

ORGANIZATIONAL READINESS FOR ELECTRONIC HEALTH RECORD AS PERCEIVED BY NURSING PERSONNEL

Magdy Ali Mohamed Aboelnaga ^{1*}, Gehan Mohamed Ahmed Mostafa ²,
Mohamed Hashem Kotb Khalafallah ³

¹ Demonstrator, Nursing Administration Department, Faculty of Nursing, Helwan University, Egypt.

Corresponding Author Email: magdy.ms1024@nursing.helwan.edu.eg

² Professor, Nursing Administration, Faculty of Nursing, Helwan University, Egypt.

Email: gehansaber40@hotmail.com

³ Lecturer, Nursing Administration, Faculty of Nursing, Helwan University, Egypt.

Email: mohamed_hashem@nursing.helwan.edu.eg

DOI: [10.5281/zenodo.8255599](https://doi.org/10.5281/zenodo.8255599)

Abstract

Background: Organizational readiness for change is a critical initial step in the implementation process of electronic health record because it helps to identify and measure the level of readiness among employees and also help to tackle the problem of failed adoption. Electronic health record implementation in health care setting will improve quality of healthcare through facilitate quick access to information, providing evidence-based practice and promote effective communication among caregivers. **Aim of the study:** the aim of this study was to assess nursing personnel perception regarding organizational readiness for electronic health record. **Design:** A descriptive cross sectional research design was used in this study. **Setting:** The study was conducted at Badr university hospital in Cairo, Egypt. **Subjects:** A convenient sample of 170 nursing staff and leaders in pre-mentioned setting was enrolled in the study. **Tools:** Two tools were used: Organizational readiness questionnaire, electronic health record readiness checklist. **Results:** The current study findings revealed that more than two thirds (66.4%) of studied nursing staff perceived that the organization had a high readiness level regarding their organizational readiness to implement electronic health record and the majority (86.7%) of studied nursing leaders perceived that the organization has a high readiness level to implement electronic health record. **Conclusion:** The study findings concluded that more than two-thirds of the studied nursing staff and the majority of studied nursing leaders perceived that organization had a high readiness level to apply electronic health record. **Recommendations:** The current study was recommended that hospital management should provide ongoing training for workers before actual system implementation and also support the idea of creating and establishment of green work environment free from paper through introducing of electronic system.

Keywords: Organizational Readiness, Electronic Health Record, Health Information System

I. INTRODUCTION

Electronic health record (EHR) has emerged as a crucial tool in managing and sharing clinical information particularly in developing countries where their efficiency can lead to improved patient outcomes. Electronic health record implementation in the healthcare settings has a lot of potential benefits for the healthcare sector as a whole and make the delivery of healthcare service effective and efficient through providing accurate, up-to-date and complete health information and allow quick access to patient medical history and standardize documentation of clinical care. (*Ngusie et al., 2022*).

EHR defined as a comprehensive digital collection and retrieval system for a patient's medical data maintained by the healthcare provider which can include the administrative and the clinical data such as demographic detail, diagnosis detail, signs and symptoms, medication, progress reports, laboratory test reports, radiology reports and past medical history (*Gerke, 2022*). Therefore, EHRs are considered a crucial aspect of the healthcare sector as they provide lifelong health data in digital form to

support continuity of care, education, and research. This trend towards digitization of healthcare records has gained traction in recent years, and is expected to continue to shape the future of the healthcare industry (*Lazarova et al., 2022*).

Nurses have an important role in the healthcare system as represent the big part of healthcare team and help in achieving high quality patient outcomes because spend a lot of time in contact, communicating and provide a direct care for patients so they have a valuable role in successful implementation of electronic systems. A successful implementation of change process is influenced by organizational factors such as management support, resources utilization and proper planning and tracking the progress report of change (*Britel, 2022*).

In the context of electronic health record adoption, readiness assessment has been recognized as a critical factor in the adoption, utilization, ensuring successful implementation and portrays a proper image of existing conditions and the readiness of health facilities and health professionals to the new system. However, many pre-implementation assessments have largely targeted organizational readiness, technical readiness, leadership, infrastructure, and financial readiness. Few studies have reported on the readiness of health professionals before EHR implementation. The success or failure of EHR in developing countries to a large extent focused on the readiness of health professionals to shift from paper-based records to electronic records (*Mauco, et al., 2020*). So, this study aims to assess nursing personnel perception regarding organizational readiness for electronic health record before actual system implementation to ensure success and avoid failure of adoption.

Research Question:

What is nursing personnel perception regarding organizational readiness for Electronic Health Record?

II. MATERIAL AND METHODS

Study Design:

A descriptive cross-sectional research design was used in conducting this study.

Research Setting:

The study was conducted at Badr University Hospital which located in Badr city Cairo, Egypt, and it is a Helwan University Hospital.

Study subject:

The subjects of this study were included all nursing personnel who were available at the time of data collection in the selected hospital (a convenience sample) and work at least one year of experience in this hospital. The total number of nursing personnel was (N=170) which divided into two groups, group one is nursing staff (N= 140) which involve staff nurses and charge nurses, group two involve nursing leaders (N= 30) include (head nurses, nursing supervisors and nursing director).

Tools of data collection:

Two tools were used to collect necessary data:

Tool (1): organizational readiness questionnaire:

This questionnaire was adapted by (*Pare, et al., 2011*) and was modified by the researcher to assess the organization's readiness to implement electronic health records. This tool consisted of (39 items) with a total grade (195). It was measured by 5-point Likert scale. For positive items, category for 5 Point Likert scale was (1= strongly disagree, 2=disagree, 3=neutral, 4= agree & 5=strongly agree). While for negative items, category for 5 Point Likert scale was (5= strongly disagree, 4=disagree, 3=neutral, 2= agree & 1= strongly agree). It was calculated based on three levels: Low readiness level if the total score was less than or equal 60%, it means less than or equal (< 117). Moderate readiness level if the total score was from 60 – 75% it means (118-146 points). High readiness level if the total score was more than 75% it means more than > 146 points).

Tool (2): electronic health record readiness checklist:

This tool was developed by the researcher based on literature review (*Ghazisaeidi et al., 2014*) to assess organizational readiness to implement electronic health record. This checklist consists of (17 items) with a total grade (51). It was measured by 3 likert scale with 3= Ready, 2= Partially Ready, 1= Not Ready. Subject responses were calculated based on three levels: Low readiness level if the total score was less than or equal 60%, it means less than or equal (< 30.6). Moderate readiness level if the total score was from 60 – 75% it means (30.7-38.2 points). High readiness level if the total score was more than 75% it means more than > 38.3 points).

Pilot Study:

It was conducted on 10% of the study subject of the total sample size (170) divided into (140) nursing staff and (30) nursing leader. The aim of the pilot study was to determine clarity, understanding applicability, clarity and the efficiency of the tool. It also aims to ensure simplicity, relevance, and feasibility of conduction of the study tool. In addition, it helps in estimation of the time needed to collect data and determine the obstacles. Accordingly, the tool was modified, and the nurses participated in it was excluded from the study sample.

Field wok:

Data was collected upon two months started at the beginning of Mai 2022 and completed by the end of June 2022. After securing all official permissions the researcher met the manager of the hospital to explain the aim of the study and gain the approval of data collection. The researcher presented 2 hours per day for eight weeks to collect data. Data was collected in the morning and subjects full filling the questionnaire. The researcher to ascertain all questions were answered and required for each nurse to fill the questionnaire was estimated be 15- 20 minutes. The researcher checked completed items filled sheet after the nurse completed it to ensure the observation any missing data.

Electronic health record readiness checklist was developed by the researcher based on literature review to assess the organizational readiness to implement EHR and designed to filled by the nursing leaders only within 10 – 15 minutes to obtain a comprehensive overview toward organization readiness regarding four areas of

readiness involving IT infrastructure, financial resources, training and finally leadership and management.

Ethical Considerations:

Prior study conduction, approval was obtained from the Scientific Research Ethical Committee in the faculty of nursing, Helwan university in addition to an approval was obtained from the manager of Badr university hospital. Before starting data collection, the nurses were informed about the aim of the study and assure that anonymity and confidentiality would be guaranteed, and informed that they allowed choosing to participate or not in the study and that they have the right to withdraw from the study at any time and obtaining a verbal consent to participate in this study. Ethics, values, culture, and beliefs were respected.

Statistical analysis:

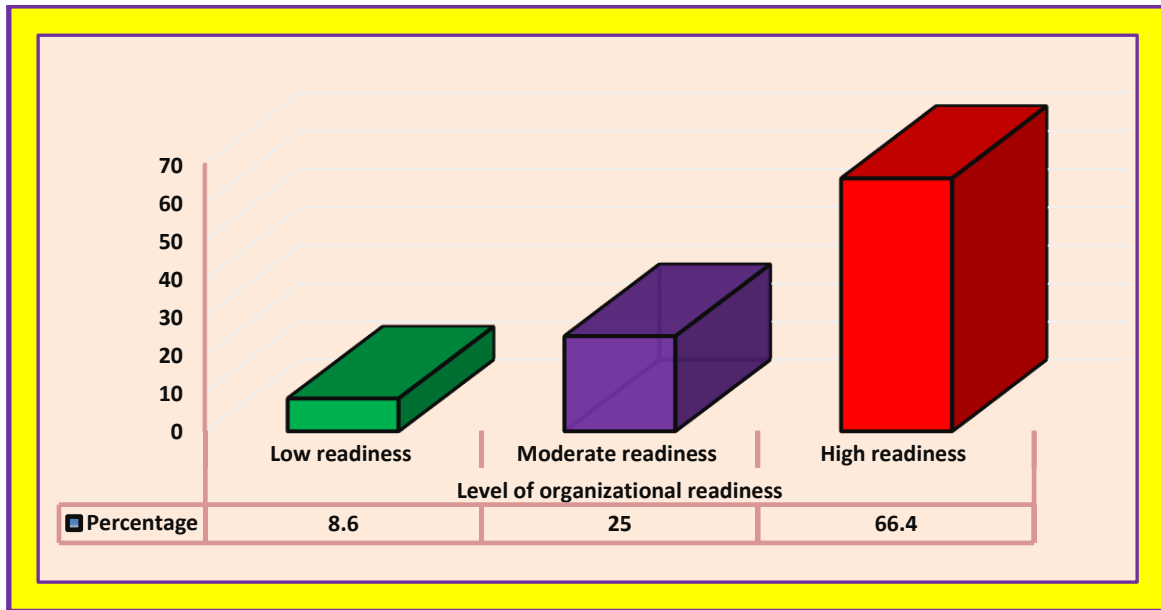
Data entry and analysis were performed using SPSS statistical package version 25. Categorical variables were expressed as number and percentage while continuous variables were expressed as (mean \pm SD). Chi-Square (χ^2) was used to test the association between row and column variable of qualitative data. F test was used to compare mean in normally distributed quantitative variables at more than two groups. Pearson correlation was done to measure correlation between quantitative variables. For all tests, a two-tailed p-value ≤ 0.05 was considered statistically significant, P-value ≤ 0.01 was considered highly statistically significant. While p-value > 0.05 was considered not significant.

III. RESULT

Table (1): Frequency distribution of the studied nursing staff and leaders according to their personal characteristics (n=170). It illustrates that (57.9%) and (56.7%) of the age of the studied nursing staff and leaders was ranged between 25 -35 years old respectively. Considering gender, (53.6%) and (66.7%) of studied nursing staff and leaders respectively were female. Regarding to work experience, (50%) of nursing staff were worked in the hospital from 3 to 5 years old but (100%) of nursing leaders worked in the hospital for more than 5 years. Concerning educational level, (75%) of the studied nursing staff had a technical institute of nursing degree and (60%) of nursing leaders had bachelor degree of nursing. Regarding to their job tittle, (75%) of nursing staff were staff nurses and (66.7%) of nursing leaders were head nurses. In relation to EHR experience, (61.4%) of nursing staff and (60%) of nursing leaders not used EHR. Concerning EHR training, (60.7%) of nursing staff and (70%) of nursing leaders not receiving any training regarding EHR.

Table (1): Frequency distribution of the studied nursing staff and leaders according to their personal characteristics (n=170)

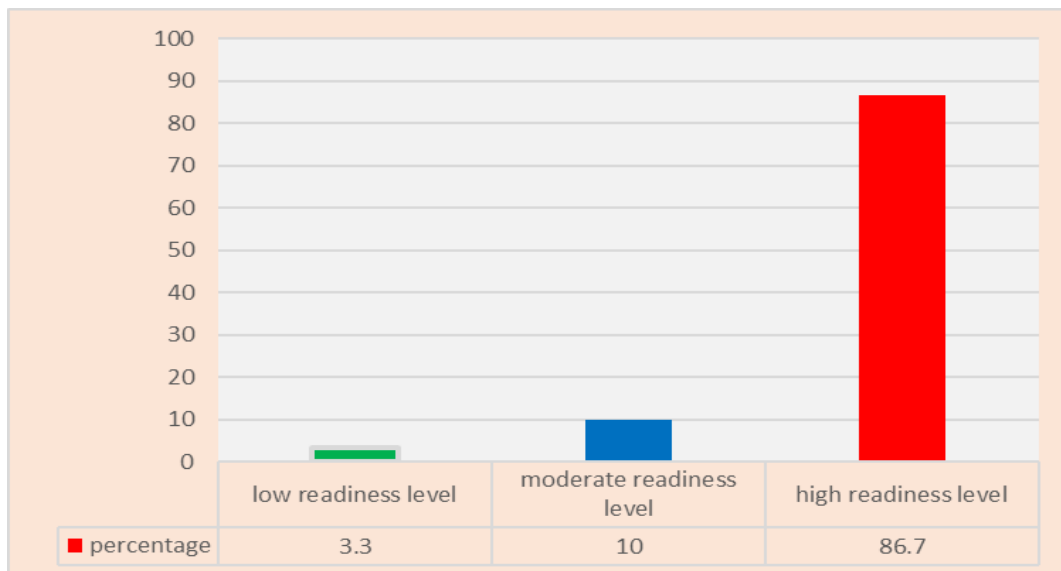
Personal Characteristics		Nursing Staff (n=140)		Nursing Leaders (n=30)	
		N	%	N	%
Age (year)	▪ <25	43	30.7	0	0.0
	▪ 25 – 35	81	57.9	17	56.7
	▪ >35	16	11.4	13	43.3
Gender	▪ Male	65	46.4	10	33.3
	▪ Female	75	53.6	20	66.7
	▪ Female to male ratio	1.3:1		2:1	
Years of work Experience	▪ 3	40	28.6	0	0.0
	▪ 3-5	70	50.0	0	0.0
	▪ >5	30	21.4	30	100.0
Educational level	▪ Diploma of nursing	9	6.4	0	0.0
	▪ Technical	105	75.0	12	40.0
	▪ Bachelor of nursing	26	18.6	18	60.0
Job title	▪ Staff nurse	105	75.0	0	0.0
	▪ Charge nurse	35	25.0	0	0.0
	▪ Head nurse	0	0.0	20	66.7
	▪ Supervisor	0	0.0	9	30.0
	▪ Nursing director	0	0.0	1	3.3
EHR experience	▪ Yes	54	38.6	12	40.0
	▪ No	86	61.4	18	60.0
EHR training	▪ Yes	55	39.3	9	30.0
	▪ No	85	60.7	21	70.0
Computer use	▪ Never	17	12.1	3	10.0
	▪ Daily	15	10.7	7	23.3
	▪ a few times a week	55	39.3	15	50.0
	▪ A few times a month	43	30.7	5	16.7
	▪ A few times a year	10	7.1	0	0.0
Rating computer skills	▪ Weak	7	5.0	0	0.0
	▪ Beginner	17	12.1	0	0.0
	▪ Intermediate	71	50.7	18	60.0
	▪ Skillful	38	27.1	12	40.0
	▪ Proficient	7	5.0	0	0.0



$\chi^2=74.67, P=0.000^{**}$

Figure (1): Percentage distribution of level of organizational readiness among the studied nursing staff (n= 140)

Figure (1) illustrates that more than two-thirds (66.4%) of the studied nursing staff perceived that organization had a high level of readiness to apply electronic health record followed by moderate and low level with the percentage of (25% and 8.5%) respectively. In addition to presence of a highly statistically significant difference at $P = 0.000$.



$\chi^2=38.6, P=0.000^{**}$

Figure (2): Percentage distribution of level of electronic health record readiness among the studied nursing leaders (n= 30)

Figure (2) illustrates that the majority (86.7%) of the studied nursing leaders were perceived that organization had high readiness level to apply electronic health record. In addition to a highly statistically significant difference, at $P = 0.000$.

Table (2): represents that, there was a highly statistically significant relation between personal characteristics (age, gender, experience, educational level, title, using computer, rating computer skills, EHR experience and training) and total level of organizational readiness among the studied nursing staff. While regarding studied nursing leaders only computer skills have a highly statistically significant correlation.

Table (2): Relation between total level of organizational readiness and personal characteristics among the studied nursing staff (n= 140)

personal characteristics		N	level of organizational readiness						X ²	P-Value
			Low		Moderate		High			
			12	8.6	35	25.0	93	66.4		
			N	%	N	%	N	%		
Age (year)	▪ <25	43	5	3.6	30	21.4	8	6.7	72.1	0.000**
	▪ 25 - 35	81	6	4.3	5	3.6	70	50.0		
	▪ >35	16	1	0.7	0	0.0	15	10.7		
Gender	▪ Male	65	2	1.4	35	25.0	28	20.0	54.6	0.000
	▪ Female	75	10	7.1	0	0.0	65	46.4		
Experience	▪ 3	40	8	5.7	28	20.0	4	2.9	85.9	0.000**
	▪ 3-5	70	0	0.0	7	5.0	63	45.0		
	▪ >5	30	4	2.9	0	0.0	26	18.6		
Educational level	▪ Diploma	9	7	5.0	0	0.0	2	1.4	71.3	0.000**
	▪ Technical	105	3	2.1	35	25.0	67	47.9		
	▪ Bachelor	26	2	1.4	0	0.0	24	17.1		
Job title	▪ Staff nurse	105	12	8.6	35	25.0	58	41.4	23.5	0.000**
	▪ Charge nurse	35	0	0.0	0	0.0	35	25.0		
Using computer	▪ Never	17	10	7.1	5	3.6	2	1.4	126	0.000
	▪ Daily	15	0	0.0	0	0.0	15	10.7		
	▪ A week	55	0	0.0	0	0.0	55	39.3		
	▪ A month	43	0	0.0	24	17.1	19	13.6		
	▪ a year	10	2	1.4	6	4.3	2	1.4		
Rating computer skills	▪ Weak	7	5	3.6	0	0.0	2	1.4	76.9	0.000**
	▪ Beginner	17	5	3.6	8	5.7	4	2.9		
	▪ Intermediate	71	0	0.0	24	17.1	47	33.6		
	▪ Skillful	38	0	0.0	3	2.1	35	25.0		
	▪ Proficient	7	2	1.4	0	0.0	5	3.6		
EHR experience	▪ Yes	54	6	4.3	0	0.0	48	34.3	29.3	0.000**
	▪ No	86	6	4.3	35	25.0	45	32.1		
EHR training	▪ Yes	55	5	3.6	0	0.0	50	35.7	30.8	0.000**
	▪ No	85	7	5.0	35	25.0	43	30.7		

*Significant p < 0.05

**Highly significant p < 0.01

V. DISCUSSION

Regarding personal characteristics, the current study revealed that more than half of the studied nursing staff and leaders age was ranged between 25-35 years old. Current results on the same line with (*Magar, 2019*) studied “electronic health record system using block chain in context of developing countries candidate's declaration” and reported that more than half of the study sample were younger than 35 years. While (*Zaman et al., 2021*) studied “the relationship between nurses’ training and perceptions of electronic documentation systems” and reported that the majority of the study subject were ranged from 42 and 64 years.

Regarding to their job title, the current study revealed that around three quarters of nursing staff were staff nurses and around two thirds of studied nursing leaders were head nurses. Current results agreed by (**Raddaha, 2017**) who studied “nurses’ characteristics and perceptions toward using the electronic health record system as predictors of clinical nursing performance improvement” and reported that more than three quarters of study subjects was staff nurses.

From the researcher point of view, staff nurses suppose the major part in the health care team which deal directly with patients.

In relation to electronic health record experience, the current findings revealed that less than two thirds of studied nursing staff and nursing leaders had no any previous EHR experience. While regarding EHR training, the current study revealed that less than two thirds of nursing staff and more than two thirds of nursing leaders respectively not receiving EHR training.

Current results matched with (**Abore et al., 2022**) studied “health professionals’ readiness to implement electronic medical recording system and associated factors in public general hospitals of Sidama region, Ethiopia” and reported that more than three quarters of study subject had no previous electronic medical record training and experience for using system. Additionally, current findings matched with (**Bisrat et al., 2021**) who studied “implementation challenges and perception of care providers on electronic medical records at St. Paul’s and Ayder hospitals, Ethiopia” and reported that around three quarters of study subject not attended previous EMR system-related training. Conversely, current findings conversed with (**Yilma et al., 2023**) studied “Organizational and health professional readiness for the implementation of electronic medical record system: an implication for the current EMR implementation in northwest Ethiopia” and reported that more than two thirds of study participant had previous system training. Regarding using computers, the current findings revealed that more than one third of the studied nursing staff and around half of nursing leaders using computer a few times a week respectively. While regarding computer skills, more than half of the studied nursing staff and leaders had intermediate computer skills.

Current result agreed with (**Oo HM et al., 2021**) studied “information and communication technology literacy, knowledge and readiness for electronic medical record system adoption among health professionals in a tertiary hospital, Myanmar: A cross-sectional study” and reported that more than half of study participant had medium information and communication technology (ICT) skills. Conversely, current results in contrast with (**Raddaha, 2017**) who found that the majority of study subject use computers several times per day. Additionally, current findings conversed with (**Kabukye et al., 2020**) studied “Assessment of organizational readiness to implement an electronic health record system a low-resource settings cancer hospital: A cross-sectional survey” and reported that more than three quarters of study participants using computers at least on a weekly. Conversely, current results disagreed with (**Abore et al., 2022**) who found that less than three quarters of the study participants were computer literate. Regarding organizational readiness level among studied nursing staff, the current study reveals that more than two thirds of them perceived that organization had a high readiness level to implement electronic health record. Current results agreed by (**Awol et al., 2020**) studied “Health professionals’ readiness and its associated factors to implement electronic medical record system in four

selected primary hospitals in Ethiopia” and reported that around two thirds of study participant have overall readiness level to implement electronic medical record system.

Conversely, current results were in contrast with **(Salwa, 2019)** studied “relationship between nurses’ perception and readiness to implement electronic medical record system” and reported that more than half of nurses perceived that the organization had low level of readiness regarding organizational readiness to implement new system. Additionally, current findings in contrast with **(Oo HM et al., 2021)** studied “information and communication technology literacy, knowledge and readiness for electronic medical record system adoption among health professionals in a tertiary hospital, Myanmar: A cross-sectional study” and reported that around half of health professionals ready for adoption of electronic medical record system which considered inadequate. From the researcher point of view, current results due to actual steps taken by organization to implement EHR resulting from governmental directions and support from the ministry of higher education for Badr university hospital to take this change.

Regarding to organizational readiness level among studied nursing leaders, the current study findings indicated that the majority of studied nursing leaders perceived that organization had high readiness level to implement electronic health record regarding (infrastructure, budget, training and management support) and this result was congruent with nursing staff perception toward their organizational readiness for change.

Current findings supported by **(Bisrat et al., 2021)** who found that the system is found well-functioning at Ayder hospital due to provision of information and communication (ICT) infrastructure, availability of equipment, incentive mechanisms, and management commitment are mentioned as supportive for successful implementation.

Also, current results matched with **(Naserolmemar and Bayat, 2022)** studied “An electronic readiness assessment model for more efficient electronic commerce adoption by Iranian small and medium contractors” and reported that the factors of top management support, financial issues, IT infrastructure and staff readiness has a high level of importance influencing organizational readiness for change.

Conversely, current results disagreed with **(Ojo and Popoola, 2015)** who studied “some correlates of electronic health information management system success in Nigerian teaching hospitals” and reported that the readiness to use electronic health record has not been positive by practitioners due to the low level of technology literacy, staff training and information and communication technology (ICT) infrastructure including hardware and software, management readiness before implementation. Also, current results disagreed by **(Ajayi, et al., 2021)** studied “assessing electronic medical records readiness for service delivery in state hospitals in southwest Nigeria” and reported that low readiness level due to inadequate of fund, staff training, and technical infrastructures.

From the researcher point of view, this finding may be due to support from hospital management and government directions in implementing health information system in university hospitals to improve quality of care through provide quick access to information and facilitate retrieving of patient health data.

Regarding the relationship between level of organizational readiness and personal characteristics of studied nursing staff, the current findings revealed that there is a highly statistically significant relation between personal characteristics (age, gender, work experience, job title, computer use frequency and computer skill level, educational level, EHR experience and training) and organizational readiness level to implement electronic health record. While regarding studied nursing leaders only computer skills have a highly statistically significant correlation.

The current results agreed by **(Abdulai and Adam, 2020)** studied “health providers’ readiness for electronic health records adoption: A cross-sectional study of two hospitals in northern Ghana” and reported that the age of participants, gender, length of employment and computer skills and knowledge of electronic health records were significant predictors of provider readiness for adoption of electronic health record.

From the researcher point of view, current findings due to the nature of younger age people are better to understand and deal with information technology, also more years of experience make staff members more oriented with organization policies and regulations and readiness of organization, staff with high computer skills is more ready than low computer skills because make tasks effectively and quickly and avoid resistance against adoption of a new system. Higher educated staff are more ready than less educated staff, and also previous electronic health record training and experience facilitate use of system.

VI. CONCLUSION

Based on the findings of current study results, more than two thirds of studied nursing staff and the majority of studied nursing leaders perceived that the organization had a high readiness level regarding their organizational readiness to implement electronic health record. Additionally, there was a highly statistically significant relation between personal characteristics (age, gender, experience, educational level, job title, using computer, rating computer skills, EHR experience and training) and total level of organizational readiness among the studied nursing staff. While regarding studied nursing leaders, there was a statistically correlation between computer skills and organizational readiness.

VII. RECOMMENDATIONS

1. Conduct ongoing training for nursing personnel on electronic health record to maintain change and enhance their practice, knowledge and increase their involvement in implementing change.
2. Encourage managers to create a positive and desirable attitude for staff to enhance their responsibility and commitment to achieve organizational goals.
3. Establishment and support the idea of creating green work environment free from paper through introducing electronic system.

References

- 1) **Abdulai, A. F., & Adam, F. (2020).** Health providers' readiness for electronic health records adoption: A cross-sectional study of two hospitals in northern Ghana. *PloS one*, 15(6), e0231569.
- 2) **Abore, K. W., Debiso, A. T., Birhanu, B. E., Bua, B. Z., & Negeri, K. G. (2022).** Health professionals' readiness to implement electronic medical recording system and associated factors in public general hospitals of Sidama region, Ethiopia. *Plos one*, 17(10), e0276371.
- 3) **Ajayi, S., Wamae, P., & Muthee, D. (2021).** Assessing Electronic Medical Records Readiness for Service Delivery in State Hospitals in Southwest Nigeria. *International Journal of Current Aspects*, 5(3), 1-17. <https://doi.org/10.35942/ijcab.v5i3.175>.
- 4) **Awol, S. M., Birhanu, A. Y., Mekonnen, Z. A., Gashu, K. D., Shiferaw, A. M., Endehabtu, B. F., ... & Tilahun, B. (2020).** Health professionals' readiness and its associated factors to implement electronic medical record system in four selected primary hospitals in Ethiopia. *Advances in Medical Education and Practice*, 11, 147.
- 5) **Bisrat, A., Minda, D., Assamnew, B., Abebe, B., & Abegaz, T. (2021).** Implementation challenges and perception of care providers on Electronic Medical Records at St. Paul's and Ayder Hospitals, Ethiopia. *BMC medical informatics and decision making*, 21(1), 1-12.
- 6) **Britel, Z., & Cherkaoui, A. (2022).** Measuring an organization's change readiness regarding the implementation of corporate social responsibility. *International Journal of Management and Sustainability*, 11(1), 1-20. <https://www.researchgate.net/publication/359280886>.
- 7) **Gerke, B. T. (2022).** Security Strategies of Electronic Health Record Systems (Doctoral dissertation, Walden University).
- 8) **Ghazisaeidi, M., Ahmadi, M., Sadoughi, F., & Safdari, R. (2014).** An assessment of readiness for pre-implementation of electronic health record in Iran: a practical approach to implementation in general and teaching hospitals. *Acta Medica Iranica*, 532-544.
- 9) **Lazarova, E., Mora, S., Maggi, N., Ruggiero, C., Vitale, A. C., Rubartelli, P., et al. (2022, June).** An Interoperable Electronic Health Record System for Clinical Cardiology. In *Informatics* (Vol. 9, No. 2, p. 47). MDPI.
- 10) **Magar, N. (2020).** Electronic Health Record System Using Blockchain in Context of Developing Countries <https://www.researchgate.net/publication/344693004> .
- 11) **Mauco, K. L., Scott, R. E., & Mars, M. (2019).** Development of an eHealth readiness assessment framework for Botswana and other developing countries: interview study. *JMIR medical informatics*, 7(3), e12949. <https://doi.org/10.2196/12949> PMID: 31441429.
- 12) **Ngusie, H. S., Kassie, S. Y., Chereka, A. A., & Enyew, E. B. (2022).** Healthcare providers' readiness for electronic health record adoption: a cross-sectional study during pre-implementation phase. *BMC health services research*, 22(1), 1-12.
- 13) **Naserolmemar, K., & Bayat, A. (2022).** An Electronic Readiness Assessment Model for More Efficient Electronic Commerce Adoption by Iranian Small and Medium Contractors. *Journal of Optimization in Industrial Engineering*, (Articles in Press).
- 14) **Ojo, A. I., & Popoola, S. O. (2015).** Some correlates of electronic health information management system success in nigerian teaching hospitals. *Biomedical Informatics Insights*, 7, BII-S20229.
- 15) **Oo, H. M., Htun, Y. M., Win, T. T., Han, Z. M., Zaw, T., & Tun, K. M, et al. (2021).** Information and communication technology literacy, knowledge and readiness for electronic medical record system adoption among health professionals in a tertiary hospital, Myanmar: A cross-sectional study. *Plos one*, 16(7), e0253691. <https://doi.org/10.1371/journal.pone.0253691>.
- 16) **Paré, G., Sicotte, C., Poba-Nzaou, P., & Balouzakis, G. (2011).** Clinicians' perceptions of organizational readiness for change in the context of clinical information system projects: insights from two cross-sectional surveys. *Implementation Science*, 6, 1-14.
- 17) **Raddaha, A. (2017).** Nurses' characteristics and perceptions toward using the electronic health record system as predictors of clinical nursing performance improvement. *Clinical Nursing Studies*, 5 (4).

- 18) **Salwa, K. (2019).** Relationship between Nurses' Perception and Readiness to Implement Electronic Medical Record System. In The 4th Annual and 1st International Scientific Conference of The Faculty of Nursing Benha University In Collaboration with Psychological Intelligence Foundation. <https://www.researchgate.net/publication/334647120>.
- 19) **Yilma, T. M., Tilahun, B., Mamuye, A., Kerie, H., Nurhussien, F., Zemen, E, et al. (2023).** Organizational and health professional readiness for the implementation of electronic medical record system: an implication for the current EMR implementation in northwest Ethiopia. *BMJ Health & Care Informatics*, 30(1), e100723. doi:10.1136/ bmjhci-2022-100723
- 20) **Zaman, N., Goldberg, D. M., Kelly, S., Russell, R. S., & Drye, S. L. (2021).** The relationship between nurses' training and perceptions of electronic documentation systems. *Nursing Reports*, 11(1), 12-27.