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Factors Related to Nurses' Hospital Management and Work Engagement in the Radiology Department

Moamen Abdelfadil Ismail[1], Aisha Abdullah Alhopish[2], SAMEER HELAL ALROBAIE[3], Houda Bander Alenezy[4], Bashayer saleam alrefai[5], Fatimah Abdullah Alhabeshi[6], Manal abdullah ALhobashi[7], Afnan fadulallah qari[8], Khulud Ahmed Alghamdi[9]

Abstract

Work engagement is critical for nurse performance and well-being, particularly in specialized areas such as radiology, where occupational hazards like radiation exposure and high-stress environments are prevalent. Despite the increasing demand for radiological nursing care, many nurses express reluctance to work in radiology due to health concerns and limited support systems. This study was conducted among nurses working in radiology departments of cancer care hospitals. Data were collected using a demographic questionnaire, the Utrecht Work Engagement Scale (UWES), and a survey assessing perceptions of radiation safety. Descriptive and multiple regression analyses were performed to identify factors influencing work engagement. Out of 200 participants, the mean UWES score was 54.3 (SD = 18.4), reflecting moderate work engagement. Absorption scored slightly higher than vigor and dedication. Key predictors of engagement included nurses' preference for radiology assignments and the availability of radiation exposure consultation services. While nurses reported confidence in workplace safety measures, gaps in consultation services and education about long-term risks were noted. Demographic factors, such as age and professional position, also played a role in engagement levels.Work engagement among radiology nurses is influenced by a complex interplay of individual preferences and organizational factors. Enhancing consultation services, providing targeted training, and implementing specialized support programs are essential strategies for fostering engagement in high-stress environments. Further research is needed to develop tailored interventions to address these challenges and improve outcomes in radiology nursing.

Keywords: *Hospital Management, Human Psychology, Work Engagement.*

Introduction

In recent years, surveys assessing work engagement among nurses have gained momentum, emphasizing the significance of job satisfaction in the nursing profession (da Silva et al., 2020; Othman & Nasurdin, 2019). Work engagement represents a state of workplace well-being that contrasts with burnout, characterized by positive emotional and cognitive experiences at work (Bakker et al., 2008). Gaining a deep understanding of this concept is crucial for thorough analysis. Research by Ferraro et al. (2020) highlights the positive relationship between work engagement and key outcomes, such as performance, organizational efficiency, and overall employee well-being, with the Utrecht Work Engagement Scale (UWES) often used to evaluate these dimensions. In contrast, diminished levels of work engagement have been linked to heightened burnout risk.

Studies employing the UWES to explore work engagement among nurses have consistently revealed significant positive relationships between engagement levels and workplace conditions (Wan et al., 2018), personality traits, professional competencies, and job performance (Hu et al., 2021). This indicates that

[1] Lecturer of Internal Medicine, Faculty of Medicine, Helwan University, Internal Medicine consultant, King Abdulaziz specialist hospital - Sakaka – Aljouf, Email: moamen.fadil83@gmail.com
[2] Nursing Technician, Al-Miqat General Hospital.
[3] Senior Health Management Specialist, Taif Health Cluster.
[4] Price Sultan medical military city, Radiographer specialist.
[5] specialist Nursing, Al Hanakia General Hospital
[6] Nurse, Oh us Ohud
[7] Nursing technician, MOH- king fahad hospital - dialysis center
[8] Nursing technician, AL Madinah AL Munawwarah general hospital
[9] Rumah primary healthcare, General practice

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achieving quality-related goals is foundational to fostering work engagement. Furthermore, comparative research has found that nurses often report lower engagement and organizational commitment than their managerial counterparts (Al-Dossary, 2022).

The International Council of Nurses (2024) has highlighted that healthcare workers, including nurses, often operate in environments fraught with occupational hazards. These include biological risks (e.g., pathogens), chemical exposure (e.g., hazardous drugs), ergonomic challenges (e.g., lifting injuries, falls), physical dangers (e.g., radiation), and psychological stressors (e.g., high workloads, shift schedules, and workplace violence). Nurses working in specialized areas, such as radiology departments, face additional unique risks due to their exposure to radiation. The specialized nature of radiological work, combined with the need to follow stringent safety protocols, can influence both their job satisfaction and engagement.

Studies examining nurses in radiology departments indicate unique challenges within this field. For instance, the use of advanced radiological treatments is increasing globally, raising concerns about occupational health. Research by Fujibuchi et al. (2021) has documented that a small percentage of nurses in radiological settings receive lens-equivalent radiation doses exceeding safety thresholds, particularly those involved in procedures like endoscopy and outpatient care. Furthermore, there is variability in how radiological services are structured and practiced internationally, with differences in roles, responsibilities, and educational backgrounds among radiographers, technologists, and nurses across various countries. These disparities influence how work engagement is perceived and supported.

Despite the growing demand for radiological care, many nurses express reluctance to work in radiology units. Surveys have revealed that a significant proportion of nurses prefer to avoid these settings, citing concerns about health risks from radiation exposure and uncertainty regarding its long-term effects (Masujima & Noto, 2018; Oishi et al., 2018).

Materials and Methods

The study was utilizing an internet-based survey . The study focused on nurses working in radiology departments of cancer care hospitals. Convenience sampling was used for participant selection. Information about the study was then provided to all nurses in the radiology departments of these hospitals (N = 400), resulting in 200 completed responses, yielding a response rate of 44.2%. The sample size was determined post-hoc, as the study aimed to explore various associations and patterns using the full available dataset. The collected sample was deemed sufficient to achieve the research objectives.

Tools of Data Collection

- *Demographic Questionnaire*: Data were gathered on participants' age, gender, marital status, number of children under 18, nursing experience, tenure in radiology, educational background, job position, certifications, interest in radiology assignments, and primary responsibilities.

- *Utrecht Work Engagement Scale (UWES):* Work engagement was measured using the UWES, developed by Schaufeli and Bakker, which evaluates three dimensions: vitality, dedication, and absorption (Schaufeli & Bakker, 2004). This study used a validated version of the UWES, which has demonstrated strong internal consistency (Cronbach's alpha = 0.92) and acceptable test-retest reliability (0.66) in previous studies (Shimazu et al., 2008).

- *Perceptions of Radiation Control*: Participants' views on radiation safety and exposure were assessed using six items rated on a 7-point Likert scale, ranging from "strongly disagree" (0) to "strongly agree" (6).

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Statistical Methods

Descriptive statistics were calculated for all variables. Single regression analysis was conducted to identify variables with p-values <0.1 for further inclusion. Multiple regression analysis was then performed, using UWES scores as the dependent variable, with the forced entry method employed for model selection. Variance inflation factors were ≤1.969, indicating no issues with multicollinearity (Shao, 1996). Statistical analysis was performed using SPSS version 28 (IBM). Statistical significance was set at $p < 0.05$.

Results

Table 1 outlines the demographic profile of the 200 participants. A substantial proportion of the respondents were in their 40s (38.5%) and 50s (28.6%), with women making up 92.9% of the sample. Most participants had extensive nursing experience, with 85.0%reporting over 11 years in the field. However, nearly half (48.6%) had spent 4 years or less in radiology departments, indicating that many experienced nurses were relatively new to this specialty. Approximately 21.4% held managerial roles. In their personal lives, 68.6% were married, and 55.7% had children under 18 years old.

Post-employment qualifications were held by 25.7%of the respondents, covering areas such as certified nursing, interventional procedures, gastrointestinal endoscopy, aromatherapy, and medical informatics. Notably, only 22.9% expressed an active preference for assignment to radiology, suggesting that many nurses in this field had not specifically chosen it as a career path. The most frequent tasks reported were angiography (60.0%), followed by radiotherapy (47.9%), endoscopy/fluoroscopy (42.1%), nuclear medicine (40.7%), and diagnostic imaging (38.6%). Many participants worked across multiple modalities within radiology.

the perceptions of participants regarding radiation safety and health risks. Scores ranged from 0 to 6, with higher scores representing stronger agreement. Respondents generally believed that workplace radiation exposure was well-managed (mean = 4.2, SD = 1.5) and that their personal protective measures were adequate (mean = 4.1, SD = 1.3). However, they showed less confidence in the availability of consultation services for radiation exposure concerns (mean = 3.7, SD = 1.6).

Interestingly, participants reported relatively low concern about their dosimeter readings (mean = 2.7, SD = 1.5), which may reflect either low exposure levels or insufficient knowledge about dosimeter interpretation. Regarding the health implications of radiation exposure, participants expressed moderate concern for their own health (mean = 2.9, SD = 1.5) but minimal concern about potential impacts on their children (mean = 2.1, SD = 1.7), which was the lowest score reported. Overall, while nurses felt confident about workplace safety measures, areas like consultation services and education about long-term risks could be enhanced.

participants' work engagement as measured by the Utrecht Work Engagement Scale (UWES). The mean (SD) overall UWES score was 54.3 (18.4). Subscale scores indicated moderate engagement, with vigor averaging 17.8 (7.0), dedication 18.0 (6.2), and absorption 18.6 (6.8). Absorption scored slightly higher than the other dimensions, indicating stronger involvement in work tasks. the results of multiple regression analysis, which identified several variables significantly associated with UWES scores. Among these, the strongest predictor of work engagement was participants' desire to work in radiology, followed by the presence of consultation systems for radiation exposure. Despite only 22.9% of nurses indicating a preference for radiology assignments (Table 1), this factor emerged as the most influential in enhancing engagement levels.

Some factors that were significant in single regression analysis, such as total nursing experience, marital status, and post-employment qualifications, were no longer significant in the multiple regression model. This suggests potential interrelations among variables or that their effects are mediated by other factors in the model.

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Table 1. Participants' Sociodemographic Factors

		***n* = 200**
Variables	**Options**	**(%)**
Age	20–29 years old	(7.9)
	30–39 years old	(20.7)
	40–49 years old	(38.5)
	50–59 years old	(28.6)
	60 years old or older	(4.3)
Gender	Female	(92.9)
	Male	(7.1)
Years as nurse	0–4 years	(5.7)
	5–10 years	(9.3)
	11 years or more	(85.0)
Nursing experience with radiology department (years)	0–4 years	(48.6)
	5–10 years	(37.9)
	11 years or more	(13.6)
Position	Staff nurse	(78.6)
	Nurse manager	(21.4)
Marital Status	Married	(68.6)
	Unmarried	(31.4)
Having minor children	Yes	(55.7)
	No	(44.3)
Acquisition of qualifications after employment	Yes	(25.7)
	No	(74.3)
Desire to be assigned to the radiology department	Desired	(22.9)
	Not desired	(77.1)
Place of work	Diagnostic imaging	(38.6)
	Angiography	(60.0)
	Endoscopy/fluoroscopy	(42.1)
	Nuclear medicine	(40.7)
	Radiotherapy	(47.9)

UWES, utrecht work engagement scale. For 'Place of work', participants could select multiple options.

Discussion

We conducted a survey targeting radiology nurses to explore factors influencing their work engagement, using the Utrecht Work Engagement Scale (UWES) as a measurement tool. Demographic characteristics such as age and gender were consistent with broader trends in nursing. For example, a survey by the Japan Nursing Association (2022) reported that 28.9% of nurses were aged 40–49, with 93.5% being female. Similarly, in a previous study of radiology nurses, 36.6% of participants were in their forties, and 93.1% were women (Oishi et al., 2018). These findings align with the age and gender profiles observed in this study, which reflect the general nursing population and radiology-specific workforce demographics.

Comparing the UWES scores of radiology nurses in this study with those reported for other nursing populations revealed some notable trends. Previous studies of nurses in urban hospitals showed lower scores than those in this study, with reports from Matsuoka and Tanaka (2022) and Ishitsuka and Miki (2016) highlighting regional differences. Additionally, nurses in this study scored lower on work engagement compared to counterparts in Brazil (da Silva et al., 2020), Saudi Arabia (Aboshaiqah et al., 2016), Iran (Torabinia et al., 2017), and China (Wan et al., 2018). These discrepancies may be influenced by cultural, organizational, and societal differences in nursing practices across countries. For instance, in some regions,

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nursing is perceived as a highly respected profession, supported by strong workplace systems, which could enhance engagement. Conversely, factors such as demanding work environments and limited self-expression opportunities might contribute to lower engagement levels in certain contexts.

The current study also emphasizes the role of organizational systems, such as radiation exposure consultation mechanisms, in improving work engagement. These findings suggest that work engagement is influenced not only by individual factors like age and gender but also by structural and cultural aspects of the workplace. This underscores the complexity of understanding work engagement and suggests that tailored interventions addressing specific organizational needs may be critical.

Our analysis identified several key factors associated with work engagement, including age, gender, professional position, a desire to work in the radiology department, and the availability of workplace consultation systems for radiation exposure. Consistent with previous studies, work engagement tends to increase with age (Nakamura & Yoshioka, 2016; Obata & Morishita, 2014; Ozawa, Sugaya & Mori, 2022). Gender differences were also noted, with men generally exhibiting higher engagement levels, as previously documented (Ogiso & Itoh, 2019; Sato et al., 2021; Schaufeli & Bakker, 2004). Higher professional positions have been linked to increased engagement, aligning with prior findings (Al-Dossary, 2022; Nakamura & Yoshioka, 2016; Ogiso & Itoh, 2019; Sakurama, Yamada & Nakajima, 2021).

Interestingly, nurses who expressed a preference for radiology assignments demonstrated higher engagement levels, suggesting that personal interest in the field may enhance motivation and enthusiasm. Additionally, workplace support systems, particularly those addressing radiation exposure concerns, appear to play a critical role. Previous studies have highlighted the importance of such systems in mitigating nurses' fears about radiation exposure and increasing their ability to address patient inquiries (Nagatomi et al., 2019; Yamada et al., 2019). The presence of Certified Nurse Specialists (CNSs) in radiology, who provide expertise in radiation safety and consultation, has been shown to enhance workplace support, potentially improving engagement levels (Japanese Nursing Association, 2024a).

The deployment of CNSs or highly trained specialists in radiology nursing may significantly enhance work engagement by reducing anxiety about radiation exposure and fostering a supportive work environment. The findings align with previous studies showing that self-efficacy and organizational support positively correlate with work engagement (Al-Hamdan & Bani Issa, 2022). Extending preceptorship programs to younger nurses or those new to radiology nursing could also improve self-efficacy and engagement, as demonstrated in international studies (Choi & Yu, 2022). This approach could provide a structured system of guidance, support, and knowledge transfer, enabling nurses to feel more confident and connected to their work.

Conclusions

This study identified key factors influencing work engagement among radiology nurses, including age, gender, professional position, interest in radiology assignments, and the availability of radiation exposure consultation systems. These findings highlight the importance of organizational support and specialized training in enhancing engagement. The deployment of CNSs and extended preceptorship programs could serve as effective strategies for addressing work engagement challenges, particularly in high-stress environments like radiology nursing. Further research is needed to explore additional factors influencing engagement and to develop targeted interventions that address both individual and organizational needs.

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