Assessment Of Innovative Work Behavior Among Critical Care Nurses

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Abstract

Background: As healthcare continues to evolve and face complex challenges, the cultivation of innovative cultures and innovative work behaviors among nurses becomes increasingly essential for promoting the sustainability and growth of the nursing profession and healthcare organizations. **Aim:** This study aims to assess the prevalence of innovative work behavior among critical care nurses. **Method:** This is a descriptive study that was conducted at all critical units of Alexandria Main University Hospital, Egypt. Data were collected from 360 nurses who were conveniently selected using the Innovative Behavior Inventory Questionnaire (IBIQ). **Results:** The overall mean score of nurses' innovative work behavior was 66.03 ± 8.35. Also, 96.1% of nurses had a moderate perceived level of innovative work behavior. Idea generation had the highest average score (2.96 ± 0.54) among the dimensions of innovative work behavior whereas implementing starting activities had the lowest average score (2.76 ± 0.52). **Conclusion:** It is concluded that the road toward innovation in nursing practice seems to be paved since nurses have a moderate level of innovative work behavior, giving a promising future to the nursing profession. **Recommendations:** Nurse managers should provide continuous training programs to enhance innovative behavior among critical care nurses. Also, identifying innovative nurses and encouraging them to maintain and enhance innovative attitudes is a cornerstone task toward the cultivation of innovation.

Keywords: assessment, nurses, behavior, innovative behavior, work behavior, critical care
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Introduction

In today's highly sensitive and sophisticated environment health care organizations confront many obstacles that can be attributed to certain issues like quickening technological progress, fierce international competition, high nursing staff turnover with a scarcity of nurses, and hierarchical organizational structures (Kepplinger., 2024). All these challenges resulting in pushing hospitals to be innovative in order to survive and obtain a long-term competitive advantage with maintaining sustainable development goals (Sharpnack., 2024).

In the dynamic and high-stakes environment of critical care nursing, the ability to think creatively, problem-solve, and adapt to changing situations is paramount. Critical care nurses are responsible for managing complex patient needs, navigating rapidly evolving medical technologies, and making critical decisions that can profoundly impact patient outcomes. Fostering innovative work behavior among these healthcare professionals is essential for promoting excellence in care, enhancing patient safety, and driving continuous improvements within the critical care field (Baig., 2022).

Innovative work behavior, in the context of critical care nursing, refers to the proactive generation, promotion, and implementation of novel ideas, processes, or solutions that enhance the quality, efficiency, or effectiveness of patient care. This encompasses a wide range of activities, from identifying and addressing unmet needs to developing innovative approaches to care delivery, problem-solving, and interprofessional collaboration. Critical care nurses are often faced with unique challenges that require creative thinking and a willingness to challenge the status quo. Whether it's devising new ways to manage complex patient conditions, optimizing workflow and communication within the care team, or leveraging emerging technologies to improve patient monitoring and intervention, innovative work behavior allows these nurses to push the boundaries of traditional practice and drive positive change (Abd-Elmoghith., 2024)

There are many examples of innovative work behavior among critical care nurses, such as designing and implementing new protocols for medication administration, developing novel strategies for pain management, or creating innovative patient education resources. These nurses may also identify opportunities for process improvements, such as streamlining documentation systems or enhancing the ergonomics of the work environment to reduce the risk of injury (Iyanna et al., 2022).

Innovative work behavior among critical care nurses can also have far-reaching implications beyond the individual patient encounter. Through the dissemination of their innovative ideas and practices, these nurses can influence the broader healthcare community, inspiring others to adopt and build upon their innovations. This can lead to the development of new best practices, the advancement of medical knowledge, and the continuous evolution of critical care nursing asprofession (Usman et al., 2022). The benefits of innovative work behavior in critical care nursing extend beyond the immediate patient care setting. By developing and implementing innovative solutions, critical care nurses can contribute to the optimization of resource utilization, the reduction of healthcare costs, and the improvement of overall system-level outcomes. This can have a significant impact on the sustainability and accessibility of critical care services within healthcare systems (Jabeen et al., 2023).

Recognizing and rewarding innovative work behavior among critical care nurses is crucial for fostering a culture of innovation and continuous improvement within healthcare organizations. By highlighting and celebrating the achievements of innovative nurses, organizations can inspire others to follow in their footsteps, leading to a ripple effect of positive change throughout the critical care landscape (Baig et al, 2022). Investing in the professional development and training of critical care nurses is another key strategy for cultivating innovative work behavior. Providing opportunities for continuing education, leadership development, and exposure to cutting-edge research and best practices can empower nurses to think creatively, challenge existing norms, and develop innovative solutions to the complex challenges they face in their daily practice (Achilleas,Ceri-Booms , Van, 2020).

Lukes and Stephan (2017) explained seven pillars of innovative work behavior: idea generation, idea search, idea communication, implementation of starting activities, involving others, overcoming The significance of this study lies in its potential to enhance understanding of the factors that drive innovation and creativity within the critical care nursing context. Identifying the prevalence of IWB among critical care nurses can provide valuable insights into the unique challenges and opportunities faced by this group of healthcare professionals. Additionally, the findings of this study may inform the development of targeted interventions and strategies to foster a culture of innovation and continuous improvement within critical care nursing units. This is especially important in the context of the rapidly evolving healthcare landscape, where the ability to adapt and implement innovative solutions is essential for delivering high-quality, patient-centered care. obstacles, and innovation outputs. Idea generation is the stage where nurses recognize problems and devise creative solutions to solve them (Afsar & Umrani., 2020). Idea search is a creative endeavor that can also be promoted by those seeking fresh ideas through the analysis of nearby knowledge sources (Lukes and Stephan, 2017). Idea communication refers to the ability of nurses to communicate effectively, which helps to improve the relationship between coming up with a creative idea and figuring out how to implement it (Sönmez et al., 2019). Implementation of starting activities refers to making plans for execution, which include obtaining funds and resources (Lukes and Stephan, 2017).

Involving others refers to engaging others in the innovation's execution with a clear understanding of its goals (Lukes, 2012). Overcoming obstacles refers to resolving barriers and opposition, which is a key task during the implementation stage. This is done by changing the concept or the plans for implementation (Shahi & Sinha., 2020). Finally, innovation outputs refer to documents detailing changes made, i.e., new ideas implemented that changed processes or offerings within an organization (Lukes and Stephan, 2017). Healthcare organizations can effectively implement innovation to improve patient outcomes and enhance healthcare delivery by concentrating on these dimensions.

Research Gap and Significance of the Study

The existing literature on innovative work behavior (IWB) among healthcare professionals has predominantly focused on physicians, managers, and general nursing staff, with limited attention given to critical care nurses. Critical care nurses play a vital role in the healthcare system, as they are responsible for providing complex, high-acuity care to patients in critical condition. However, the prevalence of IWB among this specialized group of nurses remains largely unexplored. This study aims to address this significant research gap by assessing the prevalence of IWB among critical care nurses.

Furthermore, the study's findings may have broader implications for the recruitment, retention, and professional development of critical care nurses, as IWB is closely linked to job satisfaction, organizational commitment, and overall workforce sustainability. By shedding light on the innovative capabilities of critical care nurses, this research may contribute to the development of more effective workforce management strategies and the optimization of resource allocation within critical care settings.

Aim of the study: This study seeks to determine the prevalence of innovative work behavior among critical care nurses.

Research Questions: What is the level of innovative work behavior among critical care nurses?

Materials and Method

Research design: This study was conducted using a descriptive research approach.

Setting: The study was carried out at all critical care units of Alexandria Main University Hospital (N= 23)

Subjects:

Out of 415 nurses working in the previous units, 360 were recruited conveniently to collect the required data. They give direct and indirect care and have at least 6 months of experience. They are willing to engage in the study.

***Tools*:**

Tool I: Innovative Behavior Inventory Questionnaire (IBIQ)

It was developed by Lukes and Stephan (2017) and was adopted by the researchers to assess the level of innovative work behavior among critical care nurses. It is composed of 23 items that are grouped into seven dimensions, including idea generation (3 items), idea search (3 items), idea communication (4 items), implementation starting activities (3 items), involving others (3 items), overcoming obstacles (4 items), and innovation outputs (3 items). The responses were measured on a five-point Likert scale ranging from strongly disagree (1) to strongly agree (5). The overall score was ranged from 23 to115 and low IWB 23 < 53.7, moderate IWB 53.7 < 84.4, and high level of IWB 84,4 < 115. The reliability of this tool was tested by Elsayed et al., (2024) and Cronbach's Alpha coefficient was 0.864 for innovative work behavior.

In addition, the researcher created a personal data and work-related characteristic sheet that includes questions about nurses' age, gender, marital status, education qualification, years of experience in the nursing profession, working unit, and social standing.

Method

Approval from the Research Ethics Committee (REC), Faculty of Nursing, Alexandria University was obtained before conducting the study (Permission No. IRB00013620 serial: (13-9-2023). The official letter was directed to the Alexandria Main University General Hospital authority to obtain its agreement to conduct the research after explaining the aim of the study.

The English version of the tool was translated into Arabic using the back-to-back method. A jury of five experts in the study's associated field evaluated the study tools for face and content validity. The study tools' reliability was tested using Cronbach's alpha (α=0.857), indicating acceptable internal consistency. Pilot research was done with 10% of nurses (n = 36). Data collection lasted two months, from the beginning of November 2023 until the end of January 2024.

Ethical Considerations

Formal informed consent was obtained after providing appropriate explanations of the study's purpose to nurses. Data confidentiality was maintained. The study participants' privacy and identities were respected. The subjects consented to participate in the study and were allowed to leave at anytime.

Statistical Analysis

Data collected was processed, revised, coded, and transformed into a specially designed format to be suitable for computer feeding. All entered data were verified for any errors. Data were analyzed using SPSS (statistical package for social science) with version 25. Data were described using numbers, minimum, maximum, arithmetic mean, standard deviation. Categorical variables were described using frequency and percentage. All statistical analysis was done using two tailed tests and an alpha error of 0.05.A P-value less than or equal to 0.05 was statistically significant.

Results

Table 1 shows that the highest percentage of studied nurses (36.4%) were located in the age group less than 30 with a mean age of 34.12 ± 8.10, while 6.4% of them had more than 50 years. Also, 70.6% of the studied nurses were female. As evident in this table, the highest percentage of nurses (29.7%) had from 5 to less than 10 years of experience in the nursing profession, whereas the lowest percentage of nurses (9.4%) had from 15 to less than 20 years of experience in the nursing profession, with a mean 12.98 ± 9.61.

According to level of education, less than half of the studied nurses (46.7%) held bachelor's degrees in nursing, whereas the lowest percentage of them had a diploma with an associated degree in nursing. Moreover, the same table shows 60.8% of nurses were married, compared to 38.6% single. As regards the previous attendance of training programs regarding innovation, the vast majority of studied nurses (99.2%) didn`t attend such programs, while 0.8% attended such programs in educational settings in Cairo, where they answered that they were helpful.

Table 2 shows that overall average mean score of innovative work behaviors of nurses 2.87 ± 0.36. Concerning dimensions of innovative work behavior; idea generation recorded the highest average score (2.96 ± 0.54) followed by idea search (2.95 ± 0.61) then involving others (2.93 ± 0.57). On the other hand, the lowest average mean score was related to implementation starting activities (2.76 ± 0.52) followed by overcoming obstacles (2.82 ± 0.51) then idea communication (2.91 ± 0.49) and innovation output (2.91 ±0.49).

Table 3 illustrates that the vast majority (96.1%) of the studied nurses had a moderate level of innovative work behavior, while 3.6% of the studied nurses had a high level of innovative work behavior, and 0.3% of them had a low level. Also, the table reveals that the highest percentage of nurses had a moderate level regarding all dimensions of IWB, as follows: idea generation (82.5%), idea search (79.7%), idea communication (83.1%), implementation starting activities (85.6%), involving others (78.3%), overcoming obstacles (73.9%), and innovation outputs (84.4%).

Table 4 displays that there are a statistically significant difference between a nurse's innovative work behavior and their age (F = 45.705, P = 0.001), years of experience in the nursing profession (F = 21.173, P = 0.001), years of experience in the current department (F = 26.869, P = 0.001), qualifications (F = 35.360, p = 0.001), and study courses related to different leadership styles (t = 3.363, P = 0.001). Regarding age, the same table reveals the highest mean score (78.74±16.35) of studied nurses was evident among those who aged > 50 years old, while the lowest mean score was approved among those who aged years of experience in the nursing profession, the table shows that the greatest mean score (71.39±11.88) of studied nurses was identified among those with years of experience ≥20, while nurses who have less than 5 years of experience have the lowest mean score. Regarding years of experience in the current department, the table displays that the highest mean score (71.59±11.95) of nurses was approved among those with years of experience ≥20, whereas those with less than 5 years of experience have the lowest mean score.

Concerning qualifications, as evident in the table, the greatest mean score (70.30±10.94) of nurses was identified among those who held bachelor's degrees in nursing, whereas nurses who held associated degrees in nursing had the lowest mean score. Regarding study courses related to innovation, the table shows the highest mean score (67.82 ± 9.31) of nurses who study courses related to innovation, whereas nurses who did not study any courses recorded the lowest mean score.

Discussion

As the healthcare sector continues to evolve, cultivating innovative work behaviors among nurses has become an inevitable necessity. Interestingly, the current study found the vast majority of nurses had moderate levels of innovative work behavior. This finding gives an impression of the promising future of the nursing profession in Egypt, provides valuable insights into the innovative capacity of nurses, and highlights areas for further development in fostering a culture of innovation within nursing practice.

This level among Egyptian nurses is expected and goes with the mission of Egypt toward building innovative generations. Hospitals start to put innovation on the road map of their strategic plans, especially after the "Innovate Egypt" program launched by the Egyptian government to ultimately connect educational services with community requirements through empowering the next generation of Egyptian innovators. Moreover, limited resources and funding within the public hospital system have compelled nurses to become resourceful problem-solvers, constantly seeking creative ways to provide high-quality care with the tools

and supplies available to them.

Finally, the nursing profession in Egypt has undergone a significant transformation in recent years, with increased investment in nursing education and the promotion of evidence-based practice. As nurses become more empowered with knowledge and skills, they are better equipped to identify areas for improvement and implement innovative approaches to care delivery. This culture of continuous learning and professional development further reinforces the innovative mindset that has become a hallmark of nursing in Egyptian hospitals.

It is important to note that the context of critical care units (CCUs) could stimulate nurses' innovative work behaviors and could justify why nurses had moderate level of this behavior in the current study. Nurses in CCUs frequently encounter complex medical cases and patients with severe, life-threatening conditions. Dealing with these challenging situations can inspire nurses to explore new and innovative ways to provide care, improve patient outcomes, and overcome obstacles.

In essence, the American Association of Critical-Care Nurses (2016) emphasized this result by finding that nurses who work in critical areas are creative, promote lifelong learning, seek information from anywhere, and are more innovative in the long term. Also, Jose (2016) conducted a study in Greece that discovered a significant association between nurses' educational level and their level of innovative work behaviors and emphasized the importance of attracting nursing professional cadres for maintaining magnetic hospitals.

In this respect, this finding is supported by El-Sayed, Elbassal, et al. (2024), who found nurses had a moderate level of knowledge sharing behavior with high scores in the creativity and innovation subscales. Also, Abd-Elmoghith et al. (2024) showed that over half of the group under study has a favorable opinion on creative work practices; this could be related to the options for innovation that staff nurses have available to them. In addition, Slåtten (2020) illustrated that more than half of hospital employees experience innovative behavior through their leadership autonomy practice.

Also., Mohamed and Abd Elsalam., (2015) showed that a minority of the participants in the survey believed that their level of innovative behavior was moderate. El Desoky et al., (2021) clarified that nursing staff had a highly innovative level, and more than half were early adapters and innovators. In addition, Jung and Yoon., (2018) and Matsuo et al., (2021) found that participants exhibited modest degrees of inventive activity.

Abd El-Fattah's (2017) study on the degrees of innovation behaviors and their relationship to TIGER-based nursing informatics abilities among critical care nurses in Egypt found that over half of participants exhibited a moderate level of innovative work behaviors. Ibrahim et al.'s (2024) study results revealed nurses demonstrated a high degree of inventive work behavior. Also, Ahmed et al. (2024) showed that nursing professionals demonstrated a high degree of innovative work behaviors and organizational change readiness when they received more organizational support and engaged in decisions.

Moreover, Yasir Majid (2019), Mahgoub et al. (2019), and Kamel & Aref (2017) clarified that a higher level of innovative work behavior is strongly associated with high levels of participative leadership behaviors. Shama and Ahmed (2021) results study revealed that nurses exhibited a high degree of inventive behavior, which in turn made them express satisfaction with their jobs. Furthermore, the study conducted by Ahmed, Ata, and Abd Elhamid (2019) reported that less than half of nurses had a high level of innovative work behavior connected with their organizational climate and leadership behaviors.

On the other hand, this result is inconsistent with Abd El Muksoud, Metwally, & Ata (2022), Sönmez et al. (2019), and Abdelrazek et al. (2022), who found a low level of innovative work behavior among the studied nurses. This contradiction may be since they do not receive organizational support, work in a terrible environment, and have low levels of organizational commitment, which in turn increase their turnover and decrease their satisfaction with the organization.

It is important to note that the socio demographic characteristics of nurses play an important role in shaping their innovative work behavior. Nurses with an age > 50 years old and years of experience ≥ 20 years were more innovated than others. The possible explanation for this result is the nurses' ability to develop competent skills over time, besides organizational accountability that pushes staff to always be competitive and innovative. Also, qualifications play a pivotal role in the nurse's innovative work behavior, with the highest mean score identified among those who held bachelor's degrees in nursing. This finding could be attributed to increased nurses' educational level, which leads to an increase in their professional awareness where they are frequently updated with knowledge and guidelines and always seek career advancement, which makes them more demanding and has a high ability to acquire and search for new knowledge and opportunities.

Conclusion

It is concluded that the road toward innovation in nursing practice seems to be paved since nurses have a moderate level of innovative work behavior, giving a promisingfuture to the nursing profession.

Recommendations

Based on the study's findings, the following recommendations could assist policy makers and nursing directors to encourage innovativework behaviors among nurses;

- Offer ongoing training and educational opportunities to help nurses develop innovative mindsets and skills.
- Establish a formal recognition program to acknowledge and reward innovative contributions by nurses.
- Prioritize innovative thinking and problem-solving skills in the hiring and promotion of nursing staff.
- Provide clear pathways for nurses to pursue innovation-focused career trajectories.
- Encourage nurses to work cross- functionally with other healthcare professionals, such as physicians, pharmacists, and technicians.
- Create structured innovation initiatives, such as hackathons, design thinking workshops, or innovation challenges.
- Provide nurses with access to cutting- edge technologies, such as data analytics, artificial intelligence, and automation.

Table (1): Personal and professional characteristics of the study subjects

Sociodemographic and professional characteristics of study subjects.	Total (N=360)	
	No.	%
Gender		
Male	106	29.4
Female	254	70.6
Age (years)		
<30	131	36.4
30 – <40	129	35.8
40 – <50	77	21.4
≥50	23	6.4
Min. – Max 21.0 – 59.0 Mean ± SD 34.12 ± 8.10		
Years of experience in nursing profession		
<5	73	20.3
5 – <10	107	29.7
10 – <15	44	12.2
15 – <20	34	9.4
≥20	102	28.3
Min. – Max 1.0 – 40.0 Mean ± SD 12.98 ± 9.61		
Years of experience in current department		
<5	81	22.5
5 – <10	107	29.7
10 – <15	40	11.1
15 – <20	34	9.4
≥20	98	27.2
Min. – Max 1.0 – 40.0 Mean ± SD 12.59 ± 9.58		
Qualification		
Bachelor's degree of nursing	168	46.7
Diploma with associate degree of nursing	55	15.3
Diploma degree of nursing	137	38.1
Marital status		
Married	219	60.8
Single	139	38.6
Widow	2	0.6
Did you have ever attended training program regarding innovation		
Yes	3	0.8
No	357	99.2
If yes Place of attended (educational setting in Cairo)	3	100.0
In case of yes, Was it helpful?	(n = 3)	
Yes	3	100.0
No	0	0.0
Have you ever study courses related to innovation		
Yes	150	41.7
No	210	58.3
In case of yes, Was it helpful?	(n = 150)	
Yes	150	100.0
No	0	0.0
Place of attended (educational institution)	150	100.0

Table (2): Mean score of innovative work behavior of the studied nurses.

Innovative Work Behavior Dimensions	Total score			Average Score (1 – 5)
	Score Range	Min. – Max.	Mean ± SD.	Mean ± SD.
Idea generation	(3 – 15)	4.0 – 14.0	8.84 ± 1.62	2.95 ± 0.54
Idea search	(3 – 15)	4.0 – 15.0	8.86 ± 1.83	2.95 ± 0.61
Idea communication	(4 – 20)	6.0 – 18.0	11.64 ± 1.95	2.91 ± 0.49
Implementation starting activities	(3 – 15)	5.0 – 15.0	8.29 ± 1.56	2.76 ± 0.52
Involving others	(3 – 15)	4.0 – 15.0	8.79 ± 1.70	2.93 ± 0.57
Overcoming obstacles	(4 – 20)	7.0 – 19.0	11.27 ± 2.05	2.82 ± 0.51
Innovation outputs	(3 – 15)	5.0 – 14.0	8.34 ± 1.52	2.91 ± 0.49
Overall	(23 – 115)	37.0 – 101.0	66.03 ± 8.35	2.87 ± 0.36

SD: Standard deviation

Tabel (3) Distribution of studied nurses according to their level of innovative work behavior

Innovative Work Behavior Dimensions	Low		Moderate		High	
	No.	%	No.	%	No.	%
Idea generation	9	2.5	297	82.5	54	15.0
Idea search	20	5.6	287	79.7	53	14.7
Idea communication	31	8.6	299	83.1	30	8.3
Implementation starting activities	21	5.8	308	85.6	31	8.6
Involving others	19	5.3	282	78.3	59	16.4
Overcoming obstacles	65	18.1	266	73.9	29	8.1
Innovation outputs	21	5.8	304	84.4	35	9.7
Overall	**33**	**0.3**	**346**	**96.1**	**13**	**3.6**

Low (<33.3%); Moderate (33.3 – <66.67%); High (66.67%)

Tabel (4): Relationship between nurses' sociodemographic characteristics and their innovative work behavior

Demographic data	N	Total score of Innovative Work Behavior	Test of sig.	p
		Mean ± SD.		
Gender				
Male	106	67.05 ± 8.34	t= 1.500	0.135
Female	254	65.60 ± 8.33		
Age (years)				
<30	131	62.40±4.51	F= 45.705*	<0.001*
30 – <40	129	64.93±4.63		
40 – <50	77	70.23±9.45		
≥50	23	78.74±16.35		
Years of experience in nursing profession				
<5	73	61.85±5.18	F= 21.173	<0.001*
5 – <10	107	63.94±3.68		
10 – <15	44	64.61±4.62		
15 – <20	34	67.29±7.06		
≥20	102	71.39±11.88		
Years of experience in current department				
<5	81	61.98±5.07	F= 26.869*	<0.001*
5 – <10	107	63.25±3.57		
10 – <15	40	64.63±4.66		
15 – <20	34	70.03±5.72		
≥20	98	71.59±11.95		
Qualification				
Bachelor's degree of nursing	137	70.30±10.94	F= 35.360*	<0.001*
Diploma with associate degree of nursing	55	62.24±4.40		
Diploma degree of nursing	168	63.79±4.60		
Marital status				
Married	219	65.49 ± 7.32	F= 1.616	0.200
Single	139	66.78 ± 9.68		
Widow	2	72.50 ± 12.02		
Did you have ever attended a training program about innovation?				
Yes	3	82.33 ± 16.29	t= 1.747	0.222
No	357	65.89 ± 8.15		
Have you ever study courses related to innovation?				
Yes	150	67.82 ± 9.31	t= 3.363*	0.001*
No	210	64.75 ± 7.34		

SD: **Standard deviation** **t: Student t-test** **F**: **F for One way ANOVA test**

: p value for comparison between the studied categories *: Statistically significant at $p \leq 0.05$

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