

Research Article

Adherence of Doctors to Diabetes Clinical Guidelines in Sudan

Hiba Salah Abdelgadir^{1,*} , Mustafa Magbol² , Mogahid Salih Mohamed² ,
Mohammed Ahmed Ibraheam² , Hind Salah Abdelgadir² ,
Mosab Abdelgader Ahmed² 

¹Family Medicine, Community Medicine Department, Alzaiem Alazhari University, Khartoum, Sudan

²Community Medicine Department, Alzaiem Alazhari University, Khartoum, Sudan

Abstract

Background: Adherence to the clinical guidelines improves patients' outcome by providing evidence-based care. This study aimed to assess adherence of doctors to diabetes clinical guidelines in Sudan. **Method:** A descriptive cross-sectional study was conducted from November 2022 to April 2023 on a purposive convenience sample of 465 doctors. Doctors' adherence to diabetes guidelines was measured through an online questionnaire. Data was analyzed using frequency tables. The Chi square test used to determine associations between categorized variables. All statistical tests were considered statistically significant when p value < 0.05 . **Results:** Of the 465 respondents, 76.8% were familiar with diabetes clinical guidelines, 72.7% of them implement guidelines recommendations, but only 46.5% were following the updated guideline recommendations. Only 44.5% of the surveyed doctors were aware of the local Sudanese diabetes guidelines. lack of regular training programs (17.9%), service cost (16.0%) and patients factors (15.6%) were the most common barriers to the guideline implementation. The adherence rate was positively associated with the job title, p value = 0.001. **Conclusion:** The study indicated low implementation to the updated diabetes guidelines among Sudanese doctors. To improve guidelines adherence, the study recommends launching training programs and continuous doctors' assessment, along with issuing regulations and policies to ensure the use of the updated guidelines. The national guidelines need be well disseminated and regularly updated. Regular clinical audit and establishing the clinical governance are required to improve guidelines implementation in Sudan.

Keywords

Doctors, Diabetes, Clinical Guidelines, Adherence, Implementation, Sudan

1. Introduction

Diabetes mellitus (DM) is a metabolic disorder caused by elevation of sugar in blood (blood glucose). Is a chronic disease which can lead over time - if uncontrolled - to serious complications such as heart failure, kidney failure, eye com-

plications and nervous system complications. Globally, diabetes is considered one of the major leading factors for morbidity and mortality [1]. There are about 422 million people worldwide diagnosed with diabetes according to the World

*Corresponding author: hibasalgadir@gmail.com (Hiba Salah Abdelgadir)

Received: 2 August 2024; **Accepted:** 3 September 2024; **Published:** 26 September 2024



Copyright: © The Author (s), 2024. Published by Science Publishing Group. This is an **Open Access** article, distributed under the terms of the Creative Commons Attribution 4.0 License (<http://creativecommons.org/licenses/by/4.0/>), which permits unrestricted use, distribution and reproduction in any medium, provided the original work is properly cited.

Health Organization (WHO) statistics, and it is expected to reach 552 million by 2030 [2, 3]. Diabetes is responsible of 1.5 million deaths each year and expected to be seventh leading cause of death by 2030 [4, 5].

Diabetes guidelines have been issued by many institutions, including, American Diabetic Association (ADA) [6], National Institute for Health and Care Excellence (NICE) [7], and International Working Group on the Diabetic Foot (IWGDF) [8]. Sudanese Diabetic Association developed local guidelines for diabetes management [9].

Doctors face many problems during patients' consultations. Guidelines are designed to assist doctors during their practice to treat and solve clinical problems [10]. Adherence of doctors to clinical guidelines helps them to provide high quality of care for their patients by providing them with updated treatment protocols [11-14].

The main reasons for non-adherence to the clinical guidelines in developing countries are the absence of clinical governance and regular clinical audit [14, 15]. Clinical governance is important to deliver safety context and assurance of high care quality [16]. In developing countries, many efforts are required to increase the awareness of practicing doctors about clinical governance [17, 18]. Furthermore, policy makers must ensure implementation of the updated clinical guidelines [11, 14]. Adherence of doctors to the guidelines is important to ensure safe and cost-effective clinical care [11, 16].

Doctors may face many problems that impede them from adherence of the guideline recommendations [13, 19]. Guidelines inaccessibility, volume of the guidelines, pressure from the patients and lack of resources are the most important factors of non-adherence to the guidelines [14, 20]. Other factors include guidelines disagreement, unexpected outcomes, time issues and lack of self-efficacy [11, 14].

2. Methodology

2.1. Study Design

A cross-sectional study was conducted from November 2022 to April 2023 on a purposive convenience sample of 465 doctors. The surveyed doctors were working in the family medicine, internal medicine, emergency medicine, surgery and obstetrics and gynecology departments. Data was collected with the use of pre coded and pretested structured questionnaire. A pilot survey was conducted first, and then the questionnaire was modified accordingly. The collected data include the demographic characteristics of the surveyed doctors, their job titles, years of experience awareness of diabetes guidelines and factors related to adherence and implementation.

2.2. Statistical Analysis

The Statistical Package for Social Science (SPSS 22) was used. Results of the study were presented in frequency tables. Chi-square (X^2) tests were used to assess the association between categorical variables. P value < 0.05 was considered statistically significant.

3. Result

Of the 465 surveyed doctors, (196, 42.2%) were in the age group (26 – 30 years), (279, 60%) were females. Most of the surveyed doctors (261, 56.1%) were house officers. Regarding the working department, most of the surveyed doctors were working in the internal medicine (100, 21.5%) and pediatrics (97, 20.9%) departments, as displayed in Table 1.

Most of the participants (271, 58.3%) had experience from 1- 5 years, and live in Khartoum (418, 89.9%), as displayed in Figures 1 and 2, respectively.

Table 1. Demographic characteristics of the participants, ($n = 465$).

Variables	Frequency	Percent (%)
Age groups:		
20 – 25	193	41.5
26 – 30	196	42.2
31 – 35	42	9.0
36 – 40	19	4.1
>40	15	3.2
Gender:		
Male	186	40.0
Female	279	60.0
Departments:		

Variables	Frequency	Percent (%)
Internal medicine	100	21.5
Pediatric	97	20.9
Surgery	95	20.4
Obstetrics and gynecology	94	20.2
Emergency medicine	42	9.0
Family medicine	14	3.0
Other	23	4.9
Job title:		
House officer	261	56.1
Medical officer	84	18.1
Registrar	99	21.3
Specialist	15	3.2
Consultant	6	1.3

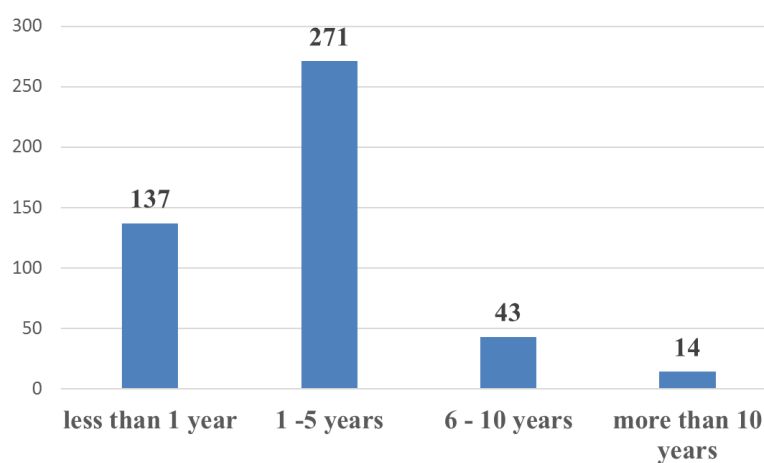


Figure 1. Distribution of the participants according to their experience years, (n = 465).

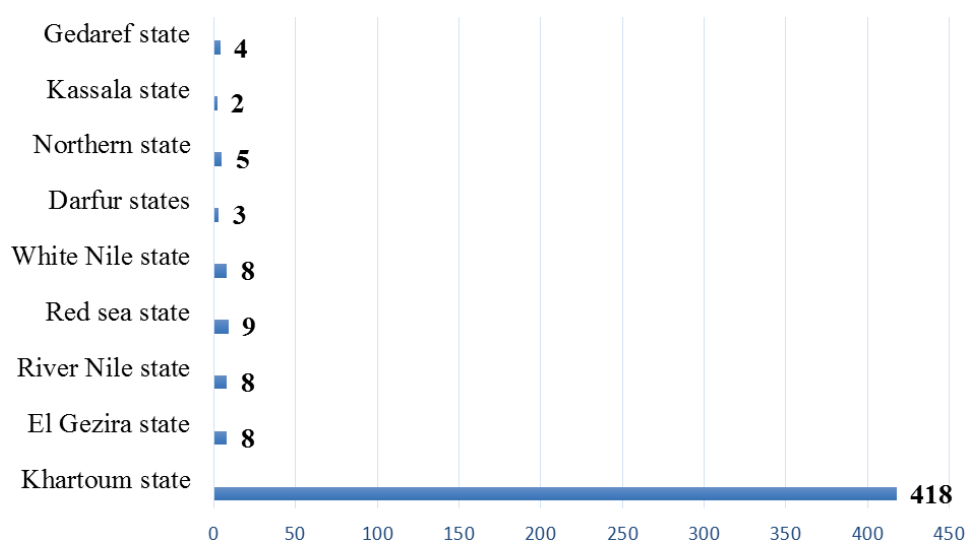


Figure 2. Distribution of the participants according to their residence, (n = 465).

Most of the surveyed doctors (357, 76.8%) were aware of the diabetes guidelines and reported that they implement the guidelines in their practice (338, 72.7%). Only (216, 46.5%) of the participants implement the updated guidelines recommendations. The awareness of the local Sudanese diabetes guidelines was reported only by (207, 44.5%) of the practicing doctors, [Table 2](#).

Inaccessibility to the guidelines (203, 25.4%), too much of the guideline's information (144, 18.0%), disagreement with specific guidelines (125, 15.6%) and frequent change of guidelines recommendations (123, 15.4%) were the common

barriers that impede guidelines adherence, [Table 3](#).

Irregular training programs (227, 17.9%), service cost (203, 16.0%) and patients factors (198, 15.6%) were the common guideline implementation barriers, [Table 4](#).

Cross tabulation between guideline implementation and the demographic characteristics of the participants displayed significant association with the job title, p value (0.001) with consultants, specialists and registrars being more adherent to the guidelines than the house officers and the medical officers, [Table 5](#).

Table 2. Distribution of the participants according to their awareness of diabetes guidelines, ($n = 465$).

Variable	Frequency	Percent (%)
Diabetes guidelines awareness:		
Not aware	108	23.2
Aware	357	76.8
Diabetes guidelines implementation:		
No	127	27.3
Yes	338	72.7
Following updated guidelines recommendations:		
Not following	249	53.5
Following	216	46.5
Awareness of the local Sudanese diabetes guidelines:		
Not aware	258	55.5
Aware	207	44.5

Table 3. Barriers to adherence to the clinical practice guidelines, ($n = 465$).

Barriers	Frequency	Percent (%)
Guideline inaccessibility	203	25.4
Large volume of guideline information	144	18.0
Lack of agreement with specific guideline	125	15.6
Lack of agreement with guideline in general	75	9.4
Lack of outcome expectancy	61	7.6
Lack of Self-Efficacy	69	8.6
Regulatory change of guidelines recommendation	123	15.4

Table 4. Barriers to implementation of the clinical practice guidelines, (n = 465).

Barriers	Frequency	Percent (%)
Lack of time	100	7.9
Patient factors	198	15.6
Service cost	203	16.0
Lack of continuity in comprehensive care process	121	9.5
Service unavailability and inaccessibility	159	12.5
Lack of regular training programs	227	17.9
Absence of local treatment protocol or guideline	131	10.3
Health insurance factors	130	10.2

Table 5. Cross tabulation between guidelines implementation and the demographic characteristics of the guidelines, (n = 465).

Variables	Guidelines implementation		P value
	No	Yes	
Gender:			
Female	75	204	0.440
Male	52	134	
Department:			
Emergency medicine	9	33	0.297
Family medicine	2	12	
Internal medicine	24	76	
Obstetrics and gynaecology	26	68	
Other	7	16	
Paediatrics	24	73	
Surgery	35	60	
Job title:			
Consultant	0	6	0.001
House officer	91	170	
Medical officer	14	70	
Registrar	18	81	
Specialist	4	11	

4. Discussion

Although many doctors reported good awareness (76.8%) and implementation of the diabetes guidelines (72.7%), updated diabetes clinical guidelines adherence was found to be

very low (46.5%), which indicates diabetes management was not always coherent to updated recommendations. These results were similar with McGee *et al.* results, who indicated high rate of adherence to diabetes guidelines (79.9%) [1]. Similarly, Lu J *et al.* reported that guidelines adherence was (72.8%) [21]. Elisabetta *et al.* concluded that the guidelines

implementation was lower than expected [22].

Results of our study revealed that guideline inaccessibility (25.4%), guidelines large information (18.0%), disagreement with specific guidelines (15.6%) and frequent modification of guidelines recommendations (15.4%) were the common barriers to adherence to the guidelines. Irregular training programs (17.9%), service cost (16.0%) and patients factors (15.6%) were also stated as prominent barriers to the guideline's implementation.

Abdelgadir *et al.* concluded that; the most reported barriers were guidelines unavailability and inaccessibility, patients' factors, service cost, limitation of health insurance coverage, and the amount of information contained in guidelines [11, 14]. Similarly, Echlin *et al.* reported lack of time and inaccessibility as barriers to guidelines implementation [23]. Lugtenberg *et al.* found that disagreement with guidelines recommendations was the frequent barrier to guidelines adherence [24].

Our study revealed a significant association between the job title and guidelines implementation (p value = 0.001). Similarly, Abdelgadir *et al.* concluded that high adherence was significantly correlated with the job titles (p value = 0.000), age (p value = 0.024) and clinical experience (p value = 0.012) [11].

5. Conclusion

There is low implementation rate to the updated diabetes guidelines among Sudanese doctors. Our study identified a wide range of barriers to adherence and implementation of the diabetes guidelines. This demands barriers-tailored interventions to adopt the common barriers which include inaccessibility, volume of guidelines information, lack of training programs and costs of service. This could include regular issuing and dissemination of the updated Sudanese (national guidelines), launching regular training programs, introducing clinical audit, monitoring systems, and launching clinical regulations to bridge clinical governance gap and confirm the implementation of updated guidelines at all levels.

Abbreviations

ADA	American Diabetes Association
DM	Diabetes Mellitus
IRB	Institutional Review Board
IWGDF	International Working Group on the Diabetic Foot
MOH	Ministry of Health
NICE	National Institute for Health and Care Excellence
SPSS	Statistical Package for Social Science
WHO	World Health Organization

Declarations

Ethical approval was granted from Alzaiem Alazhari Uni-

versity Institutional Review Board (IRB) and the Sudan Ministry of health (MOH). Written informed consent was taken from each participant. Confidentiality and all rights were assured.

Acknowledgments

We would like to thank our families, friends and teachers for their help, guidance and support. Special thanks to Dr. Salah Abdelgadir Adelmagid for his guidance and support. Appreciations to M.s Samia Sawi for her support. Thanks and love to Firas Tatay and Leen Tatay.

Author Contributions

Hiba Salah Abdelgadir: Conceptualization, Formal Analysis, Methodology, Supervision, Writing – review & editing

Mustafa Magbol: Data curation, Investigation, Methodology, Project administration, Writing – original draft

Mogahid Salih Mohamed: Investigation, Methodology, Project administration, Writing – original draft

Mohammed Ahmed Ibraheam: Investigation, Methodology, Project administration, Writing – original draft

Hind Salah Abdelgadir: Formal Analysis, Writing – review & editing

Mosab Abdelgader Ahmed: Reviewed, edited the final manuscript

Funding

The research was full funded by the authors.

Data Availability Statement

The data and materials are available upon request by direct contact with the corresponding author.

Conflicts of Interest

The authors declare no conflicts of interest.

References

- [1] McGee RG, Cowell CT, Arnolda G, Ting HP, Hibbert P, Dowton SB, et al. Assessing guideline adherence in the management of type 1 diabetes mellitus in Australian children: a population-based sample survey. *BMJ Open Diabetes Research and Care*. 2020; 8(1): e001141.
- [2] Johari MG, Dabaghmanesh M, Zare H, Safaeian A, Abdollahifard G. Smart diabetic screening and managing software, A Novel Decision Support System. *Journal of Biomedical Physics & Engineering*. 2018; 8(3): 289.

- [3] El-Sappagh S, Elmogy M. A decision support system for diabetes mellitus management. *Diabetes Case Rep.* 2016; 1(102): 2.
- [4] Diabetes: World Health Organization (WHO); 2024 [Available from: https://www.who.int/health-topics/diabetes#tab=tab_1
- [5] Magbol M, Abd Alaziz WM, Osman AM, Allah NA, Alkhowad NO, Izzoddeen A, Alsugud SA. Knowledge, Attitude and Practice of Diabetic Patients About Symptoms of Hypoglycaemia in Atbara Teaching Hospital, December 2022–October 2023. *Journal of Family Medicine and Health Care.* 2024 Mar; 10(1): 11-7.
- [6] Holt RI, DeVries JH, Hess-Fischl A, Hirsch IB, Kirkman MS, Klupa T, et al. The management of type 1 diabetes in adults. A consensus report by the American Diabetes Association (ADA) and the European Association for the Study of Diabetes (EASD). *Diabetes care.* 2021; 44(11): 2589-625.
- [7] Kassianos G. A summary of the National Institute for Health and Clinical Excellence (NICE) Clinical Guideline 66: the management of type 2 diabetes. *Drugs in Context.* 185-90.
- [8] Maldonado-Valer T, Pareja-Mujica LF, Corcuera-Ciudad R, Terry-Escalante FA, Chevarr á-Arriaga MJ, Vasquez-Hassinger T, et al. Prevalence of diabetic foot at risk of ulcer development and its components stratification according to the international working group on the diabetic foot (IWGDF): A systematic review with metanalysis. *Plos one.* 2023; 18(11): e0284054.
- [9] Sudanese Diabetes Association: Internatinal Diabetes Fedration; 2024 Available from: <https://idf.org/our-network/regions-and-members/middle-east-and-north-africa/members/sudan/sudanese-diabetes-association/>
- [10] Sciarra E. The importance of practice guidelines in clinical care. *Dimensions of Critical Care Nursing.* 2012; 31(2): 84-5.
- [11] Abdelgadir HS, Elfadul MM, Hamid NH, Noma M. Adherence of doctors to hypertension clinical guidelines in academy charity teaching hospital, Khartoum, Sudan. *BMC health services research.* 2019; 19: 1-6.
- [12] Alliabi FJA, Jaber AAS, Jallo MKI, Baig MR. Adherence of physicians to evidence-based management guidelines for treating type 2 diabetes and atherosclerotic cardiovascular disease in Ajman, United Arab Emirates. *BMC Primary Care.* 2022; 23(1): 1-8.
- [13] Mayer J, Kipps C, Cock HR. Implementing clinical guidelines. *Practical Neurology.* 2019.
- [14] Abdelgadir HS, Bajouri S, Abdelgadir HS. Implementation of the clinical practice guidelines among family medicine doctors at primary health care facilities in Khartoum and Gezira states of Sudan. *BMC Primary Care.* 2024 Jul 30; 25(1): 277.
- [15] Almazrou SH, Alfaifi SI, Alfaifi SH, Hakami LE, Al-Aqeel SA, editors. Barriers to and Facilitators of adherence to clinical practice guidelines in the Middle East and North Africa Region: A Systematic Review. *Healthcare;* 2020: MDPI.
- [16] Herd G, Musaad S. Clinical governance and point-of-care testing at health provider level. *The New Zealand Medical Journal (Online).* 2015; 128(1417): 41.
- [17] Lawrenson R, Reid J, Nixon G, Laurenson A. The New Zealand rural hospital doctors workforce survey 2015. *The New Zealand Medical Journal (Online).* 2016; 129(1434): 9.
- [18] Mohaghegh B, Ravaghi H, Mannion R, Heidarpour P, Sajadi HS. Implementing clinical governance in Iranian hospitals: purpose, process and pitfalls. *Electronic physician.* 2016; 8(1): 1796.
- [19] Trivedi MH, Kern J, Marcee A, Grannemann B, Kleiber B, Bettinger T, et al. Development and implementation of computerized clinical guidelines: barriers and solutions. *Methods of information in medicine.* 2002; 41(5): 435-42.
- [20] Qumseya B, Goddard A, Qumseya A, Estores D, Draganov PV, Forsmark C. Barriers to clinical practice guideline implementation among physicians: a physician survey. *International Journal of General Medicine.* 2021: 7591-8.
- [21] Lu J, Zhao W, Chen T, Xu Z, Sun X, Xie H, et al. Influence of guideline adherence and parameter control on the clinical outcomes in patients with diabetic nephropathy. *BMJ Open Diabetes Research & Care.* 2020; 8(1).
- [22] Iacopi E, Coppelli A, Riitano N, Abbruzzese L, Pieruzzi L, Goretti C, et al. Adherence to guideline recommended medical therapies in type 2 diabetic patients with chronic critical limb ischemia. *Diabetes Research and Clinical Practice.* 2019; 158: 107898.
- [23] Echlin PS, Upshur RE, Markova TP. Lack of chart reminder effectiveness on family medicine resident JNC-VI and NCEP III guideline knowledge and attitudes. *BMC family practice.* 2004; 5: 1-7.
- [24] Lugtenberg M, Zegers-van Schaick JM, Westert GP, Burgers JS. Why don't physicians adhere to guideline recommendations in practice? An analysis of barriers among Dutch general practitioners. *Implementation Science.* 2009; 4: 1-9.

Research Fields

Hiba Salah Abdelgadir: Family Medicine, Hypertension, Guidelines, Implementation, Chronic diseases, psychological impact
Mustafa Magbol: Family Medicine, Hypertension, Guidelines, Implementation, Chronic diseases, Psychological impact
Mogahid Salih Mohamed: Family Medicine, Hypertension, Guidelines, Implementation, Chronic diseases, Psychological impact
Mohammed Ahmed Ibraheam: Family Medicine, Hypertension, Guidelines, Implementation, Chronic diseases, Psychological impact
Hind Salah Abdelgadir: Family Medicine, Hypertension, Guidelines, Implementation, Chronic diseases, psychological impact
Mosab Abdelgader Ahmed: Family Medicine, Hypertension, Guidelines, Implementation, Chronic diseases, psychological impact