Original Article :

Telenursing on satisfaction and health outcome among diabetic patients : A Cross sectional study

Esraa Mohammed Alhussin[1], Sahar A. Mohamed[2], Haneen S Mahjoub[3], Norene M.Zaher Feteih[3], Nourah [1] Alsomali[1], Lina I al harbi[1], Wed A. Alyamani[1], Reem A Hazazi[1]

1. Nursing Education and training Department. Nursing Administration Services, King Fahad Hospital Jeddah, Jeddah, Saudi Arabia
2. Faculty of Nursing Sciences, University of Khartoum. Department of Medical Nursing, Sudan
3. Outpatient Department. Nursing Administration Services, King Fahad Hospital Jeddah, Jeddah, Saudi Arabia.

Received on Jan 28, 2024, accepted for Publication on Jan 19, 2025, doi: 10.5455/mjhs.2025.03.003

Corresponding Author:

Esraa Mohammed Alhussin. Nursing Education and training Department. Nursing Administration Services, King Fahad Hospital Jeddah, Jeddah, Saudi Arabia, email: esraama@moh.gov.sa

OPEN ACCESS Distributed under Creative Commons CC BY-NC-ND 4.0

Abstract

Background and Aims:
Information and communication technologies are currently incorporated into the nursing profession in the current healthcare system. Innovations are being utilized more frequently to deliver care, hold conversations with clients, give education, and send data over long distances. This study aimed to evaluate the Effect of telenursing on the satisfaction and health outcomes of diabetic patients.

Methods:
A cross-sectional hospital-based study including 135 patients selected through the Total coverage sampling method and meeting the selection criteria. Data were collected using a self-administered questionnaire after checking the validity and reliability with a total of 20 items The collected data were then analyzed and interpreted using descriptive and inferential statistics based on the objective and the p-value at 0.05 was considered as the level of significance using SPSS software V26.

Results:
With a mean rating of 2.22, the current study demonstrated that telenursing enhanced the health and satisfaction of diabetes patients. For 53% of the study sample, the HA1C was lowered from that of diabetics to pre-diabetics or a normal level. There is statistically significant relationship in satisfaction and health outcomes of diabetic patients and marital status, Age with p value < 0.05.

Conclusion:
The findings indicate that patients were generally satisfied and improved their health outcomes after receiving telenursing education, their perceived needs and care expectations from their nurses had an impact.

Keywords:
Telenursing, diabetes, nursing care, telecommunication, satisfaction

Introduction:

Diabetes mellitus is a widespread, but possibly deadly, medical illness that has grown in occurrence during the last few centuries to become a serious health issue in the twenty-first century.[1] Diabetes is a chronic condition characterized by excessive blood sugar levels. It might be due to a reduction in insulin synthesis or a decrease in insulin efficacy. Insulin is the primary hormone that governs the consumption of glucose from the circulation by most cells muscle and fat cells. When there is insufficient insulin, glucose cannot be taken by the cells in the body that require it, and its normal usage is interrupted.[2]

In 2021, there were approximately 84 million people worldwide having type 1 diabetes: 1.5 million (18%) were under the age of 20, and 5.4 million (64%) were between the ages of 20 and 59.[3] According to a recent American study, the worldwide diabetes prevalence in 2021 was expected to be 10.5% (536.6 million people), growing to 12.2% (783.2 million) in 2045.[4] The prevalence of diabetes was 8.5% in the Saudi Arabian population (15 years) and was greatest in the age group 60 years (49.2%).[5] Among the most effective methods for obtaining maximum normoglycemia and minimizing the emergence of diabetes comorbidities are medications. Even so, poor drug adherence in diabetes patients frequently limits the efficacy of the medication. Alternative treatment intervention options that are complementary to medication treatment have been increasingly adopted in diabetes care to raise the proportion of diabetic patients with good glycemic control and low complication rates.[6] A therapeutic diet and regular exercise, both considered non-pharmacological therapies for Type 2 diabetes mellitus (T2DM), have been shown in Randomized control trials (RCT) to significantly improve blood glucose control as well as other physiological results in individuals with T2DM. A systematic review of wellness and health programs for overweight and obese persons with type 2 diabetes (T2DM) showed that a weight surplus of at least 5% is necessary to get favorable effects on blood pressure, cholesterol, and HbA1c. And that reaching this level of weight loss needs continuous initiatives such as dietary changes, daily exercise, and constant communication with medical professionals.[7] Healthcare professionals play a crucial influence on DM patients' self-management adherence. Nurses appear to provide important assistance to patients in allowing them to successfully manage their illnesses. Furthermore, intermittent patient visits to medical services, a manqué of time, location, and a high price might all be possible hurdles. Tele-

medicine or telenursing approaches may be valuable to these patients.[8] Telehealth is defined by the United States Office of the National Coordinator for Health Information Technology (ONC) as the usage of streaming video, remote patient monitoring (RPM), store-and-forward technologies (e.g., sending wound images for evaluation), and mobile health (mHealth) applications. Telemedicine is the use of real synchronized video conferencing to enable engaging interactions between a physician and a patient.9 Telenursing is the utilization of technology to "provide nursing services and practice nurse" [8].

Telecommunication follow-up and tele-education by nurses have been shown in research to increase inpatient self-care. Telephones, computers, remote access tools, and the Net are examples of these devices. Telenursing has allowed nurses to undertake responsibilities such as monitoring patients and teaching, specific nursing actions, and pain management. Among many of the telecommunications devices utilized in this area, the telephone is probably the most extensively used and easily accessible instrument[10] Due to shorter durations, an increase in clinical therapies, greater patient awareness, and an increase in communications technology, patient education has become more challenging. The career experience of telenursing has been the subject of numerous studies, but relatively few have looked at how these skills could impact engagement with patients. Grounding on technological competency as caring in nursing, the use of telenursing is a valuable exemplar of the harmonious coexistence between technologies and caring in nursing that help improve patient satisfaction and outcomes.[11] This study was conducted to evaluate the telenursing on the satisfaction and health outcomes of diabetic patients.

Material and Methods:

Design:

The study used a Descriptive comparative, cross-sectional hospital-based study.

Setting and samples:

Participants included 135 Diabetic patients who received telenursing in the outpatient department (OPD) at a governmental hospital between (April- June 2023). The sampling criteria were as follows: Adult male and female patients who answered the teleconsultation call more than one time and were able to speak and understand to fill out the questionnaire.

The response rate of this study is 100%. The survey was not administered to patients who have a history of mental illness and to Diabetic health staff.

Total coverage sampling methods were used and the sample size was 135 during 3-month follow-up in the Telenursing

clinic to achieve a confidence level of 95% and precision of +/- 0.05.

Measurement:

Data was collected by using a self-administered questionnaire, a questionnaire developed by the researcher including two parts: The first part of Demographic data and the Second part of questions related to satisfaction and the effect of telenursing on patient outcomes.

pilot study was done by using 10% of the sample size (15 patients) was give them the questionnaire to determine the clarity of questions, effectiveness of test instructions, the time required to complete the questionnaire, and success of data collection techniques. In addition, three experts and professionals in nursing reviewed the questionnaire and commented on it to assess the reliability of the tool. It Contains 20 items. It was presented in four options: Yes, No, Sometimes and I don't know. The data were collected by Diabetic educators (Co-authors). The patients completed the questionnaires after three months of regular telenursing and Ha1c was done for all patients. The patients who agreed to participate in the study were provided with an explanation about the purpose of the study and they signed an informed consent form.

Statistical analysis:

Descriptive statistics (e.g., frequencies, percentages, means, and standard deviations (SD)) were performed to describe the demographic characteristics of the participating Diabetic patients and the main study variables. One way ANOVA test was used to examine the relationship between patient satisfaction and demographic data , Statistical software for data science (SPSS) software version 26 was used for data analysis.

Ethical considerations:

The ethics committee approval was granted from the Ministry of Health Jeddah, Ethical Approval Number A01634, and the consent of participants was taken. This study was conducted Declaration of Helsinki principles. All participants were informed of the study's objectives and all information would remain confidential.

Results:

Sociodemographic characteristics:

Near half of the participants were aged between 40-60 years (45.5%). The majority of patients in the study were female (63.8%), married (61.5), More than half achieved the University level (58.5%), and most of them were first diagnosed with diabetes less than 10 years (60%) as charted in Table 1 & Figure 1.

Table 1: Sociodemographic characteristics (N = 130).

Patients' characteristics	Frequency	%
Age		
20-39	12	9.2%
40-60	62	45.5%
More than 60	55	42.3%

Gender		
Male	47	36.2%
Female	83	63.8%
Marital status		
Married	80	61.5%
Divorced	27	20.8%
Single	23	17.7%
Level of education		
Not educated	3	2.3%
Primary education	11	8.5%
Secondary education	39	30%
University level	76	58.5%
First diagnose of diabetes		
More than 20 years	3	2.3%
years 10-20	49	37.7%
Less than 10 years	78	60%
Result of HA1C		
Normal	26	20%
Pre diabetes	43	33.1%
Diabetes	61	46.9%

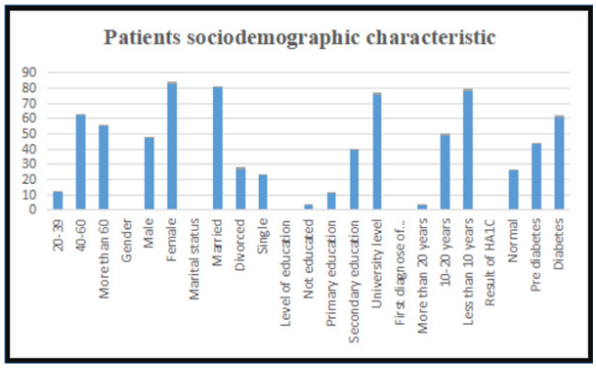


Figure 1: Patients Sociodemographic Characteristics.

Patient satisfaction and health outcome of diabetic patients:

According to an analysis of questionnaire scores, the item with the highest satisfaction and patient health outcome levels was the Overall, advice and information given to patients (1.00 SD 0.00). And lowest satisfaction and health outcome level toward answering patients' questions at a time (3.45 SD 0.92). Overall, the questionnaire scores of the patients ranged from (1.00-3.45), with an average score of 2.22. This demonstrated that Telenursing received was generally well-received, as Table 2.

Table 2: Distribution of the satisfaction and health outcome of diabetic patients (N = 130).

Items	Mean	SD	Min	Max
Do you make exercise daily	2.1	0.58	1	3
Are you did exercise half an hour	2.29	0.69	1	3
Are you smoker	2.16	0.58	1	4
Have you had symptoms of high blood sugar in last 3 month	2.11	0.87	1	4
Do you have any complications of diabetes	1.91	0.69	1	4
Do you check your blood sugar every 3 month	1.6	0.90	1	4
Is Ha1c within normal range last time	2.31	1.27	1	4
You have any ketones body in your urine	1.06	0.39	1	4
When you called, did you expect the nurse to listen carefully to you	1.01	0.17	1	3
When you called, did you expect the nurse to show you respect	1.1	0.41	1	3
When you called, did you expect the nurse to provide accurate and useful information	1.17	0.66	1	4
When you called, did you perceive that you were given the opportunity to ask all your questions	1.22	0.71	1	4
When you called, did you perceive that you received answers to all your current questions at the time	3.45	0.92	3	4
When you called, did you perceive that you felt confidence in the nurse you talked to	1.02	0.19	1	3

When you called, did you perceive that the nurse asked relevant questions about your health problem	1.01	0.17	1	3
Overall, how satisfied were you with the advice and information you were given	1.00	0.00	1	1

Comparison of satisfaction and health outcome of diabetic patients based on patient's characteristics:

The mean questionnaire score of participants at the age of 40-60 years was significantly higher than those observed for patients aged 20-39 years and aged Above 60 years (2.33 ± .639, p-value= 0.00). Furthermore, their statistical relation was found statistically significant in satisfaction and health outcomes of diabetic patients and marital status (p-value= .003) (Table 3).

Table 3. Comparison of satisfaction and health outcome of diabetic patients based on patient's characteristics (N= 130).

	N	M±SD	Statistical evaluation	
			f	P-value
Age		2.33±.639	3.06	0.00
20-39	12			
40-60	62			
≥ 60	55			
Gender		1.63±.482	1.47	.127
Male	47			
Female	83			
Marital status		1.56777. ±	2.56	.003
Single	23			
Divorced	27			
Married	80			
Level of education		3.48809. ±	1.19	.287
Uneducated	3			
Primary education	11			
Secondary education	39			
University level	76			
First Diagnose of Diabetes		2.57540. ±	1.33	.192
More than 20 years	3			
10-20 years	49			
Less than 20 years	78			
Result of HA1C		2.26775. ±	1.33	.192
Normal	26			
Pre diabetes	43			
Diabetes	61			
F: one-way ANOVA				

Discussion:

The act of telenursing involves nurses overseeing and directing the distribution of medical care and amenities using data as well as electronic communication to fulfill the patient's wellness needs. Key competencies for telenursing have been identified by the Swedish Society of Nursing in several domains, including nursing, instruction and interaction, healthcare, nursing as well as information technology, the profession and society as a whole, the profession along with wellness promotion/ illness safeguarding, nursing and code of conduct, research, instruction and growth, and administration.[12] Nurse-led mobile follow-up treatments, nevertheless, have demonstrated beneficial impacts on com-

pliance with medications in older people with long-term medical conditions.[13] This cross-sectional study was conducted to evaluate the Impact of telenursing on the satisfaction and health outcomes of diabetic patients, we found that the majority of participants were female, in their middle 40s to 60s, married, and had a higher level of education, which was consistent with the results of a previous study conducted in Iran.[14] However, a prior study conducted by Konstantina et al. found that the majority of participants were married, under 40 years old, and equal to both gender.[15]

Being able to say which telephone is a communication tool that all patients are familiar with and utilize, as opposed to other gadgets, is why it was used more frequently, in our opinion. This kind of care is not a brand-new idea. Since 1970, healthcare professionals with administrative responsibilities have called patients to share test results, alert them to prescription adjustments, or provide guidance on treatment. The aforementioned duties have expanded in the past few years to incorporate activities like teaching patients how to take care of their health, answering inquiries regarding medicines, alerting clients of scheduled visits, and enhancing interactions among medical experts.[16] The ongoing deployment of technological innovations in the field of nursing is mostly driven by the severe lack of nurses and rising exhaustion[11]. Additionally, nursing emphasizes care that is patient-focused, which calls for the use of various tactics and technology to encourage dialog among nurses and patients. The Nursing and Midwifery Council (NMC) mandates that nurse practitioners use a variety of techniques to promote courteous, kind, and efficient relationship with patients that promotes positive results for patients.[17] For those with diabetes to maintain their blood sugar level and hit the necessary glucose levels, diabetic individuals require specialized treatment and regular outpatient sessions. As a result of the absence of enthusiasm, lack of knowledge, and high costs, notably since they have to go from rural places, they are frequently frustrated. Innovation and telecommunications appear to be crucial to the oversight and treatment of DM patients.[15]

Within the study we conducted, the patient health outcomes with the most rates of satisfaction were how fulfilled were you ultimately with what knowledge and guidance you received? (1.00 SD 0.00) The research's results showed that despite patients' baseline average blood sugar levels being higher since they were newly diagnosed with diabetes, this type of telephone communication improved glycemic control and boosted patients' compliance. Similarly, respondents appeared to have missed

fewer glycemic readings during the three-month observational study. The findings of other research were comparable to ours as well. a Japanese study conducted by Kaori et al. GAS's inclusion in the telenursing system helped type 2 diabetes patients maintain their self-care behaviors. It additionally offered the visualization of tracking one's data, enabling patients to check the information they provided throughout the moment. Furthermore, it offered the choice of the most suitable treatment technology to meet patient demands and healthcare requirements.[18] In this study, the HbA1C of the participant group was decreased after 3-month implementation of telenursing (2.26 ± .775SD) unless no statistical relationship (p-value .190) Similar to the RCT study conducted by Fariba et al, the findings of this study revealed a substantial difference in HbA1C and PPG between the two different groups.[19] In addition, an RCT study conducted in Turkey found that the A1c levels of those participating was significantly lower by 0.49% overall at the expiration of the six-month observing period, while those in the placebo group had A1c levels that were substantially higher by 0.17% overall after the six-month monitoring period.[20] Consistent with the study done by Arezoo in Iran BMI and HbA1c levels in the intervention group had a statistically significant reduction compared to the control group at the end of the study. (P-value 0.001).[21] Regarding sociodemographic characteristics there is a statistical relationship between satisfaction and health outcomes of diabetic patients and their demographic data in Age and marital status with P values of 0.00 and .003 inconsistent with a study done by Mohammad et al 2020 there is no relationship between demographic data and outcome of participant (p-value>0.05) respectively.[1]

Conclusions:

Telenursing is a good strategy to provide remote nursing interventions that will help control HbA1c levels, particularly in those with diabetes who have a brief observation time (follow-up is under three months). The fast rise in the number of diabetes patients may be effectively managed via telenursing as a support for medical professionals. However, we need to think about what are the best strategies for improving patient compliance. Technological competency as caring in nursing is the harmonious coexistence between technologies and caring in nursing. Randomized control trials are advised for future studies to sustain the beneficial effect after intervention.

Authors' Contributions:

All authors have contributed equally to all processes of the research work. They have read and agreed to the published ver-

sion of the manuscript.

Funding:

This research did not receive external funding.

Ethical Approval:

The Imam Mohammad ibn Saud Islamic University (IMSIU) research ethics committee approved the study (project number 528-2023; approval date, September 11, 2023).

Conflicts of interest:

The authors report no conflicts of interest in this work**.**

Informed Consent:

Informed consent was attained from all participants within the study.

References:

1. Tomic D, Shaw JE, Magliano DJ. The burden and risks of emerging complications of diabetes mellitus. Nature Reviews Endocrinology 2022; 525–539.
2. Makroum MA, Adda M, Bouzouane A, Ibrahim H. Machine Learning and Smart Devices for Diabetes Management: Systematic Review. Sensors 2022; 1843.
3. Correction to Lancet Diabetes Endocrinol 2022; published online Sept 29. https://doi.org/10.1016/S2213-8587(22)00252-2. The Lancet Diabetes & Endocrinology 2022; 10:e11.
4. Sun H, Saeedi P, Karuranga S, Pinkepank M, Ogurtsova K, Duncan BB, et al. IDF Diabetes Atlas: Global, regional and country-level diabetes prevalence estimates for 2021 and projections for 2045. Diabetes Research and Clinical Practice 2022;183:109119.
5. Alqahtani BA, Elnaggar RK, Alshehri MM, Khunti K, Alenazi AM. National and regional prevalence rates of diabetes in Saudi Arabia: analysis of national survey data. International Journal of Diabetes in Developing Countries 2022; 392–397.
6. Hassan F, Hatah E. A Thematic Analysis of Non-Pharmacological Intervention Strategies in the Management of Diabetic Patients in Malaysia. Archives of Pharmacy Practice 2022; 62–69.
7. Leite RGOF, Banzato LR, Galendi JSC, Mendes AL, Bolfi F, Veroniki AA, et al. Effectiveness of non-pharmacological strategies in the management of type 2 diabetes in primary care: a protocol for a systematic review and network meta-analysis. BMJ Open 2020; 10:e034481.
8. Kotsani K, Antonopoulou V, Kountouri A, Grammatiki M, Rapti E, Karras S, et al. The role of telenursing in the management of Diabetes Type 1: A randomized controlled trial. International Journal of Nursing Studies 2018; 80:29–35.
9. Groom LL, McCarthy MM, Stimpfel AW, Brody AA. Telemedicine and Telehealth in Nursing Homes: An Integrative Review. Journal of the Amer-

ican Medical Directors Association 2021; 22:1784-1801.e7.

10. Pourbalouch O, Navidian A, Askari H. Assessing the Impact of Telenursing on Self-Care in Hemodialysis Patients: A Clinical Trial Study. Medical - Surgical Nursing Journal 2020; 8.
11. Krel C, Vrbnjak D, Bevc S, Štiglic G, Pajnkihar M. Technological competency as caring in nursing: A description, analysis and evaluation of the theory. Slovenian Journal of Public Health. 2022 Mar 21;61(2):115–23.
12. Wahlberg AC, Bjorkman A. Expert in nursing care but sometimes disrespected—Telenurses' reflections on their work environment and nursing care. Journal of Clinical Nursing 2018; 27:4203–11.
13. Ramelet A-S, Fonjallaz B, Rapin J, Gueniat C, and Hofer M. Impact of a Telenursing service on satisfaction and health outcomes of children with inflammatory rheumatic diseases and their families: a crossover randomized trial study protocol. BMC Pediatrics 2014; 14.
14. Alizadeh T, Takasi P. Effect of telenursing on Glycosylated Hemoglobin in patients with diabetes: A systematic review. Journal of Nursing Reports in Clinical Practice 2024; 0:0–0.
15. Kotsani K, Antonopoulou V, Kountouri A, Grammatiki M, Rapti E, Karras S, et al. The role of telenursing in the management of Diabetes Type 1: A randomized controlled trial. International Journal of Nursing Studies 2018; 80:29–35.
16. Sánchez-Guarnido AJ, Gonzalez-Vilchez M, de Haro R, Fernández-Guillen M, Graell-Gabriel M, Lucena-Jurado V. Nursing and Telemental Health during the COVID-19 Pandemic. Healthcare 2022;10:273.
17. Al Baalharith I, Al Sherim M, Almutairi SHG, Albaqami ASA. Telehealth and Transformation of Nursing Care in Saudi Arabia: A Systematic Review. International Journal of Telemedicine and Applications 2022; 2022:1–12.
18. Higano K, Shibayama T, Ichikawa M, Motomura M, Shimano H, Kawakami Y, et al. The Effects of Telenursing with Goal Attainment Scaling in Diabetic Patients: A Case Report. International Journal of Nursing & Clinical Practices 2015; 2.
19. Lashkari, T., Borhani, F., Sabzevari, S., & Abbaszadeh, A. (2013). Effect of telenursing (telephone follow-up) on glycemic control and body mass index (BMI) of type 2 diabetes patients. Iranian journal of nursing and midwifery research, 18(6), 451–456.
20. Tavşanli Ng, Karadakovan A, Saygili F. The use of videophone technology (telenursing) in the glycaemic control of diabetic patients: a randomized con
21. Shahsavari A, Bakhshandeh Bavarsad

M. Is Telenursing an Effective Method to Control BMI and HbA1c inIlliterate Patients Aged 50 Years and Older With Type 2 Diabetes? ARandomized Controlled Clinical Trial. Journal of Caring Sciences 2020; 9:73–9.