

▪ **Basic Research**

**The Mediating Role of Organizational Information Communication Technology (ICT) Support in ICT demand and E- leadership: Nursing staff Perspectives**

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**Abstract**

Leadership practices must evolve to adapt to new remote or virtual conditions in order to ensure effective leadership and sustainable performance. **Aim:** To assess the mediating role of organizational information communication technology (ICT) support in ICT demand and e-leadership from the nursing staff perspectives. **Research Design:** A descriptive-correlational research design. **Setting:** The study was conducted within selected units at Damietta General Hospital. **Sample:** A convenient sample of 100 nursing staff from various departments. **Tools:** Barriers for using e- leadership questionnaire, ICT Demands Scale and organizational ICT support scale. **Results:** The nursing staff perspectives on barriers to using e-leadership were prevalent in 75.95% of situations, with a mean score (83.54±23.75). The most common barrier identified was related to e-social skills factors 77.53%, with a mean score of (11.63±3.24). While the e-technological factors were the least commonly perceived barriers to e-leadership from the nursing staff's perspective (73.40%), with a mean score of (11.01±3.60). A positive statistically significant correlation was found between total ICT demands factors and e-leadership barriers, and total barriers' score, except for Communication and team barriers. A negative correlation was found between total ICT support factors and e-leadership barriers, and total barriers' score, with no statistical significance. The total ICT support has a highly statistically significant positive effect on ICT demand (B=0.158, p=0.000). Furthermore, the total ICT support has a highly statistically significant negative effect on total e-leadership barriers (B= -0.137, p=0.000). **Conclusion:** The research findings accept all three hypotheses. The study concludes that there is a direct association between ICT demands and e-leadership barriers, that organizational ICT support positively predicts ICT demands, and that organizational ICT support negatively predicts e-leadership barriers, as perceived by nursing staff. These results highlight the importance of organizational support and ICT resources in mitigating e-leadership barriers in healthcare settings. **Recommendations:** Fostering a culture of collaboration, communication, and support among nursing staff and leadership. Enhance technological training and provide necessary resources to ensure proficient use of technology, reducing technological barriers.

**Key words:** E leadership, Information Communication Technology, Nursing staff Perspectives & Organizational ICT Support.

## Introduction

In recent times, the field of leadership literature has encountered a significant challenge in addressing the widespread and profound diffusion of information and communication technologies (ICTs), which have fundamentally transformed relationships among employees. Consequently, leadership is evolving in response to the influence of these technologies. This emerging phenomenon has been termed "e-leadership," and researchers have explored it with the aim of understanding its distinctions from traditional leadership approaches. Over the past few decades, the pervasive nature of ICTs has brought about fundamental changes in how businesses structure themselves. More specifically, ICTs have deeply permeated the interactions between leaders and their followers, intensifying these relationships. Therefore, as proposed by other scholars **(Cortellazzo et al., 2019)**, leadership is presently evolving through the "mediation" of new ICTs, the presence and utilization of which necessitate a transformation in leadership practice **(Torre and Sartii, 2020)**

Healthcare systems are undergoing rapid changes due to the integration of numerous independent hospital units into larger corporate hierarchies. Nurse Managers are required to establish connections with colleagues spread across extensive and often remote geographic areas. These modifications have created a complex working environment for nurse managers, necessitating multiple levels of communication. They must utilize Information Communication Technology (ICT) to engage with coworkers in both physical and virtual team settings **(Sharpp et al., 2019)**.

Nursing personnel need to acquaint themselves with new technological communication methods as part of the costly ICT system upgrades that frequently accompany the consolidation of healthcare organizations. This includes leveraging healthcare technology such as telemedicine and virtual patient assessments, as well as enhancing access to mobile ICT technology. These advancements are poised to enhance the effectiveness of healthcare delivery for individuals in diverse locations **(Sharpp et al., 2019)**.

By making use of healthcare technology such as telemedicine and virtual patient monitoring, the increased accessibility of mobile ICT technology is enhancing healthcare efficacy, particularly for marginalized populations. Healthcare organizations are now capable of fostering greater communication across numerous healthcare departments and groups. Indeed, the term "virtual" is employed to characterize certain teams, underscoring their significant reliance on technology **(Torre & Sarti, 2020)**.

In contrast to traditional workgroups, where individuals physically interact with one another, these "new" teams are defined by web-based communication and mobile technology, both of which are essential for minimizing physical distance among team

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members and enabling individual performance at various times and locations. As a result, for an accurate definition of a virtual team, two criteria must be met: (1) the importance of technology in facilitating collaboration, and (2) the geographical separation of group members (**Torre & Sarti, 2020**).

Recently, managers' daily responsibilities have integrated the practice of leading in the virtual realm. The adoption of new communication technologies and the expansion of business operations across various geographic locations have underscored the importance of exerting influence through digital channels. E-leadership, also known as electronic leadership, thrives in an e-environment where work primarily unfolds online through the utilization of information technology (IT). In this context, leaders and subordinates engage in the electronic collection, dissemination, and communication of information. These leaders are commonly referred to as virtual leaders, as they interact with their subordinates and employ novel technologies to enhance their professional endeavors. Virtual leaders play a pivotal role in guiding team members from a distance to accomplish tasks and attain the organization's objectives. Thanks to technological advancements, e-leadership, or distance leadership, is gradually replacing traditional leadership practices (**Darics, 2020**).

E-leadership means the proper usage of electronic and traditional ways in communication. It involves knowing how to use current ICTs and also learning new technology for persons and organizations as well. It also means being competent in using the chosen technology. So, it's not only about using more ICTs, but for Employing ICTs when they offer advantages for various reasons. Choosing the best and most suitable ICTs based on the value of available resources Utilizing in-person communication channels when they are most appropriate, and demonstrating competence in the use of ICTs, similar to how one would differentiate between a successful face-to-face interaction and an unsuccessful one based on various criteria (**Roman et al., 2019**).

**Roman et al., (2019)** operationalized the concept of e-leadership to six competencies based on a comprehensive literature review. They developed the SEC (Six E-Competency) model, which highlights effective e-leadership as a product of six competencies. Accordingly, e-communication competency is the ability of leaders to communicate using ICTs effectively to enhance performance. E-social competency denotes the leadership's ability to create a conducive working environment that promotes collaboration and communication. E-team competency is the ability to develop, lead, and motivate virtual teams, while e-change is the ability to embrace and effectively manage change initiatives through ICTs. E-trust competency is the leader's ability to build trust by being viewed as honest, consistent, and fair in the virtual context. Finally, e-tech competency refers to the leader's awareness of ICT developments and cyber security issues (**Alkhayyal & Bajaba, 2023**).

These technologies which are now persistent in almost every working context (include the internet, the intranet, e-mail, instant messaging, video conferencing systems, groupware systems, text messages, blogs, document sharing, smart apps, and social media **(Darics, 2020)**). To educate both leaders and followers on the most recent and cutting-edge communication technology, proper training must be provided. ICT is well acknowledged to be the foundation for e-leadership. It cannot be successfully applied by healthcare organization without knowledge of the most recent IT. In e-leadership, face-to-face communication is recommended; however, the leader may find it challenging to observe the expressions and responses of his subordinates to his directions in the absence of face-to-face engagement. It can be challenging for the e-leadership to better inspire and motivate the followers. In order to have face-to-face connection with his subordinates, the e-leadership can employ video calling **(Cardon et al., 2019; Roman et al., 2019)**,

### **Significance of the study**

The widespread adoption of ICTs has triggered significant innovation in the public sector, leading to the creation of positive public value across managerial, service delivery, and policy domains. Nevertheless, achieving these positive outcomes is not guaranteed solely through ICT usage. Public leaders can either neglect to adopt relevant new ICTs, use them ineffectively, or employ them in manners that actually diminish its public value. This raises the question of the critical role of e-leadership **(Liu et al., 2020)**.

While all studies emphasize the significance of ICT as a method to enhance business management and enable organizations to operate more efficiently, the discussion regarding how leadership has been impacted is still an ongoing area of study. Various concepts, such as "digital leadership," have emerged in recent years and are frequently used interchangeably with "e-leadership." Despite the growing importance of e-leadership, either due to technological advancements or the evolving role of leadership in organizations, academic contributions to this topic remain limited **(Roman et al., 2019)**.

In conclusion, since there have been no prior research efforts to investigate the barriers, relationships, and perspectives of nursing staff concerning information communication technology and e-Leadership, as well as the role of organizational ICT support in Egypt, the researchers have chosen to conduct a quantitative study to delve into these barriers and relationships. This research aims to empower other nurse leaders to effectively address the evolving needs of the community in the healthcare sector. By enhancing their roles and staying updated with new approaches in nursing management and information management, nurse leaders can better serve their communities.

### **Aim of the Study**

The aim of this study was to assess the mediating role of organizational ICT support in ICT demand and e-leadership from the nursing staff perspectives.

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## **Operational definition**

In the current study; Information communication technology (ICT) referred to technologies that include using internet, e-mail, instant messaging, video conferencing systems, text messages, document sharing, smart apps, and social media.

## **Research hypotheses**

**H<sub>1</sub>:** There is a direct association between ICT demands and e- leadership barriers.

**H<sub>2</sub>:** Organizational ICT support is a positive predictor for ICT demands.

**H<sub>3</sub>:** Organizational ICT support is a negative predictor for e-leadership barriers.

## **Research Design:**

A descriptive-correlational research design was used to achieve the aim of the present study and test the research hypotheses.

## **Setting:**

The study was conducted within selected units, including adult ICU, NICU, urology, obstetric ward, surgery, orthopedic, and emergency unit, at Damietta General Hospital, which is affiliated with the Ministry of Health in Egypt. Damietta General Hospital serves as a critical healthcare institution within the Egyptian healthcare system, offering a wide range of medical services to the local population.

## **Study Sample**

A convenient sample was selected 100 of nursing staff who are working across various departments, at the above-mentioned settings and who will be available at the time of data collection

## **Tools of Data Collection:**

Depending on the theoretical literature and previous studies; data were collected using the following scales:

**Tool I: Self-administered questionnaire “Barriers for using e- leadership questionnaire”** Adopted from **Van Wart et al., (2019)**. The questionnaire composed of two parts:

**First: Nursing staff personal data:** It was concerned with (Educational level, years of experience, working at this unit, gender, unit title, period of using internet, and frequency of using internet).

**Second: Nursing staff perspectives regarding barriers for using e- leadership questionnaire:** It comprised 22 items, across seven dimensions as follows: e-

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communication factors (3 items), e-social skills factors (3 items), e-team building factors (3 items), e-change management factors (3 items), e-technology factors (3 items), e-trust factors (3 items), and miscellaneous factors which consisted of (4 items). **Scoring:** Participants' responses were assessed using a 5-point Likert scale, where strongly disagree = 1, disagree = 2, neither agree nor disagree = 3, agree = 4, and strongly agree = 5. The scores from the barriers for using e-leadership in nursing questionnaire were classified into three categories: (a) a high perceived level of nursing staff regarding barriers for using e-leadership  $\geq 60\%$  (scores ranging from 67 to 110), (b) a moderate level from 33.6% - 59% (scores ranging from 37 to 66), and (c) a low level less than 33.6% (scores ranging from 0 to 36).

**Tool II: ICT Demands Scale:** Adopted from **Day et al., (2012)**. It comprised 27 items a five-point scale assessing the eight theorized areas of ICT-related demands as follows: Response expectations (2 items), availability (3 items), ineffective communication (4 items), lack of control over ICT (3 items) hassles using ICT (5 items), employee monitoring; (4 items), ICT learning expectations (2 items), and workload (4 items). Participants were asked to rate the frequency of their experience with each potential demand using a five-point Likert scale where never =1, rarely = 2, sometimes =3, usually = 4, and always = 5.

**Tool III: ICT support scale:** Adopted from **Day et al., (2012)**. It includes eight items designed to assess the extent to which the organization is (1) providing personal assistance for employees to deal with ICT issues; and (2) ensuring necessary upgrades and up-to date materials to encourage and support the use of technology within the organization. Participants were asked to rate this support using a five-point Likert scale, where never = 1, rarely = 2, sometimes = 3, usually = 4, and always = 5. This scale measured the organization's supply of necessary ICT upgrades, up-to-date materials, and personal technical support and assistance to the nursing staff.

### **Validity**

The study tools were submitted to a panel of three experts in the field of nursing administration to judge the instrument content and face validity. Modifications have been done based on the judgment of panel concerning the clarity of sentences and appropriateness of content. The experts were asked also to comment on the structure-and layout of the instrument in term of the clarity of the questionnaire instructions, readability, and ease of understanding, questions' sequence, format, overall appearance and time needed for completion.

## **Reliability**

Reliability of the tools was performed to confirm its consistency by alpha coefficient test. Statistical equation of Cronbach's alpha reliability coefficient normally ranges between 0 & 1. Higher estimation of more than 0.7 indicates acceptably reliability **Tavokol & Dennick, (2011)**. Internal consistency using Cronbach's alpha was (79%) for The Contemporary effects of virtuality in administration (Barriers for e-leadership) scale; (82%) for The ICT demand scale and (83%) for The ICT support scale which indicated high reliability.

## **Ethical consideration**

An official approval to conduct the proposed study as obtained from the research ethics committee of the faculty of nursing, MTI University to carry out the study. Participation in the study was voluntary and based on the subjects' acceptance to give informed consent; where informed consent has been signed by the participants after reading all its details. The ethical issues considerations include explaining the purpose and nature of the study, stating the possibility to withdraw at any time, confidentiality of the information where it was not be accessed by any other part without taking permission of the participants and participation was with no risk.

## **Procedure**

After obtaining the formal approval from the Dean of the Faculty of Nursing - MTI University, along with approval from the research ethics committee, and securing consent from both the medical and nursing directors of the hospital under study, the researchers initiated the data collection process. They conducted meetings with the nurse managers from the selected study units during both morning and afternoon shifts, wherein they explained the research aim and extended invitations for voluntary participation. Subsequently, the nursing staff provided formal written consent to take part in the study.

## **Pilot study:**

A pilot study was carried out on (n=10) (10%) of the total sample of nursing staff who are working across various departments before data collection to ensure the applicability of the tool and to estimate the time needed to complete the used tools. No recommended modification was done. The pilot sample was included.

## **Statistical Analysis:**

The collected data were coded and entered statistical package for social sciences (SPSS) program version 25. Data were analyzed using the appropriate statistical methods. Descriptive statistics, including frequency, mean, and standard deviation, were utilized to analyze the data in this study. Relative statistical tests of significance, such as the correlation coefficient and linear regression analysis used to identify the relationships

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between the study variables. The p-value used to determine the degree of significance, with a significance level of  $\leq 0.05$  for all statistical analyses.

## Results

Table (1) presents the personal data for the nursing staff. The ages of 34% of them were between the 40 to less than 50 years. A total of 99% of them were female. 47% had completed secondary technical nursing school, and 26% worked in the adult ICU. In terms of years of experience, 44% had 20 years or more with a mean score of  $(17.11 \pm 10.35)$ . Additionally, 61% of them reported using the internet for 7 years or longer.

Table (2) reveals that 75% of the nursing staff in the study reported using the internet daily at home, while 50% reported using the internet daily at their workplace.

Table (3) emphasizes that, from the nursing staff perspectives, barriers for using e-leadership were prevalent in 75.95% of situations totally, with a mean score of  $(83.54 \pm 23.75)$  which indicates high perception level, and the most prevalent barrier was the e-social skills factors which represents 77.53% among all other barriers with mean score of  $(11.63 \pm 3.24)$ . While the e- technological factors were the lowest barriers for the e-leadership from the nursing perspectives (73.40%) mean score of  $(11.01 \pm 3.60)$ .

Table (4) presents that total ICT Demand dimensions accounted for 61.07%, where the highest mean percent (68.73%) with mean score of  $(10.31 \pm 2.80)$  was related to staff availability, while employees monitoring was the lowest mean percent (50.94%) from nursing perspectives.

Table (5) portrays that as regarding to necessary upgrades and up-to date materials dimension; 57% of nursing staff reported that the organization either "never" or "rarely" implements appropriate software. 50% stated that the organization either "never" or "rarely" use of the latest technology. When it comes to receiving necessary technology upgrades, 52% mentioned that they "never" or "rarely" receive these upgrades. Regarding the timely implementation of IT systems, 45% indicated that this happens "never" or "rarely".

Moreover, as regards to personal assistance for employees; the availability of technical support, 49% reported that it was "never" or "rarely" available at work as needed. For the helpfulness of IT team, 47% felt that their IT team is "rarely" or "never" helpful. The responses regarding the promptness of response from the technical support team were 49% said the response was "rarely" or "never" prompt. Additionally, 54% reported that the IT team "rarely" or "never" teaches them to solve technical issues if they reoccurred. Additionally, regarding to total Organizational ICT support mean percent was (60.81%).

Table (6) explores that there was a highly statistically significant positive correlation between total ICT demands dimensions and e-leadership barriers ( $r=0.92$ ,  $p=0.01$ ), while there was a negative correlation between total ICT support dimensions and e-leadership barriers and total barriers' score with no statistical significance.



Table (7) displays that, the total ICT support has a highly statistically significant positive effect on ICT demand ( $B=0.158$ ,  $p=0.000$ ).

Table (8) displays that, the total ICT support has a highly statistically significant negative effect on total e-leadership barriers ( $B= -0.137$ ,  $p=0.000$ )

Table (9) shows that there was no significant difference in the perception of barriers based on age, gender, years of experience or the period of using internet. While there was a significant difference in the perception of barriers related to educational level ( $F = 3.62$ ,  $p = 0.03$ ), as the nursing staff with a technical nursing institute degree have the highest mean score compared to those with a secondary technical nursing school or bachelor's degree, also, there was a significant difference between nursing staff perception regarding e- leadership barriers in relation to their working unit ( $F = 5.45$ ,  $p = 0.00$ ).

Table (10) shows that there was no significant difference in total ICT perceptions among nursing staff based on age, educational level, years of experience or the period of using internet. While there was a significant difference in the total ICT perceptions based on gender and the working unit ( $F = 5.05$  &  $F = 9.23$  respectively at  $P = 0.00$ ), as the female gender had higher mean score than males' mean score, and the ICU nursing staff have the highest mean score compared to nursing staff in other units.

**Table 1: Distribution of the studied nursing staff according to their personal data (n=100).**

<b>Personal data</b>	<b>Categories</b>	<b>%</b>
<b>Age</b>	20-<30 year	31
	30-<40 year	26
	40-<50 year	34
	≥50 year	9
	<b>Mean ± SD</b>	37.46±10.18
<b>Gender</b>	Male	1
	Female	99
<b>Educational level</b>	Secondary technical nursing school	47
	Technical nursing institute	37
	Bachelor's degree	16
<b>Working unit</b>	Obstetric	10
	Emergency	17
	Adult ICU	26
	NICU	11
	Orthopedic	12
	Surgery	12
	Urology	12
<b>Years of experience</b>	<5 years	19
	5-< 10 years	13
	10-< 20 years	24
	≥20 years	44
	<b>Mean ± SD</b>	17.11±10.35
<b>Period of using internet</b>	Never used it	9
	Less than 6 months	3
	6 to 12 months	5
	1 to 3 years	4
	4 to 6 years	18
	7 years or more	61

**Table 2: Distribution of the nursing staff according to their frequency of using internet (n=100).**

Place	Frequency of internet use*			
	Daily	Weekly	Monthly	Never
At home	75	2	1	5
At workplace	50	3	2	4
Others	5	0	0	0

\*Not mutually exclusive

**Table 3: Mean scores and mean percentages of barriers for using e-leadership from nursing staff perspectives (n=100).**

Dimensions	Mean $\pm$ SD	Mean%
E-Communication barriers	11.12 $\pm$ 3.31	74.13
E-Social skills barriers	11.63 $\pm$ 3.24	<b>77.53</b>
E-Team building skills barriers	11.44 $\pm$ 3.14	76.27
E-Change management barriers	11.46 $\pm$ 3.09	76.40
E-Technological barriers	11.01 $\pm$ 3.60	73.40
E-Trust barriers	11.51 $\pm$ 3.10	76.73
Miscellaneous barriers	15.37 $\pm$ 4.26	76.85
<b>Total</b>	<b>83.54<math>\pm</math>23.75</b>	<b>75.95</b>

**Table 4: Mean scores and mean percentages of ICT demand dimensions from nursing staff perspectives (n=100).**

ICT demands	Mean $\pm$ SD	Mean%
Response expectations	6.83 $\pm$ 1.95	68.30
Staff availability	10.31 $\pm$ 2.80	<b>68.73</b>
Ineffective Communication	11.17 $\pm$ 3.23	58.79
Lack of Control over ICT	8.64 $\pm$ 2.90	57.60
Hassles using ICT	14.49 $\pm$ 3.56	63.00
Employees Monitoring	8.15 $\pm$ 2.60	50.94
ICT Learning expectations	4.12 $\pm$ 1.31	58.86
Workload	14.46 $\pm$ 3.59	62.87
<b>Total ICT Demands</b>	<b>78.17<math>\pm</math> 21.94</b>	<b>61.07</b>

**Table 5: Nursing staff's perspective regarding organizational ICT support (n=100).**

ICT support	Never	Rarely	Sometimes	Usually,	Always
	%	%	%	%	%
<b>Necessary upgrades and up-to date materials</b>					
Implementation of appropriate software	28	29	19	14	10
Use of the latest technology	26	24	20	14	16
Receiving necessary technology upgrades	29	23	16	16	16
Timely implementation of IT systems	26	19	19	28	8
<b>Personal assistance for employees</b>					
Availability of technical support	4	45	18	33	0
Helpfulness of IT team	3	44	19	29	5
Prompt response from technical support team	4	45	16	29	6
Problem-solving training of recurrent technical issues	12	42	14	25	7
<b>Organizational ICT support</b>	<b>Mean ± SD</b>			<b>Mean%</b>	
	21.89 ± 8.50			60.81	

**Table 6: Correlation between both total ICT support and demand dimensions, and e-leadership barriers from the nursing staff perspectives**

		E-Communication barriers	E- Social Barriers	E- Team barriers	E-Change barriers	E-Technological barriers	E-Trust barrier	E-Miscellaneous barriers	Total e-leadership barriers
ICT demands	r	1.00	-0.06	0.70	-0.03	0.78	0.74	0.04	0.92
	P	0.00	0.54	0.04	0.77	0.03	0.03	0.69	0.01
ICT support	r	-0.08	-0.17	-0.15	-0.10	-0.08	-0.11	-0.17	-0.14
	P	0.42	0.09	0.13	0.33	0.41	0.30	0.09	0.17

**Table 7: Linear regression analysis for the effect of organizational ICT support on the total ICT demands dimensions from nursing staff perspectives**

Linear regression model	R	Unstandardized Coefficients		Standardized Coefficients	T	Sig.
		B	Std. Error	Beta		
(Constant)	0.16	72.738	3.671	0.158	19.814	<b>0.000*</b>
ICT support		0.248	.156		1.586	0.116
Dependent variable: ICT demand						

**Table 8: Linear regression analysis for the effect of ICT support in relation to total e-leadership barriers from nursing staff perspectives (n=100)**

Linear regression model	R	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
(Constant)	.14	91.174	5.963	-.137-	15.291	<b>0.000*</b>
ICT support		-.349-	.254		-1.372-	.173
Dependent variable: e-leadership						

**Table 9: Difference between nursing staff's total perspective of E-leadership barriers in relation to their personal data (n=100).**

Personal data	Categories	Total perspective	One-way ANOVA	
		Mean $\pm$ SD	F	P
Age	20-<30 year	86.77 $\pm$ 19.68	0.55	0.65
	30-<40 year	79.92 $\pm$ 24.40		
	40-<50 year	84.24 $\pm$ 21.00		
	$\geq$ 50 year	80.22 $\pm$ 23.13		
Gender	Male	66.00	0.67	0.42
	Female	83.72 $\pm$ 21.62		
Educational level	Secondary technical nursing school	82.26 $\pm$ 21.74	3.62	<b>0.03*</b>
	Technical nursing institute	89.68 $\pm$ 17.53		
	Bachelor's degree	73.13 $\pm$ 25.96		
Working unit	Obstetric	101.59 $\pm$ 19.03	5.45	<b>0.00*</b>
	Emergency	84.69 $\pm$ 21.14		
	ICU	86.73 $\pm$ 12.43		
	NICU	87.33 $\pm$ 20.85		
	Orthopedic	71.92 $\pm$ 25.05		
	Surgery	63.50 $\pm$ 10.30		
	Urology	77.08 $\pm$ 16.42		
Years of experience	<5 years	89.89 $\pm$ 15.51	0.73	0.54
	5-< 10 years	79.92 $\pm$ 24.93		
	10-< 20 years	83.04 $\pm$ 25.25		
	$\geq$ 20 year	82.14 $\pm$ 20.81		
Period of using internet	Never used it	74.89 $\pm$ 21.16	1.37	0.24
	Less than 6 months	80.33 $\pm$ 11.72		
	6 to 12 months	98.40 $\pm$ 10.78		
	1 to 3 years	73.25 $\pm$ 26.91		
	4 to 6 years	78.11 $\pm$ 20.13		
	7 years or more	86.03 $\pm$ 22.21		

**Table 10: Difference between total ICT perspective among nursing staff regarding to their personal data (n=100).**

Personal data	Categories	Total ICT	One-way ANOVA	
		Mean $\pm$ SD	F	P
Age	20-<30 year	99.10 $\pm$ 17.23	0.82	0.49
	30-<40 year	101.12 $\pm$ 16.73		
	40-<50 year	98.12 $\pm$ 17.48		
	$\geq$ 50 year	107.67 $\pm$ 14.15		
Gender	Male	63.00	5.05	0.03
	Female	100.43 $\pm$ 16.57		
Educational level	Secondary technical nursing school	99.32 $\pm$ 17.25	0.13	0.88
	Technical nursing institute	100.27 $\pm$ 14.02		
	Bachelor's degree	101.75 $\pm$ 22.28		
Working unit	Obstetric	106.18 $\pm$ 9.36	9.23	<b>0.00*</b>
	Emergency	87.38 $\pm$ 18.82		
	ICU	113.45 $\pm$ 13.81		
	NICU	97.50 $\pm$ 11.97		
	Orthopedic	112.92 $\pm$ 10.68		
	Surgery	107.40 $\pm$ 7.41		
	Urology	90.17 $\pm$ 14.28		

**Table 10 (cont'd): Difference between total ICT perspective among nursing staff regarding to their personal data (n=100).**

<b>Years of experience</b>	<5 years	99.16± 18.12	0.45	0.72
	5-< 10 years	98.69± 16.12		
	10-< 20 years	103.58± 15.70		
	≥20 year	98.93± 17.52		
<b>Period of using internet</b>	Never used it	100.33± 18.20	0.77	0.58
	Less than 6 months	107.00± 24.27		
	6 to 12 months	86.40± 19.09		
	1 to 3 years	99.50± 33.65		
	4 to 6 years	100.50± 16.00		
	7 years or more	100.70± 15.36		



## Discussion

Regarding personal characteristics, the study's findings indicated that approximately one-third of the participants were aged between 40 and less than 50 years old. Additionally, nearly half of them had completed secondary technical nursing school, and they had accumulated 20 years or more of work experience. Furthermore, more than half of the participants reported using the internet for seven years or longer. Moreover, it was observed that the majority of nursing staff used the internet daily at home, and half of them utilized the internet daily at their workplace.

In terms of mean scores, the mean percent of nursing staff responses concerning barriers to e-leadership use indicated that approximately three-fourths of the study sample had the highest mean percentage when considering their overall perspective of e-leadership barriers. This may be due to e-leadership also face new difficulties, such as how to overcome followers' physical distance, work effectively with remote team members, motivate followers online, establish trust with those who may meet their leaders over long periods of time, in addition, the leaders have the burden of accomplishing their goal as if they were actually present in the traditional way. This aligns with the findings of **Van Wart et al., (2019)** and **Torre & Sarti, (2020)** who reported that communication skills, social skills, team skills, change management skills, and trust-building skills are fundamental for effective e-leadership.

Furthermore, e-leadership should possess the knowledge of how to integrate traditional communication methods, such as face-to-face communication, with modern information and communication technologies (ICTs), like email. As suggested by **Darics, (2020)**, leading people through digital channels requires the amalgamation of various leadership and management functions.

Moreover, the findings of the present study highlighted that the most prominent barrier related to e-social skills factors. The authors contribute that to good social skills will help leaders' understanding of how to provide useful feedback, how to be more encouraging, how to communicate ideas more successfully. This can greatly improve the morale of team since this social factor exists, team will be more motivated to work hard. This outcome aligned with the research of **Alkhayyal & Bajaba, (2023)** which defined e-leadership as "a social influence process embedded in both proximal and distal contexts mediated by advanced information technology that can produce a change in attitudes, feelings, thinking, behavior, and performance." According to their perspective, when the e-leadership possesses the competence to effectively communicate feedback, employees should experience increased confidence in their ability to complete tasks. This can consequently lead to enhancements in job performance and boost the workplace well-being.

Furthermore, the study findings indicated that e-technological factors were perceived as the least significant barriers to e-leadership from the nursing staff perspective. This finding contradicted the conclusion made by **Van Wart et al., (2019)**, who denoted that; effective leaders should possess competencies in virtual environments, awareness of current ICT tools, the ability to select them appropriately, and the technical proficiency to adopt and utilize selected ICTs.

According to the current study's results, it was revealed that two-thirds of the nursing staff considered staff availability to be the most pressing ICT demand. The authors confirmed that many work-related ICT devices are portable, enabling staff to continue working even when not physically present at their workplace. This increased accessibility allows individuals to be more reachable to fulfill their assigned duties. However, this greater accessibility driven by ICTs can lead to heightened expectations for employees to be constantly available and accessible beyond regular work hours. While ICT can enhance flexibility for employees by facilitating remote work, it may also result in challenges related to maintaining boundaries between work and personal life.

In light of the current findings, nursing staff perceived the lowest ICT demand to be related to employee monitoring. From the authors' perspective; some organizations employ monitoring technology to record employee information, telephone conversations with clients, email, and internet usage. Employees may perceive such monitoring as an invasion of their personal privacy, leading to increased stress and a sense of being constantly overseen all the time.

Based on the findings of the current study, it was revealed that the overall mean percentage of satisfaction with ICT support, from the perspective of nursing staff, was just over half. Approximately half of the nursing staff reported that the organization rarely provided necessary upgrades, up-to-date materials, and personal assistance for employees. This might be due to in some organizations doesn't persuade that remote leadership makes collaboration much easier. Employees who are not present physically in the office cannot communicate effectively. Using ICT tools like databases cannot keep precise records of their communications, transactions, and interactions.

This finding contrasted with studies conducted by **Jasimuddin et al., (2019) & Rahman, (2022)** which highlighted that appropriate ICT support is essential for facilitating the decision-making process. It should enable timely access and knowledge exchange, promote formal and informal connections among individuals from various organizational hierarchies within and between organizations, and assist organizational leaders in efficiently communicating with their subordinates. The availability of adequate ICT-facilitated communication may also impact organizational structure, improving staff interactions and expediting the decision-making process.

Moreover, these results were incongruent with the findings of **Amoako et al., (2020)**, who emphasized that when an organization demonstrates supportive behavior and assurance of support, thereby enhancing employees' skills and organizational commitment, it can derive greater benefits from ICTs and enhance overall organizational performance.

In the light of the current study results, there was a highly statistically significant positive correlation between total ICT demands dimensions and e-leadership barriers. In the same line, **Mustajab et al., (2020)** emphasized the significance of e-leadership in motivating employees to comprehend the effective utilization of information technology. An e-leader must possess the ability to establish diverse connections for communication and foster mutual trust. E-leadership and information technology represent multidimensional domains that can significantly enhance an organization's performance, provided that the organization's leaders can cultivate trust within the diverse spectrum of the organization.

Similarly, **Capogna, Figus, & Mustica, (2018)** underscored that in the current era of revolution, the role of e-leadership has transitioned from being merely a necessity to becoming an imperative for organizations, whether large or small and medium-sized. This shift is essential for sustaining the existence and performance of organizations, enabling them to survive and compete with business competitors, as well as non-competitive threats such as natural disasters, wars, and unforeseen events that could disrupt organizational operations. Therefore, organizations require leaders who possess the ambition to leverage the opportunities presented by digital technology.

In accordance with The World Health Organization **WHO, (2020)**, telework has emerged as a crucial measure which was successfully implemented by organizations and governments worldwide. In this context, the role of e-leadership had pivotal in facilitating working conditions and maintaining employee motivation to achieve the desired goals.

Based on the results of current study, there was a negative correlation between total ICT support dimensions and e-leadership barriers and total barriers' score with no statistical significance. This result was congruent with **Iriqat & Khalaf, (2017)**, in their study which investigated the use of e-leadership as a strategic tool to enhance the organizational commitment of virtual teams which revealed that; there was no significant positive relationship between organizational commitment and each of the e-leadership dimensions.

Furthermore, in a similar vein, **Oh & Chua, (2018)** have emphasized that "high-trust environments can be fostered through the interactive development of technological innovations alongside e-leadership and effective communication."

Regarding the effect of organizational ICT support on ICT demands, the results of the present study revealed a statistically significant positive effect of ICT support on ICT demands. This finding is consistent with the research conducted by **Qin Xiliang et al., (2023)** which demonstrated that organizational support significantly and positively moderates the relationship between ICT and the total performance of the organization.

Furthermore, these findings align with the research conducted by **Liu & Lu, (2021)**, which highlighted the influence of employees' perception of organizational management behavior on their thoughts and actions. When organizational personnel perceive that the organization exhibits supportive behavior in its policy-making processes, they are motivated to acquire knowledge about advancements in ICTs and develop the necessary skills to effectively utilize ICT technologies, tools, and resources. This perception of organizational support also enhances employees' work efficiency and their overall contributions to the organization's outcomes. Consequently, in an environment characterized by high perceived organizational support, the contribution of ICTs to the organization is significantly enhanced.

Moreover, these findings were consistent with the research conducted by **Pham & Tran, (2020)**, which emphasized that when an organization demonstrates supportive behavior through its representatives toward employees engaged in management, operations, production practices, and marketing of products and services, it fosters a strong emotional connection between employees and the organization. These emotionally engaged employees are committed to the organization's objectives and work diligently to achieve them; thereby ensuring the organization maintains its profitability at a high level.

Regarding the effect of organizational ICT support on the total e-leadership barriers, the results of the present study revealed a highly statistically significant negative effect of total ICT support on total e-leadership barriers. In accordance with these results, the findings of studies conducted by **Roman et al., (2019)**, **Tramontano et al., (2021)**, & **Alkhayyal & Bajaba, (2023)** support the concept that organizations are encouraged to invest in digital transformation and adopt appropriate ICTs to facilitate the telework model for their workforce. This involves providing employees with the necessary resources to effectively operate in a virtual context. However, this transformation necessitates concurrent efforts to equip both e-leaders and e-followers with specific competencies such as e-communication, e-social skills, e-team building skills, e-change management, e-technological skills, and e-trustworthiness. These competencies enhance their self-efficacy and ability to engage in and drive performance.

These results were in the same alignment with the findings of **Viete & Erdsiek, (2020)** which demonstrated that the utilization of ICT tools and instruments within an organization enhances the communication network between management and both internal and external stakeholders. This robust communication network enables managers

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to share their insights with stakeholders and gather their input and ideas. Such information exchange facilitates the adaptation of strategies by managers to better align with organizational objectives, fostering flexibility, responsiveness, and agility in daily operations.

The current study results provided insights on nursing staff perspectives on barriers to e-leadership based on different demographic and professional factors. There were no significant variations in nursing staff perspectives on e-leadership barriers based on age, gender, years of experience, or the duration of internet usage. However, a notable difference emerged in their perspectives regarding e-leadership barriers concerning their educational level. Furthermore, the study also revealed a significant difference in their perspectives regarding e-leadership barriers among nursing staff based on their respective working units. This observation indicates that the nature of job roles or responsibilities within various units of the organization can influence how employees perceive e-leadership barriers.

From the authors' point of view, while certain demographic and professional factors like age, gender, experience, and internet usage did not seem to influence the nursing staff perspectives regarding e-leadership barriers, educational level and working unit emerged as significant factors influencing how nursing staff got these barriers. These findings highlighted the importance of considering educational backgrounds and departmental roles when implementing e-leadership strategies within healthcare organizations. Further investigation may be needed to understand the specific factors contributing to this difference.

The current study results provided insights into the variations in total ICT from nursing staff perspectives based on various demographic and professional factors; concluding that; nurses across different age groups, educational backgrounds, levels of experience, and internet usage durations have similar overall perspective of ICT. In contrast, there was a significant difference in total ICT from nursing staff perspectives based on gender. Additionally, a significant difference in total ICT from nursing staff perspectives based on the working unit, as the ICU nursing staff had the highest mean score compared to nursing staff in other units.

From authors' point of view, these findings underscored the importance of considering gender-related differences and departmental roles when implementing ICT initiatives within healthcare organizations. Additionally, understanding the factors contributing to higher ICT from nursing staff perspectives in the ICU unit through further researches could guide efforts to enhance ICT adoption in other units.

## Conclusion

The study's findings supported the first hypothesis; H<sub>1</sub> “There is a direct association between ICT demands and e- leadership barriers”, as a positive and statistically significant correlation was observed between total ICT demands factors and e-leadership barriers. The results also aligned with H<sub>2</sub> “Organizational ICT support is a positive predictor for ICT demands” as indicating a highly statistically significant positive effect of total ICT support on ICT demand.

The study's outcomes also supported the hypothesis H<sub>3</sub> “Organizational ICT support is a negative predictor for e-leadership barriers”, as demonstrating a highly statistically significant negative effect of total ICT support on total e-leadership barriers. This implies that greater organizational ICT support is associated with reduced e-leadership barriers as perceived by nursing staff.

Finally, based on the study findings, it could be concluded that the nursing staff highly perceived e-leadership barriers. And there were significant differences in the perception of e-leadership barriers based on educational level and working place of the nursing staff. There were also significant differences in the total ICT perceptions based on gender and work unit.

## Recommendations

- Fostering a culture of collaboration, communication, and support among nursing staff and leadership in the healthcare organizations to improve social aspects related to technology integration.
- Enhance technological training among the nursing staff by providing adequate training and resources to ensure proficient use with technology for reducing any technological barriers.
- Regular assessment of ICT infrastructure and resources to meet the evolving needs of nursing staff by investing in updated technology or providing additional support.
- Ensuring healthcare organizations’ support systems to respond to the nursing staff needs by creating dedicated support teams, providing timely assistance, and addressing staff concerns promptly.
- Organizations should establish training programs to ensure employees understanding the health, safety, and welfare aspects of remote work and possess the necessary knowledge, skills, and behaviors for optimal performance in the evolving digital environment.
- Future researches to investigate e-leadership by considering different leadership styles such as digital transformational leadership.

- Future researches to explore how different generations react to e-leadership in order to understand the complexities of the relationship between leadership styles, e-work self-efficacy, and job performance.
- Future researches to explore why ICU nurses perceive ICT more positively than others, to inform strategies for improving ICT adoption in other units.

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### الملخص العربي

#### الدور الوسيط للدعم المؤسسي في تكنولوجيا المعلومات والاتصال والقيادة عن بعد : منظور هيئة التمريض

**مقدمة:** عند ممارسة القيادة يلزمها أن تتطور لتتكيف مع الظروف البعيدة أو الافتراضية الجديدة لضمان القيادة الفعالة والأداء المستدام. **الهدف:** تقييم الدور الوسيط للدعم المؤسسي في تكنولوجيا المعلومات والاتصال والقيادة عن بعد من منظور هيئة التمريض **تصميم البحث:** تم استخدام تصميم بحث وصفي ارتباطي. **مكان الدراسة:** تمت الدراسة داخل وحدات مختارة بمستشفى دمياط العام. **عينة الدراسة:** عينة مناسبة مكونة من (100) من هيئة التمريض من مختلف الأقسام. **أدوات الدراسة:** استبان معوقات استخدام القيادة عن بعد – مقياس متطلبات تكنولوجيا المعلومات والاتصال – ومقياس دعم تكنولوجيا المعلومات والاتصال. **النتائج:** أوضحت الدراسة ان منظور هيئة التمريض فيما يتعلق بمعوقات استخدام القيادة عن بعد كانت سائدة بنسبه اجمالى (75.95%) مما يدل على مستوى إدراك مرتفع. وكان المعوق الأكثر انتشارا هو عوامل المهارات الاجتماعية عن بعد والتي تمثل ( 77.53%) من بين جميع المعوقات الأخرى بينما كانت العوامل التكنولوجية عن بعد أقل معوقات القيادة عن بعد من منظور هيئة التمريض (73.40%) . يوجد علاقة إيجابية ذات دلالة إحصائية بين إجمالي عوامل متطلبات تكنولوجيا المعلومات والاتصالات ومعوقات القيادة عن بعد ودرجة المعوقات الكلية باستثناء معوقات الاتصال وفريق العمل بدون دلالة إحصائية. يوجد ارتباط سلبي بين إجمالي عوامل دعم تكنولوجيا المعلومات والاتصال ومعوقات القيادة عن بعد ودرجة المعوقات الكلية مع عدم وجود دلالة إحصائية. تظهر نتيجة الدراسة أن إجمالي دعم تكنولوجيا المعلومات والاتصال له تأثير ذو دلالة إحصائية عالية على متطلبات تكنولوجيا المعلومات والاتصال . أيضا تظهر الدراسة ان إجمالي دعم تكنولوجيا المعلومات والاتصال له تأثير ذو دلالة إحصائية عالية على إجمالي معوقات القيادة عن بعد. **الخلاصة:** خلصت النتائج إلى أن هيئة التمريض مدركين عوائق القيادة عن بعد بشكل كبير؛ وكانت العوامل الاجتماعية عن بعد هي العائق الرئيسي، في حين كانت العوامل التكنولوجية عن بعد هي الأقل اعتبارًا كعائق. وكان هناك ارتباط إيجابي بين إجمالي متطلبات تكنولوجيا المعلومات والاتصال ومعوقات القيادة عن بعد، في حين كان هناك ارتباط سلبي بين إجمالي دعم تكنولوجيا المعلومات والاتصال ومعوقات القيادة عن بعد ودرجة المعوقات الإجمالية، دون دلالة إحصائية. علاوة على ذلك، خلصت نتائج الدراسة الحالية إلى أن الدعم التنظيمي لتكنولوجيا المعلومات والاتصال له تأثير على متطلبات تكنولوجيا المعلومات والاتصالات والقيادة عن بعد وفقا لمنظور هيئة التمريض و لذلك تم قبول افتراضات الدراسة الثلاثة **التوصيات:** تعزيز ثقافة التعاون والاتصال والدعم بين هيئة التمريض والقيادة في مؤسسات الرعاية الصحية لتحسين الجوانب الاجتماعية المتعلقة بالتكامل التكنولوجي. تعزيز التدريب التكنولوجي بين هيئة التمريض من خلال توفير التدريب والموارد الكافية لضمان الاستخدام الكفء للتكنولوجيا لتقليل أي عوائق تكنولوجية.

**الكلمات الدالة:** القيادة عن بعد- تكنولوجيا المعلومات والاتصال - منظور هيئة التمريض - الدعم المؤسسي