that will provide insight into the nurse's subjective perception of workload.

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