

Effect of Green Management Training Program on Nursing Managers' Perception of Occupational Safety and Green Management Practices

Nadia Mohammed Ali Saleh¹, Nashwa Mahmoud Eldeep², Sanaa Mohammed Soliman³

(1) Assistant Professor of Nursing Administration, Faculty of Nursing, Sohag University, Egypt
Email: nadiasaleh15@yahoo.com

(2) Assistant Professor of nursing administration, Faculty of Nursing, Damanhour University, Egypt
Email: as7663934@gmail.com

(3) Lecturer of nursing administration, Faculty of Nursing, Fayoum University, Egypt
Email: Sms11@fayoum.edu.eg

Abstract:

Background: Healthcare facilities can reduce their environmental impact and occupational hazard by promoting green management. **Aim:** This study aimed to assess the effect of a green management training program on nursing managers' perception of occupational safety and green management practices. **Research design:** quasi-experimental research design was used. **Setting:** this study carried out at Sohag University Hospital. **Sample:** involving 42 nursing managers' from inpatient units. **Tools:** Three tools were used structured interviewing questionnaire for demographic data and concerned nursing managers' knowledge; green management practices questionnaire; and Occupational Safety Scale were used to collect data. **Results:** Prior to the intervention, 83.3% of nursing managers' had a low level of green management, which improved to a high level for 80.9% of them post-intervention and sustained for 76.2% at the follow-up stage. Similarly, prior to the intervention, 66.7% of nursing managers had low levels of occupational safety, which improved to high levels for 88.1% of them post-intervention but decreased to 85.7% at the follow-up stage. **Conclusion:** The green management training program significantly improved nursing managers' green management practices and knowledge and led to a sustained improvement in their occupational safety. **Recommendations:** Continuing to provide green management training programs for nursing managers' to maintain the positive impact on their practices and knowledge, and conducting periodic assessments to monitor progress and identify areas that need improvement.

Keywords: Green management, Nursing manager, occupational safety, and green management practices.

Introduction:

Green management at hospitals refers to the practice of implementing environmentally sustainable policies and procedures in the operation and management of healthcare facilities (O'Hara et al., 2022). Green management at hospitals involves collaboration between healthcare professionals, administrators, and environmental experts to develop and implement sustainable policies and procedures. The ultimate goal of green management at hospitals is to promote a culture of sustainability and environmental stewardship in the healthcare industry (Adu et al., 2020).

A registered nurse who is in charge of managing the day-to-day activities of a nursing unit within a healthcare facility is known as a nurse manager. They are often in charge of

supervising the nursing staff, creating and executing policies and procedures, ensuring adherence to legal requirements, and advancing the health and wellbeing of both patients and employees (Barraclough et al., 2019). Nurse Managers collaborate closely with other medical specialists, such as doctors, administrators, and support workers, to guarantee the provision of high-quality patient care. They may also be in charge of planning the budget, making schedules, and developing the personnel. They are crucial in fostering a culture of safety and wellbeing at work (Ofei et al., 2020).

As a nurse manager, encouraging green management is crucial to minimizing the environmental impact of healthcare facilities (Paillé et al., 2020). A waste audit, recycling programs, the use of energy-efficient equipment,

the promotion of sustainable transportation methods, the use of environmentally friendly cleaning products, the implementation of water-saving measures, and staff education on the significance of sustainability are important first steps. The future of healthcare institutions may be more sustainable as a result of these activities (Trus et al., 2019).

In recent years, there has been a steady rise in public awareness of environmentally friendly management techniques and their possible implications. In order to lessen their impact on the environment and increase sustainability, several healthcare companies are now incorporating green initiatives in their facilities. The promotion of occupational safety, which refers to the steps taken to prevent workplace accidents, illnesses, and injuries, is one significant part of green management (Zhang et al., 2022).

The idea of occupational safety in hospitals is locating and evaluating potential risks in the hospital setting, then putting controls in place to reduce or eliminate such risks. This involves equipping employees with the proper personal protective equipment (PPE), putting infection prevention and control procedures in place, and educating and training employees on safe work practices (Dopolani et al., 2022).

Occupational safety at hospitals is crucial to protect healthcare workers, including nurses, from potential workplace hazards such as infectious diseases, physical injuries, and psychological stressors (Minikumary et al., 2023). Nurse Managers play a crucial role in promoting safety and well-being by supervising safety protocols and procedures, creating safety training programs, making sure the proper PPE is available and utilized properly, encouraging a culture of safety, and dealing with work-related stress and burnout. Overall, nurse managers are crucial in establishing a safe and healthy workplace for nurses and other healthcare professionals (Saputra & Mahaputra, 2022).

Significance of the study:

Programs for green management training can improve the occupational safety of nursing managers. These initiatives include supporting

sustainable practices, raising environmental awareness, and enhancing worker safety. The training courses can assist nursing managers in identifying potential risks at work and taking the necessary precautions to avoid incidents or injuries (Roscoe et al., 2019). The programs can also offer guidance on how to handle garbage and dangerous substances safely, lowering the risk of exposure. Additionally, these programs may help to foster a culture of safety at work, where workers are urged to put safety first and be accountable for their own health. A safer and more effective work environment can come from increased communication and teamwork among employees (Anwar et al., 2020). So, the current study aimed to assess the effect of green management awareness training program on nurse manager's occupational safety.

Aim of the study:

The current study aimed to assess the effect of green management training program on nursing managers' perception of occupational safety and green management practices, through objectives:

1. Assess nursing managers' occupational safety and green management practices levels pre intervention.
2. Applying green management training program on nursing managers'.
3. Investigate the effect of green management training program on nursing managers' occupational safety and green management practices.

Hypothesis:

H1: The green management training program had a positive effect on nursing managers' green management practices.

H2: The green management training program had a positive effect on nursing managers' occupational safety.

Subject and Method

Research design:

Quasi-experimental research design was utilized to accomplish the aim of this study. It is an empirical study that is used to estimate the effect of an intervention on its target population

without random assignment (Cook & Wong, 2008).

Setting

The study was carried out at Sohag University Hospital has departments for general internal medicine, specialized internal medicine, general surgery, specialized surgery, pediatrics, obstetrics and gynecology, oncology, general intensive care, and cardiac care.

Sample:

Participants were recruited using a convenience sampling technique. A total of 42 nursing managers' "Nurse manager, one Deputy Nurse Manager, 10 supervisors and 30 head nurses from the previously mentioned setting, who accepted to participate in the study were recruited in the study.

Sample Size: The sample size was calculated based on statistical power of 90%, level of confidence (1-Alpha Error): 95%, Alpha 0.05, Beta 0.1, determines the sample size, which is set at 38 nursing managers'. Considering 10% sample attrition, the final sample size is 42 nursing managers'.

Tools of Data Collection

Tool I: Structured interviewing questionnaire was developed by the researchers after reviewing literature reviews as Singh et al, 2020 and Pinzone et al., 2019. It consists of two parts as the following:

Part I concerned with the demographic profile of the studied nursing managers, included characteristics of them such as age, gender, educational level, years of experience, training courses about green management and occupation safety.

Part II concerned nursing managers' knowledge and included 20 multiple-choice questions covering concepts of green management, principles of green management, benefits of green management, green management practices, and more. Each correct answer was given a score of 1, while incorrect answers received a score of 0. The total knowledge score was categorized as

unsatisfactory (<70.0%) or satisfactory (\geq 70.0%)."

Tool II: Green management practices questionnaire: It developed by the researchers after reviewing literature reviews as Raut et al., 2019 and Mousa & Othman, 2020. Which includes 19 items divided to five domains as follow; **Leadership commitment to sustainability domain** "3 items" as the head nurse actively promotes sustainability initiatives to staff and stakeholders. **Staff engagement and training domain** "3 items" as the head nurse promotes sustainability practices to staff and provides training and education on these practices. **Sustainability planning and implementation domain** "3 items" as Sustainability initiatives are implemented effectively and efficiently, and progress is monitored and reported on regularly. **Green procurement domain** "3 items" as the head nurse prioritizes the use of environmentally friendly products in the workplace. **Energy conservation domain** "3 items" as the head nurse regularly monitors energy consumption and reports on progress towards reducing energy usage. **Waste reduction and management domain** "4 items" as the head nurse regularly monitors waste reduction efforts and reports on progress towards waste reduction goals. Each item scored on likert scale as never (0 points) Sometimes (1 point), and Always (2 points). Total scores of each nursing managers' categorized on high green management if score >70% and low if score 70% or less.

Tool III: The Occupational Safety Scale (OSS), which assessed nursing managers' perceptions of occupational safety in the workplace. It adapted from Ozturk & Babacan, 2012. The OSS was a 25-item instrument that measures five domains of **Physical environment domain** "5 items" as the physical environment of this workplace is safe, **Equipment safety domain** "5 items" as the equipment used in this workplace is safe, **Hazardous exposures domain** "5 items" as the chemicals used in this workplace are stored safely, **Workplace violence domain** "5 items" I feel safe from violence in this workplace, **Job stress domain** "5 items" as the workload in this workplace is manageable. Each item was rated on a 5-point Likert scale, ranging from 1

(strongly disagree) to 5 (strongly agree). Total scores of each nurse manager categorized on high occupational safety if score >70% and low if score 70% or less.

Pilot study:

A pilot study was conducted on four nursing managers', representing 10% of the estimated sample size, to test the feasibility of the research tools and the clarity of the questions included in the study. The pilot study also helped to estimate the time required for participants to complete the questionnaire. Based on the results of the pilot study, no corrections or omissions were made to the items, and the nursing managers who participated in the pilot study were included in the final sample

Validity and Reliability: The data collection tools were evaluated by a group of three experts in nursing administration to ensure that they accurately measured the concept being studied and covered all relevant aspects. To assess the reliability of the tools, consistency of results across time, observers, and test sections was measured using the Cronbach's alpha test. The reliability scores for tools I, II, and III were 0.826 (good), 0.870 (very good), and 0.912 (excellent), respectively. This indicates that the tools were reliable and consistent in measuring the targeted constructs.

Fieldwork: The researchers attended the research setting during the morning shift from 9:00 a.m. to 1:00 p.m. The data collection process spanned over a period of 3 months, starting from *June to September 2023*, which included the pretest, educational program session implementation, posttest, and follow-up after three months. The researchers introduced themselves to the nursing managers and explained the aim of the study. Data collection was carried out through individual interviews with the nursing managers', and each interview lasted for approximately 30 minutes.

Framework

Assessment phase: The researchers explained the aim of the study and the components of the tools to the studied nursing managers. The researchers distributed a questionnaire to them for assessing their

knowledge about green management, green management practices, and occupation safety. The educational program was prepared and designed according to the nursing managers' needs according to pretest.

Intervention phase: The researchers divided the studied nursing managers into three groups; each trained two days (four hours per day –two sessions) in the form of lectures and seminars. The nursing managers were informed about the group to which they would be allocated via an invitation letter. They were also notified about the time and place of training. In the hospital conference hall, theoretical sessions were led by a researcher; the training program implementation took about three weeks, (each group two days per week). The training program for nursing managers was developed by the researchers after reviewing the literature as **Ali Y, et al., 2019** to improve their knowledge about green management, green management practices, and occupation safety.

The training program's contents:

First day:

Session 1: Introduction and Overview of Green Management (2 hour). Introduce the concept of green management and its importance in healthcare organizations. Provide an overview of the green management practices that can be implemented in healthcare organizations. Explain how these practices can be applied in the nursing department.

Session 2: Key Green Management Strategies (2 hour). Discuss the key strategies for implementing green management practices in healthcare organizations. Explain how the head nurses can apply these strategies in their department. Provide examples of successful implementation strategies.

Second day:

Session 3: Best Practices of green management (2 hour). Share best practices and case studies of healthcare organizations that have successfully implemented green management practices. Discuss the benefits they have seen and the challenges they have overcome. Encourage the head nurses to learn

from these examples and adapt them to their own department.

Session 4: Action Planning and Evaluation (2 hour). Have the head nurses develop an action plan for implementing green management practices in their department. Provide guidance and support in creating measurable goals, identifying key stakeholders, and developing an implementation timeline. Evaluate the training program directly post intervention and follow up after three weeks with the head nurses to assess their progress in implementing green management practices.

Ethical Considerations

Ethical approved by the institutional review board of Faculty of Nursing, Sohag University, and Written consent was obtained from each nursing manager after the researcher informed them about the aim of the study. Moreover nursing manager, who agreed to participate in the study, informed that all data gathered during the study were confidential. Also, they have the right to withdraw from the study at any time. The questionnaire was filled in anonymously and the data were kept confidential and used for research purposes only.

Statistical Analysis

Data were organized, categorized, result were presented in tables. Data were analyzed using a compatible personal computer using the Statistical Package for the Social Sciences (SPSS Inc; version 21; IBM Corp., Armonk, NY, USA). The ANOVA test was used to compare mean scores pre, post and follow-up intervention (**Franke et al., 2012**). The correlation coefficient is a numerical measure of some type of correlation, meaning a statistical relationship between two variables. Linear regression analysis is used to predict the value of a variable based on the value of another variable. The results were considered significant when the probability of error is less than 5% ($p < 0.05$) and highly significant when the probability of error is less than 0.1% ($p < 0.001$). The developed tool was tested for their reliability by using Cronbach's alpha test (**Nayak & Hazra, 2011**).

Results:

Table (1) shows that the mean age of nursing managers was 40.23 (4.99) years, and 85.7% of them were female. Additionally, 76.2% of nursing managers held a bachelor's degree, and the mean years of experience was 15.35 (4.8) years. The data indicates that only 9.5% of nursing managers attended training courses on green management, while 21.4% attended courses on occupational safety.

Table (2) indicates that the mean score of nursing managers knowledge related to Leadership commitment to sustainability was 1.83 (0.32) before the intervention, while the post-intervention score was 4.63 (1.5) and the follow-up score was 4.41 (1.36). Furthermore, the mean score for Energy conservation before the intervention was 1.80 (0.23), while the post-intervention score was 4.19 (1.04) and the follow-up score was 4.01 (1.1). It is worth noting that there was a significant difference between all green management domains at different stages, with a p-value of $<0.01^{**}$

Figure (1) illustrates that before the intervention, 83.3% of nursing managers' had a low level of knowledge about green management practices. After the intervention, 80.9% of them had a high level of knowledge, and this was sustained with 76.2% of nursing managers still maintaining a high level of knowledge about green management practices at the follow-up stage.

Figure (2) indicates that prior to the intervention, 76.2% of nursing managers' had unsatisfactory knowledge regarding green management. However, after the intervention, 92.8% of them had satisfactory knowledge, and this knowledge was sustained at the follow-up stage with 88.1% of nursing managers maintaining satisfactory knowledge.

Table (3) shows that the mean score of nursing managers' perception related to Physical environment before the intervention was 13.34 (3.8), while the post-intervention score was 19.6 (4.1) and the follow-up score was 18.1 (3.7). Furthermore, the mean score for workplace violence before the intervention was 14.6 (4.1), while the post-intervention score was 19.8 (3.6) and the follow-up score was 18.4

(4.5). It is worth noting that there were significant differences between all occupational safety domains at different stages, with a p-value of $<0.01^{**}$.

Figure (3) illustrates that before the intervention, 66.7% of nursing managers had a low perception level of occupational safety. After the intervention, 88.1% of them had a high perception level of occupational safety. However, at the follow-up stage the percentage to 85.7%.

Table (4) shows that there was no significant relationship between green management training and occupational safety before the intervention, with a p-value of >0.05 . However, there was a high positive correlation between green management training and occupational safety after the intervention, as well as at the follow-up stage, with a p-value of $<0.01^{**}$.

Table (5) reports that the F-test value for the high significant model was 10.777, with a p-

value of 0.000. This model explains 64% of the variation in occupational safety, as indicated by the R2 value of 0.64. Additionally, the table highlights that education level, training courses on occupational safety, total knowledge, and green management had a high frequency of positive effects on occupational safety, with a p-value of $<0.01^{**}$. On the other hand, age and experience had a slight frequency of positive effects on occupational safety, with a p-value of $<0.05^{*}$.

Table (6) shows that the F-test value for the high significant model was 9.801, with a p-value of 0.000. This model explains 59% of the variation in green management, as indicated by the R2 value of 0.59. The table also highlights that education level, training courses on green management and occupational safety had a high frequency of positive effects on green management, with a p-value of $<0.01^{**}$. Additionally, age, experience, and total knowledge had a slight frequency of positive effects on green management, with a p-value of $<0.05^{*}$.

Table (1) Distribution of nursing managers according to their demographic characteristics (n=42)

Items	n	%
Age:		
25 - <35	10	23.8
35 - <45	20	47.6
>45	12	28.6
Mean (SD)	40.23 (4.99)	
Gender:		
Male	6	14.3
Female	36	85.7
Education level:		
Bachelor	32	76.2
Master degree	8	19
PHD degree	2	4.8
Years of experience:		
1 - <10 years	12	28.6
10 - 20	21	50
>20 years	9	21.4
Mean (SD)	15.35 (4.8)	
Training program about green management		
Yes	4	9.5
No	38	90.5
Training program about occupational safety		
Yes	9	21.4
No	33	78.6

Table (2) Mean score of nursing managers' knowledge about green management practices (n=42)

Domains	Pre Mean (SD)	Post Mean (SD)	Follow-up Mean (SD)	ANOVA P. value
Leadership commitment to sustainability	1.83 (0.32)	4.63 (1.5)	4.41 (1.36)	7.882 <0.01**
Staff engagement and training	1.95 (0.26)	5.01 (1.01)	4.72 (1.2)	6.999 <0.01**
Sustainability planning and implementation	2.01 (0.20)	4.80 (1.3)	4.51 (0.98)	7.552 <0.01**
Green procurement	1.76 (0.39)	3.99 (0.92)	3.81 (0.76)	8.001 <0.01**
Energy conservation	1.80 (0.23)	4.19 (1.04)	4.01 (1.1)	7.955 <0.01**
Waste reduction and management	2.7 (0.94)	5.77 (1.66)	5.31 (1.8)	9.623 <0.01**
Total	12.05 (2.4)	28.39 (4.7)	26.77 (3.9)	12.882 <0.01**

Figure (1) Distribution of nursing managers' knowledge related total green management practices (n=42)

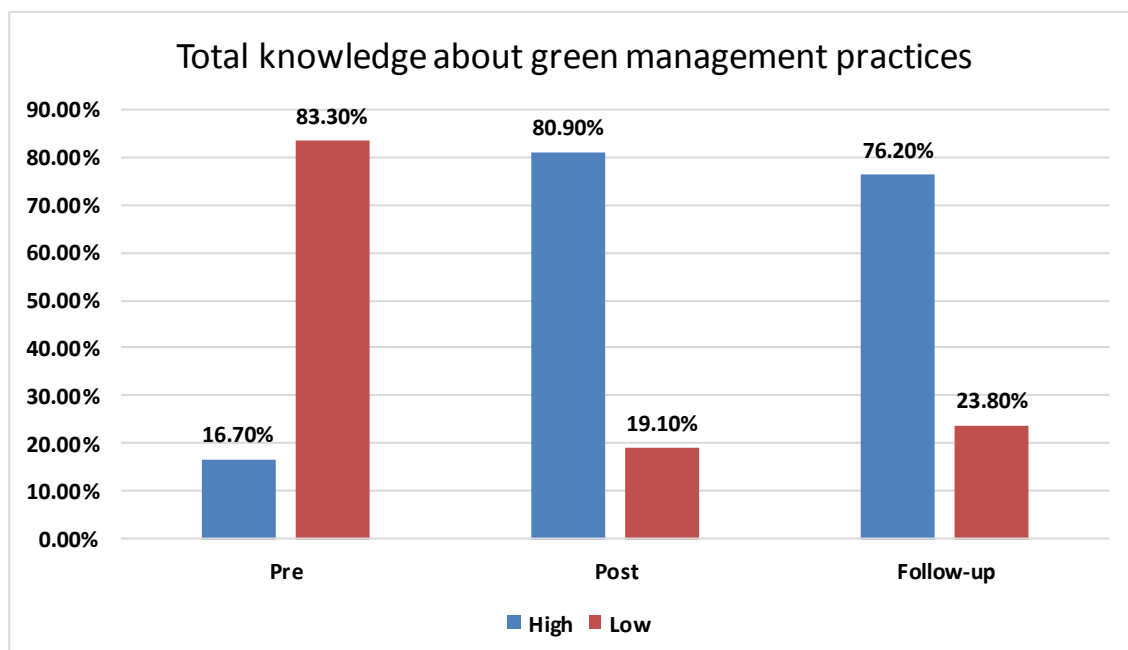


Figure (2) Distribution of nursing managers related total level of knowledge (n=42)

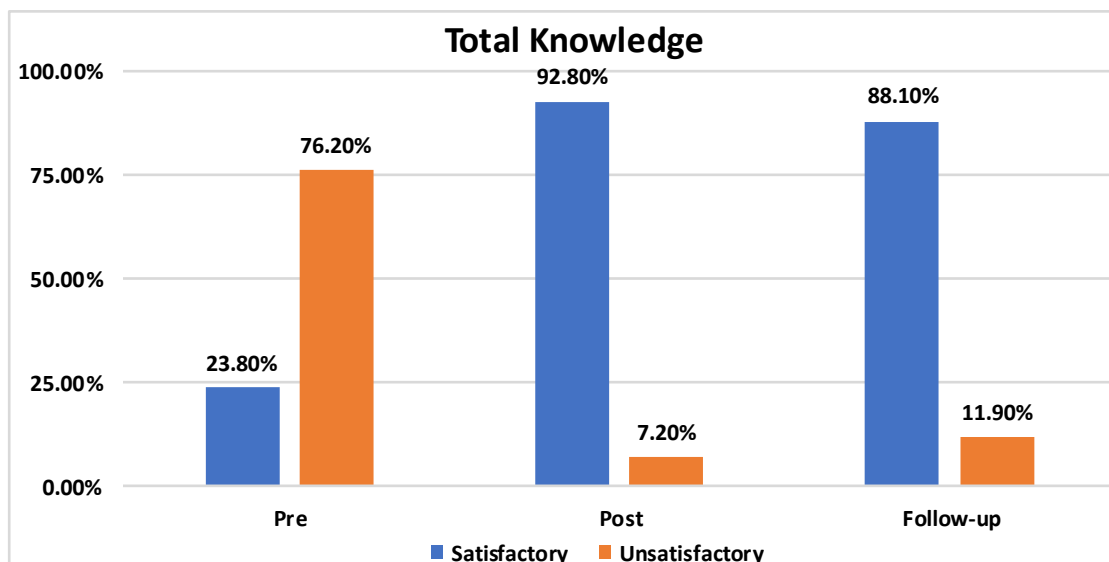


Table (3) Mean score of nursing managers 'perception about occupation safety (n=42)

Domains	Pre Mean (SD)	Post Mean (SD)	Follow-up Mean (SD)	ANOVA P. value
Physical environment	13.34 (3.8)	19.6 (4.1)	18.1 (3.7)	8.222 <0.01**
Equipment safety	14.9 (4.1)	20.9 (5.3)	19.0 (5.0)	9.025 <0.01**
Hazardous exposures	13.5 (3.9)	21.2 (4.6)	20.1 (5.6)	7.663 <0.01**
Workplace violence	14.6 (4.1)	19.8 (3.6)	18.4 (4.5)	9.334 <0.01**
Job stress	12.9 (3.0)	20.3 (5.2)	19.4 (5.8)	7.051 <0.01**
Total	69.24 (16.5)	101.8 (20.6)	95.0 (16.3)	15.221 <0.01**

Figure (3) Distribution of nursing managers 'perception related total occupation safety (n=42)

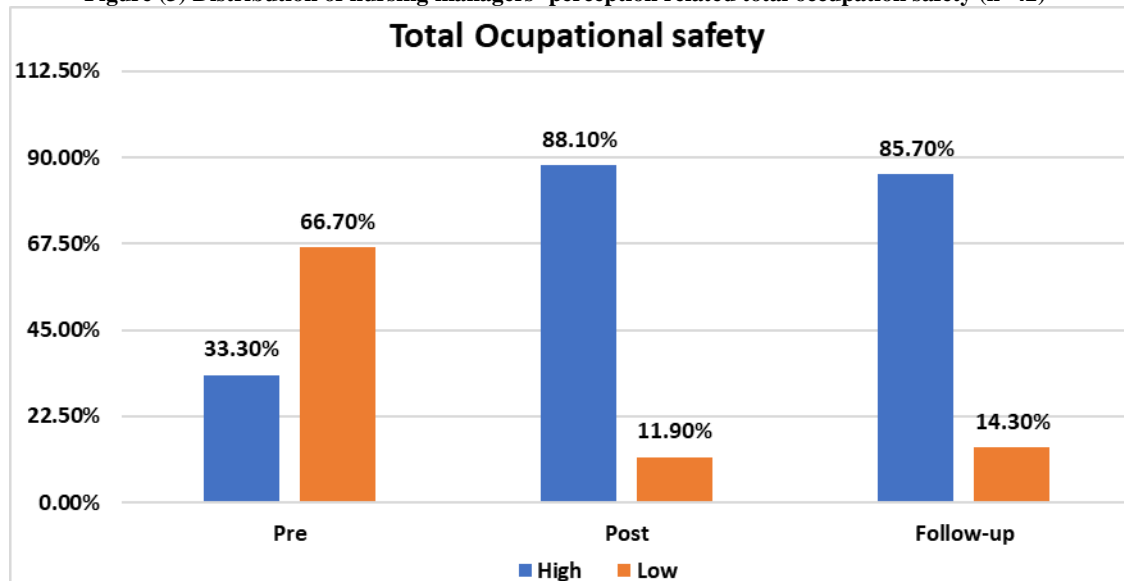


Table (4) Correlation between Green management training and occupational safety

	r.	p. value
Green management and occupational safety pre intervention	0.145	0.052
Green management and occupational safety post	0.456	<0.01**
Green management and occupational safety follow-up	0.437	<0.01**

Table (5): Multiple Linear regression model for occupational safety post intervention (n=42).

	Unstandardized Coefficients		standardized Coefficients	T	P. value
	B	B	B		
Age	.199	.112	.112	2.054	<0.05*
Years of experience	.230	.192	.192	2.600	<0.05*
Education level	.276	.235	.235	3.990	<0.01**
Training course about occupation safety	3.661	3.021	.302	5.889	<0.01**
Total knowledge	.277	.245	.245	4.022	<0.01**
Green management	.399	.338	.338	6.082	<0.01**
Model	R²	Df.	F	P. value	
Regression	0.64	5	10.777	.000**	

a. Dependent Variable: **Occupational safety**

b. Predictors: (constant): Age, Years of experience, Education level, Training course about occupation safety, total knowledge, green management

Table (6): Multiple Linear regression model for green management practice post intervention (n=42).

	Unstandardized Coefficients		standardized Coefficients	T	P. value
	B	B	B		
Age	.201	.159	.159	2.009	<0.05*
Years of experience	.213	.176	.176	2.300	<0.05*
Education level	.311	.278	.278	4.500	<0.01**
Training course about green management	.298	.230	.230	4.111	<0.01**
Total knowledge	.240	.187	.187	2.134	<0.05*
Occupation safety	.340	.281	.281	4.810	<0.01**
Model	R²	Df.	F	P. value	
Regression	0.59	5	9.801	.000**	

a. Dependent Variable: Green management

b. Predictors: (constant): Age, Years of experience, Gender, Education level, Training course about green management, Total knowledge, Occupation safety

Discussion

Green management is a strategy that involves integrating environmental sustainability ideas into organizational management procedures. In order to minimize the environmental impact of your healthcare institution, it is crucial for nurse managers to put their staff's occupational safety first (Pinzone et al., 2019).

According to green management practices, the current study detected that there was significant improvement at nursing managers' knowledge about green management practices at post and follow up green management training program. Also, the results of the intervention showed a significant improvement in the level of green management among nursing managers. The data indicated that a large proportion of nursing managers who had a low level of green management prior to the intervention were able to transition to a high level of green management. Furthermore, the sustained high level of green management among nursing managers at the follow-up stage indicates the effectiveness of the intervention. Additionally, about three quarters of nursing managers had unsatisfactory knowledge regarding green management pre intervention, while improved to the majority of them had satisfactory knowledge at post and follow-up intervention.

These results are in line with earlier research in the field, such the one by **Ebrahim Elshall et al. (2022)**, which found that educational interventions were successful in raising nurses' awareness of, attitudes toward, and behaviors related to sustainability development. **Cruz et al. (2018)** also discovered that attending relevant seminars and training on environmental issues as well as learning about them while enrolled in nursing programs had a favorable impact on environmental and sustainability consciousness. According to **Elshaer et al. (2023)**, small- and medium-sized hospitality firms could perform more sustainably by fostering an environment of environmental stewardship and integrating staff members in green projects. **Lee & Lee (2022)** emphasized the significance of senior management in inspiring staff to engage in

environmentally friendly healthcare practices. **El-Shaer (2015)** observed a significant improvement in the knowledge level of head nurses following a training intervention, while **Li et al. (2022)** discovered that nurses' intention to engage in green behavior positively influenced their actual conduct. While, , **Leppänen et al., 2022** revealed that Perioperative nurses and nurse managers understand the importance of ecological and economic sustainability Furthermore, **Abdelmonem et al. 2022** noted that just over two thirds (66.7%) of head nurses had a positive impression of green human resource management techniques.

According to our findings, following participation in green management training, nursing managers reported a considerable increase in workplace safety, which was supported by their own assessments. When it came to occupational safety, the majority of nursing managers reported high levels during the post-training and follow-up stages, while just one-third reported low levels. The utilization of various instructional techniques, such as role-playing games, group discussions, and multimedia resources including videos, animations, and interactive presentations may be responsible for these encouraging outcomes.

These results are consistent with the findings of several other studies. **Ramadan et al. (2018)** reported that educational programs can reduce occupational hazards among nurses, while **Denge and Rakhudu (2022)** found that nurses are affected by a variety of occupational hazards that can impact their work. To promote the health and well-being of staff, future interventions such as training and education on green management should be considered. **Taghavi and Ghazanchaei (2019)** have noted that implementing green management in health centers can result in benefits such as safety, economic savings, environmental protection, and improved health and social outcomes for both patients and employees. **Bolandian-Bafghi et al. (2022)** also reported that green management can help reduce occupational hazards.

In addition, our study found a significant positive correlation between green management

and occupational safety at different stages of the program. These findings are consistent with the study by **Nasser Rayan et al. (2021)**, which reported a positive and statistically significant correlation between total practice scores regarding occupational health hazards among nurses. Similarly, **Nehad & Mohamed (2018)** noted a strong positive relationship between organizational climate and occupational safety.

The present study found that education level, training courses on occupational safety, total knowledge, and green management had a high frequency of positive effects on occupational safety. However, age and experience had only a slight frequency of positive effects on occupational safety. Our results supported with **Amabye, 2016** who found significant association between occupational hazards exposure and **Elewa & El Banan, 2016** revealed that there was statistically significant relation between total nurses' occupational hazards and gender, area of training and safety training. Moreover, **Saqer, 2014** stated that there is no significant association between the occupational hazards and the ward, gender. While disagreement with the study by **Qaraman et al., 2022** showed that according in terms of practice of occupation safety, the means scores were statistically significant between males and females.

Conclusion:

The green management training program significantly improved the level of green management practices among nursing managers. Additionally, prior to the intervention, about three quarters of nursing managers had unsatisfactory knowledge regarding green management, while the majority of them had satisfactory knowledge post-intervention and at follow-up. Furthermore, there was a significant improvement in occupational safety among nursing managers after the green management training, which was sustained at follow-up.

Recommendations:

1. Continuing to provide green management training programs for nursing managers to sustain the positive impact on their practices and knowledge.

2. Conducting periodic assessments of nursing managers' green management practices and knowledge to monitor their progress and identify areas that need improvement.

3. Encouraging the implementation of green management practices and occupational safety protocols in all healthcare facilities to protect the environment, reduce waste, and promote a safer workplace for healthcare workers.

4. Collaborating with academic institutions and researchers to develop and implement evidence-based interventions and best practices to promote green management and occupational safety in healthcare facilities.

Limitation:

One limitation of this study is that it only focused on nursing managers in one specific setting. It is possible that the results may not be generalizable to other healthcare facilities or to different types of healthcare professionals.

References:

- Abd-elmonem, A. M., Rashed, S. E., & Hasanin, A. G. (2022).** The Relation between Green Human Resource Management Strategies and Organizational Innovativeness among Head Nurses. *Assiut Scientific Nursing Journal*, 10(32), 113-125.
- Adu, R. O., Gyasi, S. F., Essumang, D. K., & Otabil, K. B. (2020).** Medical waste-sorting and management practices in five hospitals in Ghana. *Journal of environmental and public health*, 2020.
- Ali Y, Saad T B, Sabir M, Muhammad N, Salman A, and Zeb K 2019** Integration of Green Supply Chain Management Practices in Construction Supply Chain of CPEC Manag. *Enviro.l Qual*
- Amabye, T. (2016).** Occupational risks and hazards exposure, knowledge of occupational health and safety practice and safety measures among workers of Sheba Leather Plc, Wukro, Tigray Ethiopia. *MOJ Public Health*, 4(2), 1-7.
- Anwar, N., Mahmood, N. H. N., Yusliza, M. Y., Ramayah, T., Faezah, J. N., & Khalid,**

- W. (2020). Green Human Resource Management for organisational citizenship behaviour towards the environment and environmental performance on a university campus. *Journal of Cleaner Production*, 256, 120401.
- Barracough, K. A., Gleeson, A., Holt, S. G., & Agar, J. W. (2019).** Green dialysis survey: Establishing a baseline for environmental sustainability across dialysis facilities in Victoria, Australia. *Nephrology*, 24(1), 88-93.
- Bolandian-Bafghi, S., Adib-Hajbaghery, M., & Zandi, M. (2022).** Nurses' experiences of the role of organizational and environmental factors in the development of love of the profession: a qualitative study. *BMC nursing*, 21(1), 1-8.
- Cook, T. D., & Wong, V. C. (2008).** Better quasi-experimental practice. *The Sage handbook of social research methods*, 134-164.
- Cruz, J. P., Alshammari, F., & Felicilda-Reynaldo, R. F. D. (2018).** Predictors of Saudi nursing students' attitudes towards environment and sustainability in health care. *International nursing review*, 65(3), 408-416.
- Denge, T., & Rakhudu, M. (2022).** Perceptions of nurses on occupational health hazards and safety practices in Ditsobotla public hospitals in North West province. *Curationis*, 45(1), e1-e9. <https://doi.org/10.4102/curationis.v45i1.2220>
- Dopolani, F. N., Arefi, M. F., Akhlaghi, E., Ghalichi, Z., Salehi, A. S., Khajehnasiri, F., ... & KHAMMAR, A. (2022).** Investigation of occupational fatigue and safety climate among nurses using the structural equation model. *Work*, (Preprint), 1-11.
- Ebrahim Elshall, S., Samir Darwish, S., & Mohamed Shokry, W. (2022).** The effectiveness of educational interventions about sustainability development among nursing students. *Egyptian Journal of Health Care*, 13(1), 294-310.
- El-Shaer, A. M. (2015).** Impact of time management program on time wasters of head nurses and their perception toward effective organizational performance. *IOSR Journal of Nursing and Health Science*, 4(3), 18-30.
- Ellewa, A. H., & El Banan, S. H. A. (2016).** Occupational hazards as perceived by nursing interns and protective measures. *IOSR Journal of Nursing and Health Science (IOSR-JNHS)*, 5(6), 107-118.
- Elshaer, I. A., Azazz, A. M., & Fayyad, S. (2023).** Green Management and Sustainable Performance of Small-and Medium-Sized Hospitality Businesses: Moderating the Role of an Employee's Pro-Environmental Behaviour. *Interna*
- Franke, T. M., Ho, T., & Christie, C. A. (2012).** The chi-square test: Often used and more often misinterpreted. *American journal of evaluation*, 33(3), 448-458. <https://doi.org/10.1177/1098214011426594>
- Lee, S. M., & Lee, D. (2022).** Developing Green Healthcare Activities in the Total Quality Management Framework. *International journal of environmental research and public health*, 19(11), 6504. <https://doi.org/10.3390/ijerph19116504>
- Leppänen, T., Kvist, T., McDermott-Levy, R., & Kankkunen, P. (2022).** Nurses' and nurse managers' perceptions of sustainable development in perioperative work: A qualitative study. *Journal of Clinical Nursing*, 31(7-8), 1061-1072.
- Li, M., Gong, Z., Gilal, F. G., Van Swol, L. M., Xu, J., & Li, F. (2021).** The moderating role of ethical leadership on nurses' green behavior intentions and real green behavior. *BioMed Research International*, 2021.
- Minikumary, C. K., Pillai, J. S., & Mondal, R. (2023).** A study on occupational safety and health among workers at a tertiary care hospital at south India. *International Journal of Community Medicine and Public Health*, 10(1), 254.

- Mousa, S. K., & Othman, M. (2020). The impact of green human resource management practices on sustainable performance in healthcare organizations: A conceptual framework. *Journal of Cleaner Production*, 243, 118595.
- Nasser Rayan, H., Mohamed Abdallah, S., & Mohamed Abdrabou, H. (2021). Assessment of Nurse Interns Knowledge and Practice & Attitude regarding Occupational Health Hazards. *Egyptian Journal of Health Care*, 12(1), 1576-1590.
- Nayak, B. K., & Hazra, A. (2011). How to choose the right statistical test?. *Indian journal of ophthalmology*, 59(2), 85-86. <https://doi.org/10.4103/0301-4738.77005>
- NEHAD, E. F., & MOHAMED, E. Y. (2018). Relationship between organizational climate and occupational safety and health for nurses. *The Medical Journal of Cairo University*, 86(March), 129-135.
- O'Hara, A. C., Miller, A. C., Spinks, H., Seifert, A., Mills, T., & Tuininga, A. R. (2022). The Sustainable Prescription: Benefits of Green Roof Implementation for Urban Hospitals. *Frontiers in Sustainable Cities*, 4, 70.
- Ofei, A. M. A., Paarima, Y., & Barnes, T. (2020). Exploring the management competencies of nurse managers in the Greater Accra Region, Ghana. *International Journal of Africa Nursing Sciences*, 13, 100248.
- Ozturk, H., & Babacan, E. (2012). A study in scale development: the occupational safety scale (OSS) for health care personnel working in hospital/Bir olcek gelistirme calismasi: hastanede calisan saglik personeli icin is guvenligi olcegi. *Journal of Education and Research in Nursing*, 9(1), 36-43.
- Paillé, P., Valéau, P., & Renwick, D. W. (2020). Leveraging green human resource practices to achieve environmental sustainability. *Journal of Cleaner Production*, 260, 121137.
- Pinzone, M., Guerci, M., Lettieri, E., & Huisigh, D. (2019). Effects of 'green' training on pro-environmental behaviors and job satisfaction: Evidence from the Italian healthcare sector. *Journal of Cleaner Production*, 226, 221-232.
- Pinzone, M., Guerci, M., Lettieri, E., & Huisigh, D. (2019). Effects of 'green' training on pro-environmental behaviors and job satisfaction: Evidence from the Italian healthcare sector. *Journal of Cleaner Production*, 226, 221-232.
- Qaraman, A. F. A., Elbayoumi, M., Kakemam, E., & Albelbeisi, A. H. (2022). Knowledge, Attitudes, and Practice towards Occupational Health and Safety among Nursing Students in Gaza Strip, Palestine. *Ethiopian journal of health sciences*, 32(5), 1007-1018. <https://doi.org/10.4314/ejhs.v32i5.16>
- Ramadan, E. N., Mahfouz, H. H., & Taha, A. S. (2018). Safety Measures Program for Prevention of Occupational Hazards among New Graduate Bachelor Nurses. *IOSR Journal of Nursing and Health Science (IOSR-JNHS)*, 7(4), 98-111.
- Raut, R. D., Luthra, S., Narkhede, B. E., Mangla, S. K., Gardas, B. B., & Priyadarshinee, P. (2019). Examining the performance oriented indicators for implementing green management practices in the Indian agro sector. *Journal of Cleaner Production*, 215, 926-943.
- Roscoe, S., Subramanian, N., Jabbour, C. J., & Chong, T. (2019). Green human resource management and the enablers of green organizational culture: Enhancing a firm's environmental performance for sustainable development. *Business Strategy and the Environment*, 28(5), 737-749.
- Saputra, F., & Mahaputra, M. R. (2022). Building Occupational Safety and Health (K3): Analysis of the Work Environment and Work Discipline. *Journal of Law, Politic and Humanities*, 2(3), 105-114.
- Saqer, A. (2014). Assessment of health and safety risk among health care providers in European Gaza Hospital. *Assessment of*

Health and Safety Risk among Health Care Providers in European Gaza Hospital.

Singh, N., Tang, Y., & Ogunseitan, O. A. (2020). Environmentally sustainable management of used personal protective equipment. *Environmental science & technology*, 54(14), 8500-8502.

Taghavi, L. & Ghazanchaei, E. (2019). Green Management; A Step in Sustainable Development of Health Centers. 4. 28-37.

Trus, M., Galdikiene, N., Balciunas, S., Green, P., Helminen, M., & Suominen, T. (2019). Connection between organizational culture and climate and empowerment: The

perspective of nurse managers. *Nursing & health sciences*, 21(1), 54-62.

Zhang, Q., Gao, B., & Luqman, A. (2022). Linking green supply chain management practices with competitiveness during covid 19: The role of big data analytics. *Technology in Society*, 70, 102021.

Zhang, Q., Gao, B., & Luqman, A. (2022). Linking green supply chain management practices with competitiveness during covid 19: The role of big data analytics. *Technology in Society*, 70, 102021.