White Paper

EXAMINING HEALTHCARE DESIGN: HOW THE PHYSICAL HEALTHCARE ENVIRONMENT CONTRIBUTES TO NURSE FATIGUE

How Design Can Help Mitigate Nurse Fatigue and Its Effects

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Executive Summary

There are more than 2.9 million registered nurses (RNs) working in the U.S. today, making up the largest component of our country's healthcare workforce. The day-to-day work of these professionals is both physically demanding and mentally complex, which causes high levels of physical, mental and overall fatigue that can impact patient and staff safety and ultimately lead to burnout.

Using secondary data analysis of a 2017 focus group session, a recent study considered factors of the physical healthcare environment (PHE) and their impact on nurse fatigue. The study identifies 19 types of fatigue that are substantially impacted by the PHE. The effects of fatigue were found to have influence at the personal and organizational levels, as well as the profession at large. The findings demonstrate the ability of healthcare organizations to mitigate and prevent nurse fatigue and its effects through the PHE.

Nurse Fatigue: A National Dilemma

According to the Bureau of Labor Statistics, the U.S. healthcare workforce currently employs more than 2.9 million registered nurses (RNs).[1] As the largest component of our healthcare workforce, nurses experience a strenuous combination of physical and mental demands due to the nature of their work, resulting in increased levels of physical, mental and overall fatigue.[2] Although several professional institutions have consistently identified nurse fatigue as an urgent priority,[3, 4, 5] 85% of nurses from a recent survey reported suffering from job-related fatigue. Furthermore, 63% indicated that they had experienced burnout due to their work.[6]

These statistics are alarming for all healthcare organizations as they strive to provide high-quality care. In addition to these concerns, the U.S. is witnessing a rapid increase in nurse turnover due to an aging workforce coupled with difficulty retaining new talent. A 2018 survey found that nearly 23% of new RNs left within their first year of employment.[7] This dwindling pool of new resources, along with the estimated 60,000 RNs who will retire this year, continues to raise nursing shortage concerns in healthcare organizations. These concerns also extend to nurses' perceptions that staff shortages are a stimulus for increased nurse fatigue.[8]

Fatigue and Its Impact

Work-related fatigue in nurses is defined as "a multidimensional state that arises in workers who are exposed to excessive demands through their work tasks, environment, and schedules, and that can interfere with workers' physical and cognitive abilities and their ability to function at their normal capacity."[9] Nurses can experience this fatigue as an acute phenomenon, which occurs in temporary intervals, or a chronic condition, lasting for an extended period. For some individuals, what starts as an acute phenomenon can progress to a chronic condition.[2, 10]

Beyond the impacts on a nurse's experience while at work, fatigue can manifest in physical, mental and emotional symptoms, such as musculoskeletal injuries, emotional disorders, job dissatisfaction and burnout.[10] Fatigue can compromise more than just an individual's health and well-being—at times negatively impacting family and social interactions, as well as engagement with society at large.[10] These effects may extend across the healthcare environment, contributing to adverse patient outcomes, nosocomial infections, medication errors and falls.[11]

Contributing Factors to Nurse Fatigue

An important factor in nurse fatigue is a lack of opportunity for recovery. Rest between shifts is known to moderate fatigue and is critical when addressing its multidimensional nature.[13, 14] Several studies focused on the effects of circadian rhythm disruptions, shift length and staffing issues have established a foundation for institutional changes that advocate for individual, organizational and unit policy changes to support nurse fatigue management.[15, 16, 17, 18] However, despite recent efforts to implement fatigue management strategies, interventions such as encouraging duty-free breaks, planned shift naps and diminishing overtime culture have shown minimal success.[19, 20]

Several recent studies have examined multiple work system factors contributing to nurse fatigue utilizing the Systems Engineering Initiative for Patient Safety (SEIPS) model as a framework.[9, 12, 21, 22]

The SEIPS model views the nurse workforce as an entity comprised of individual professionals, their interactions with their environment, technology, tools and tasks in conjunction with the healthcare organization as a whole, including its policies and regulation.[23, 24]

These studies have identified the PHE as affecting nurse fatigue via several environmental variables, including supply locations, lighting, temperature and noise, in addition to patient room, unit and breakroom layouts.[9, 21] While these studies provide evidence that the PHE contributes to nurse fatigue, little evidence exists to support how the PHE impacts nurse fatigue. Prior research indicates that the PHE is an underutilized strategy for addressing nurse fatigue.[22] When integrated with individual, organizational and policy interventions, the PHE can provide a comprehensive approach to address nurse fatigue.

The Experts' Take: Nurses' Insights on Fatigue and the PHE

The 2019 study by Interface sought to investigate factors in the PHE that contribute to nurse fatigue by addressing three objectives:

1. Identify the unique types of fatigue nurses experience due to the PHE;
2. Determine what aspects of the PHE impact nurse fatigue; and
3. Develop a conceptual framework for how the PHE impacts nurse fatigue.

This Institutional Review Board-approved study employed secondary data analysis collected during a 2017 focus group session, which evaluated the challenges nursing professionals face while delivering care; the effects of fatigue on current and future care delivery; and how system factors (organizational, environmental and social) either reduce or contribute to nurse fatigue. Members from a design-focused professional nursing organization were recruited using purposive sampling to participate in the focus group if they currently held an RN license, had five years minimum of clinical experience and contributed to the design or redesign of a healthcare facility at some point in their career. A total of 11 nurses self-selected to participate. Table 1 shows the demographic characteristics of the study sample.

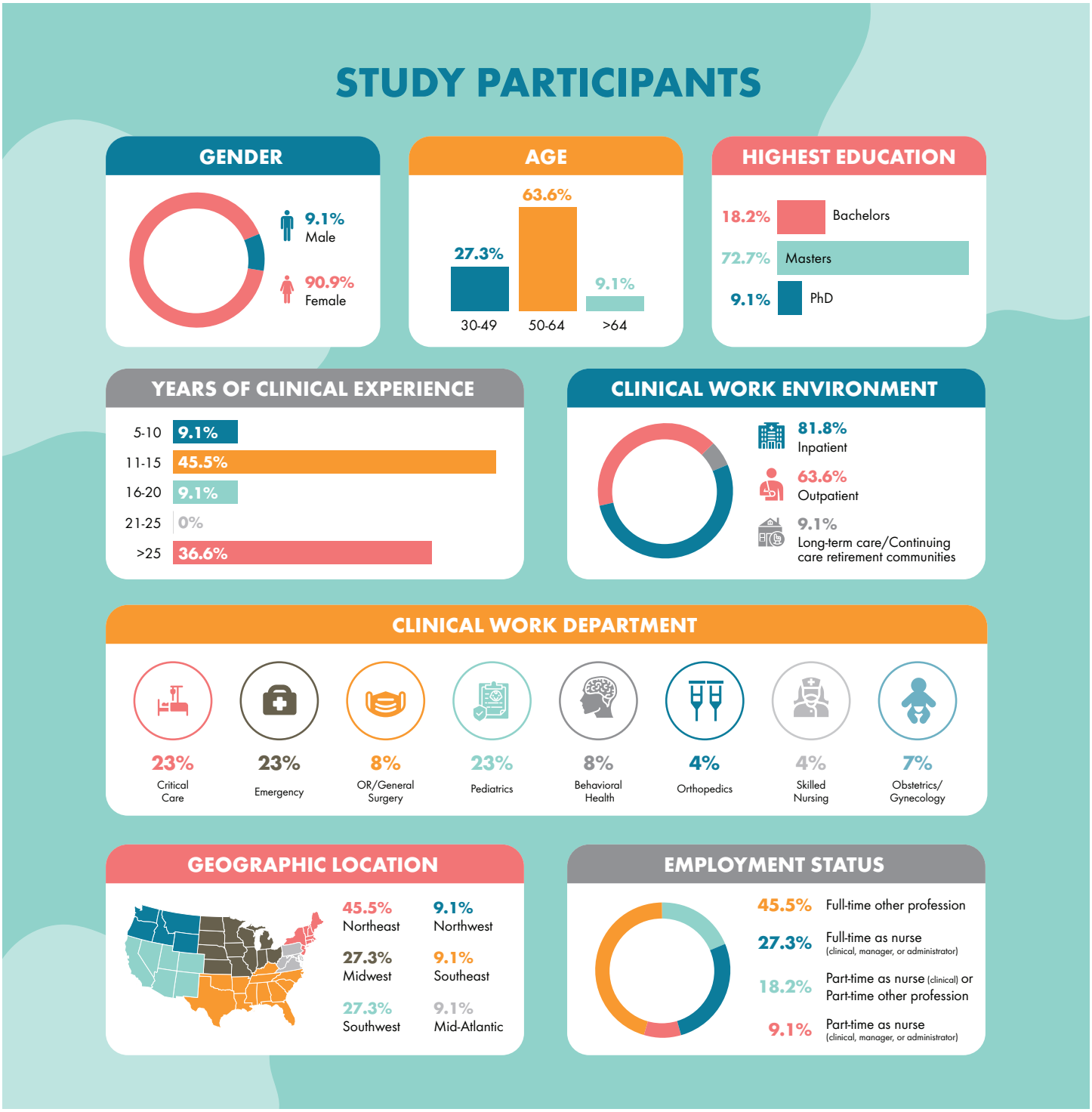

Table 1: Demographic characteristics of study sample

Types of Nurse Fatigue

As illustrated in Table 2, the study revealed four categories representing the various dimensions of fatigue—physical, cognitive, emotional and psychosocial—as well as 19 sub-codes identifying types of fatigue. Descriptions for each type of fatigue were developed through further analysis of participant responses.

The physical dimension of fatigue includes musculoskeletal, distance, elimination and sleep. These fatigue types result in increased physical demands on the body, making the profession more strenuous on a daily and career-wide level.

Cognitive fatigue, represented as mental, documentation, alarm, information and interruptions, is associated with repetitive sensory input, compromising cognitive task ability.

Emotional fatigue, identified by moral, spiritual, compassion and barrier fatigue, creates internal dilemmas that hinder the ability to give quality patient care.

The psychosocial fatigue dimension, which includes attitude, responsibility, hierarchy, policy, justification and integrity fatigue, represents the additional effort required to deliver care due to operational constraints or organizational culture.

PHYSICAL FATIGUE

Elimination
The inability to take care of natural bodily functions during the course of shift

Sleep
Lack of sleep due to length of shift and number of days worked in a row

Distance
The excessive amount of walking that is required during the course of a shift

Musculoskeletal
Pain and aching in bodily joints due to patient care activities such as assisting patients with activities of daily living or pushing and pulling equipment and furniture such as a patient bed

COGNITIVE FATIGUE

Alarm
Repetitive sounds from equipment that individuals begin to tune out

Mental
Inability to focus and make a decision due to constant anxiety and stress

Documentation
Repetitive documentation of the same information

Information
The constant flow of information that becomes overload

Interruption
Difficulty staying focused on task or completing a task well due to repeated interruptions

EMOTIONAL FATIGUE

Compassion
Inability to be empathetic due to the multiplicity of everything that occurs in the course of a shift after working multiple days in a row

Spiritual
Inability to internally comprehend and accept a sequence of events where incredibly challenging or extremely young patients cannot be healed or something horrible occurs

Barrier
The asymmetry of knowing what could or needs to be accomplished and the frustration of not having the resources or authority to do it

Moral
Consistently having to ask what the right thing to do is in any given situation

PSYCHOSOCIAL FATIGUE

Attitude
Colleagues that constantly have issues with everything and bring a negative energy to the work environment

Spiritual
Constantly being on the defensive due to the need to protect patients and their families and defend your actions

Policy
Bureaucratic rules and regulations that require work-arounds to deliver care

Integrity
Frequently being asked or told to do things that you think are morally wrong and not the right thing to do

Responsibility
Consistently accepting or being given responsibility for taking care of things that others will not do to help or protect your patients

Hierarchy
Consistently having to explain your capabilities and relevance in the executive decision-making process

Table 2: Content analysis codes for the types of fatigue identified and their associated description

Impact of the PHE

Four environmental factor categories were identified as impacting nurse fatigue: ergonomic, sensory, layout and restorative. Within these environmental factors, the study defined 27 sub-codes denoting design elements within the PHE. These findings are illustrated in Table 3.

Table 3: Content analysis codes for the environmental factors that impact nurse fatigue and their associated design elements

Five design elements in the ergonomic category, including seating options, travel distance, reach distance, movable equipment and lift load, impact physical fatigue due to the pressures placed on the body. Physical activities such as standing, walking, reaching, pushing and lifting required in day-to-day patient care can result in joint and muscular strain.

Ten sensory design elements were identified as impacting all four dimensions of fatigue. The elements—noise level, thermal comfort, outdoor connections, access to fresh air, smells, visual stimuli, lighting, ambiance and wayfinding—influence fatigue due to the type, amount, and duration of sensory inputs placed on an individual nurse during his or her work.

Layout factors included nine design elements: supply location, zone flexibility, workstation type, unit configuration, peer-to-peer visibility, patient visibility, medication access, room standardization and room size. These were considered to impact the physical, cognitive and psychosocial dimensions of fatigue due to spatial adjacencies, functionality of spaces, and visual connectivity. For example, spatial adjacencies between supplies, workstations and equipment for providing direct care and the ability of teams to be flexible and support changing practice needs impacts physical fatigue. At the same time, visual connectivity between care team members and their patient influences both cognitive and psychosocial fatigue. Patient room standardization is also important. The location of furniture, equipment and supplies, sinks and environmental controls can impact both physical and cognitive fatigue for nurses. Finally, the size of a patient room and ease of movement around the patient bed to provide care plays a significant role in physical fatigue.

Three design elements were identified as restorative factors: break area access, break area aesthetic and private area access. These elements were found to affect all four dimensions of nurse fatigue, as these spaces can support in-shift recovery and allow privacy for personal moments.

Effects of Fatigue

For the effects of fatigue, four external and internal factors and 18 sub-codes categorizing the effects of fatigue were identified, as illustrated in Table 4. Further, the directionality of the effects was categorized to indicate whether the factors resulted in either increased or decreased effects.

Seven effects of fatigue were identified by participants related to care quality. These include vigilance, empathy, engagement, advocacy, situational awareness, nurse well-being, and nurse health. While considering these effects, participants identified experiencing a decrease in physical, emotional and cognitive capacities, diminishing their ability to provide high-quality care and, ultimately, placing patient and staff security at risk due to increased potential for errors and violence against nurses.

Internal motivation was identified as being influenced by the following effects: passion, creativity, fulfillment and internal light. These four effects contributed to a decrease in emotional capacity, limiting the ability of participants to perform past minimum care requirements and diminishing their innate desire to care for people and be a positive influence to others.

Participants suggested the three effects associated with knowledge-based factors—retention, credibility and mentorship—prompt decreased competencies among the nursing workforce due to a loss of experience and the inability to retain talent in the profession.

Finally, the study outlined four effects related to internal pressure factors: strained relationships, guilt, errors and self-doubt. These effects resulted in doubts about career path and job capabilities as a nurse, challenging the very ideals that initially compelled them to enter the profession.

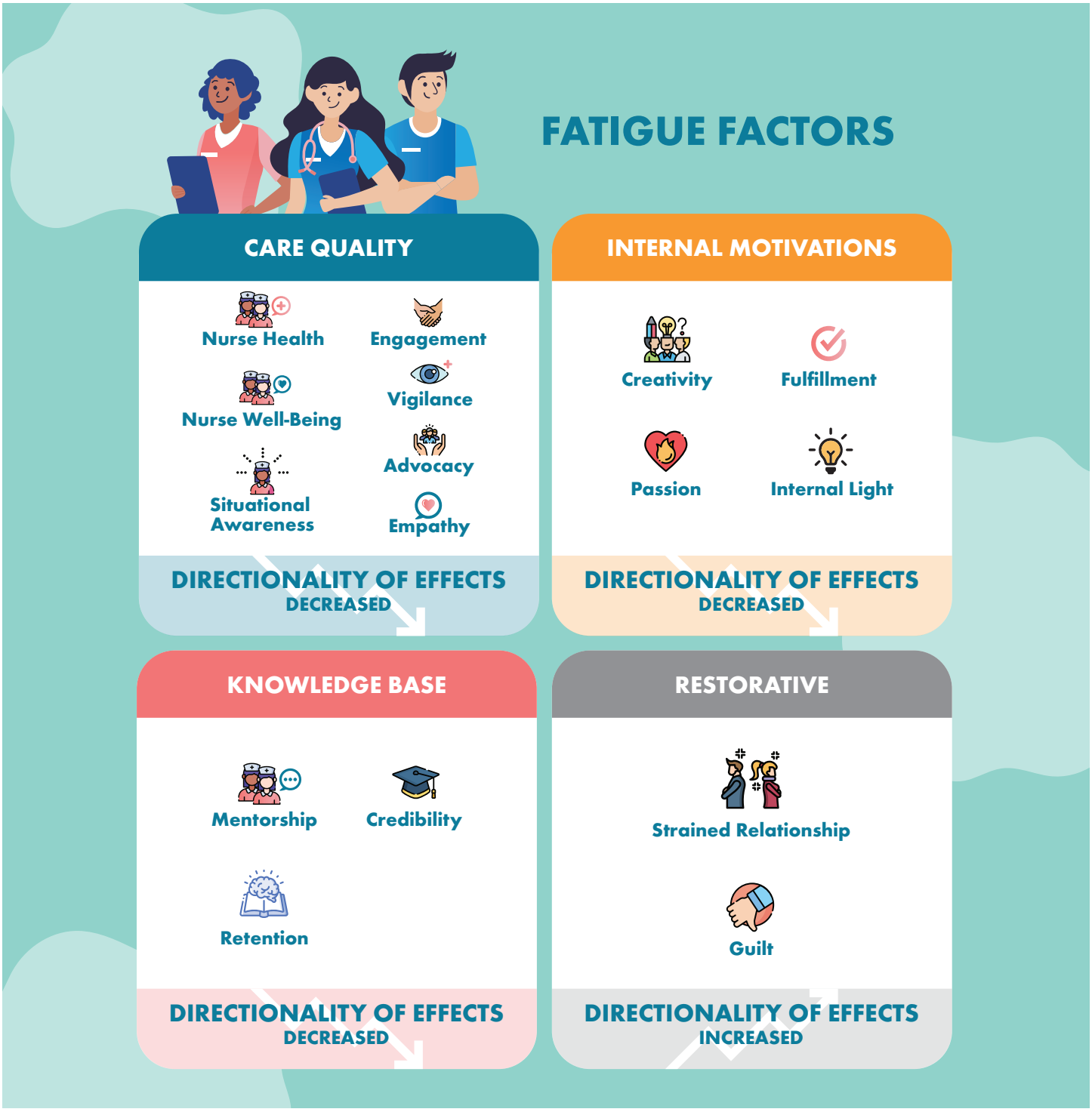

Table 4: Content analysis codes for the effects of fatigue identified and the directionality of the effects

A Conceptual Framework

The study portrays nurse fatigue as a multi-faceted construct. Within this construct are four interconnected, yet discrete, physical, cognitive, emotional and psychosocial dimensions. Within the PHE, design elements contribute to varied dimensions of fatigue—ergonomic, layout, sensory and restorative factors—making it difficult for participants to identify which element contributed more or less to fatigue. The effects of fatigue were found to be cumulative, resulting in increased internal pressures and decreased care quality, internal motivation and knowledge base.

Addressing Fatigue Through Thoughtful Design

As suggested in the study's findings, the PHE can have a substantial impact on nurse fatigue, which, in turn, can dramatically impact patient and staff safety. While this phenomenon has been hard to define due to a complex interconnection of factors, participants in this study demonstrated psychosocial factors directly contribute to fatigue, with six of the 19 types of fatigue being associated with the psychosocial dimension.

With this study, evidence depicts four distinct fatigue dimensions and how, within the larger nurse work system, the environmental component can support efforts to mitigate and prevent nurse fatigue. The design elements discussed and identified by participants provide specific opportunities to impact those who deliver care.

Whether renovating or designing, it is critical to consider these design elements and how best to integrate within the health care facility to support efforts to reduce nurse fatigue.

Study Notes: Limitations and Ethics Approval

A limitation of this study is purposive sampling, as the self-selected participants may not be representative of all nursing professionals. With that being said, the study's participants represented a range of clinical experience, length of career, demographic regions, current employment and type of clinical environments and departments, supporting the transferability of the findings. Also, a majority of the participants were aged 50 to 64-years-old, which is within the average age range for retirement in the U.S., necessitating further research to determine if applicable to the younger RN population.

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