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# Implementation of the clinical practice guidelines among family medicine doctors at primary health care facilities in Khartoum and Gezira states of Sudan

Hiba Salah Abdelgadir<sup>1\*</sup>, Sahar Bajouri<sup>2</sup> and Hind Salah Abdelgadir<sup>3</sup>

## Abstract

**Introduction** The health system in Sudan faces several challenges, including increasing numbers of patients, shortages of health supplies, and disparities in the distribution of health services. Guidelines implementation improves patients' outcomes and ensures efficient use of the resources in such a resource limited country. The study aimed to assess the implementation of the clinical practice guidelines among family medicine doctors working in the primary health care centers in Khartoum and Gezira states to provide baseline data about the current practice in Sudan.

**Methods** Descriptive cross-sectional facility-based survey, conducted from April to December 2021, on 373 of the practicing family-medicine doctors. A total of 101 Primary health care centers were surveyed (77 centers in Khartoum state and 24 in Gezira state). The questionnaire was pilot tested on a small group of physicians to improve clarity and reduce response bias. Descriptive statistics were used to summarize the data and analyzed by frequency tables. Chi square and logistic regression tests were used to determine the association between categorized variables. *P* value < 0.05 was considered statistically significant.

**Results** Most of the practicing family-medicine doctors (98.4%) reported implementation of the guidelines. Moreover, (68.6%) of them received training programs which were organized and funded by the Sudan Ministry of Health. The local Sudanese guidelines were difficult to access and not regularly updated. Services unavailability and inaccessibility (87.1%), health insurance factors (83.9%), and patient factors (81.2%) were the most frequent barriers to guidelines implementation. Service cost (79.9%), lack of regular training programs (79.9%), absence of local guidelines (77.2%), lack of continuity in the comprehensive care process (63.0%), and lack of time (57.1%) were also reported as barriers to guidelines implementation.

**Conclusion** Guidelines implementation is limited by unavailability and inaccessibility of the health services and the health insurance limited coverage. Expansion of the health insurance coverage, organization of continuous training programs, encouragement of regular auditing and issuing regulations to ensure the use of updated guidelines,

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dissemination of the updated national guidelines along with establishing clinical governance in Sudan can be useful tools for policymakers in the optimum allocation of public health resources.

**Keywords** Clinical, Guidelines, Implementation, Adherence, Family medicine, Primary health care, Government, Clinical governance, Sudan

## Introduction

Clinical practice guidelines (CPG) are designed to assist health care practitioners in specific clinical conditions [1]. They are considered as a transformation tool in practice and policy, that covers the clinical circumstances according to evidence-based information that was summarized to assist and regulate the clinical care by providing scientific information for decision-making in order to improve patient's outcome [2–4].

CPG acknowledges the practicing doctors with evidence-based treatment methods and types of intervention through clearly stated recommendations. Moreover, they summarize various treatment options and plans of management tailored to suit the patient's needs according to their clinical presentation [5, 6]. Implementation of the guideline's recommendations regulate the clinical work and increase the confidence of the practicing doctors. Furthermore, CPG implementation play a role in improving patients' compliance to treatment as they are informed with the evidence-based treatment methods [6, 7].

CPGs are considered efficient tools to reduce the gap between the evidence-based recommendations and the physicians' clinical practice [8]. To improve the quality of care, the global development and implementation of clinical practice guidelines have increased [9]. Issuing regulations by the policy makers and establishment of the clinical governance ensure regular implementation of the updated guidelines recommendations [1].

Despite their importance in improving the quality of medical care, and the witnessed increase of their implementation at the global level during the past several decades, there is no acknowledged standard approach to developing, adapting or implementing CPGs efficiently or effectively in Sudan [1, 10].

## Primary health care in Sudan

The primary health care (PHC) approach has started in Sudan in 1976 in an attempt to achieve rural extension for the limited urban based health services. The attempt was part of a five-year social development plan. Additional impetuous was given by Alma Ata declaration which clarified the vision towards the universal equitable health services [11, 12].

From that time, the adoption of the elements and the principles of PHC have been taking place in Sudan health policies. The PHC program in Sudan embarked in implementation of the PHC elements in several ways and

degrees according to its professional, internal political and administrative context [11, 12].

Initially ambitious and enthusiastic PHC plan was developed in Sudan. The PHC plan was supported by the government strongly and involved all concerned departments, nonprofit organizations (NGOs), and the community.

The PHC plan was considered as a part of five-year comprehensive development strategy in Sudan. The new development plan met an exceptional attraction from the community in addition to the technical and the political interest. The plan implementation was fully funded, well prepared and supervised, therefor the outcome was unprecedented [13, 14].

Sudan Family Medicine Association was formulated in 2014 as professional body to advocate for the new discipline, but it is not well functioning. Also as part of PHC expansion project, extensive training program for allied health workers especially medical assistants and vaccinators and nutritionists are being implemented [12, 15]. The main aim of this program is to consolidate the concept of integrated and multidisciplinary service delivery, which is an important dimension in family practice, although other components of the approach should be injected on the ongoing training. There are major gaps in the current implementation [12, 15, 16]. Continuous training programs to the practicing family medicine doctors was arranged and funded by the Sudan Ministry of Health (MOH). The main aim of these programs to ensure evidence-based practice according to the updated guidelines to improve patients' outcomes.

The overall objective of the study was to investigate the implementation of clinical practice guidelines among family medicine doctors working in the referral primary health care centers in Khartoum and Gezira States in Sudan. As a baseline survey, its findings are essential to help synthesize and implement CPGs by identifying implementation barriers appropriate and interventions to address them. This in turn is believed to improve quality of care health outcomes and optimize use of resources in such a resource-limited country.

## Methods

### Study design and population

Descriptive cross-sectional facility-based survey was conducted in the public referral primary health care centers in Khartoum and Gezira States in Sudan during period from April to December 2021.

Khartoum and Gezira states are known to be the most populated states in Sudan. Moreover, these two states contain large number of primary health care centers and practicing family medicine doctors compared with other states in Sudan, due to presence of family medicine training and educational programs. Khartoum is the capital and largest city of Sudan. It is located at the confluence of the White Nile, and the Blue Nile. Its population is estimated at more than 8 million, accounting for about 20% of the Sudanese total population. Gezira state lies between the Blue Nile and the White Nile in the east-central region of the country. It has an area of 27,549 km. Its population is estimated at about 4.5 million, amounting for about 10.7% of the Sudanese total population. Figure 1 shows Khartoum and Gezira states location in the Sudan Map.

A total of 101 primary health care centers were surveyed (77 centers in Khartoum state and 24 in Gezira state). The study targeted all practicing family medicine doctors in the referral primary health care centers (321 in Khartoum state and 79 in Gezira State). A total of 373 doctors responded to the survey (301 in Khartoum state and 72 in Gezira state). The surveyed doctors were either M.Sc. holders/residents or Medical Doctorate (MD) holders/residents. About six trained research assistants and enumerators from both genders were employed to collect data with use of a pre coded and pretested structured questionnaire which was revised, modified, edited, and finalized after piloting. The questionnaire was designed by the researchers to collect the required

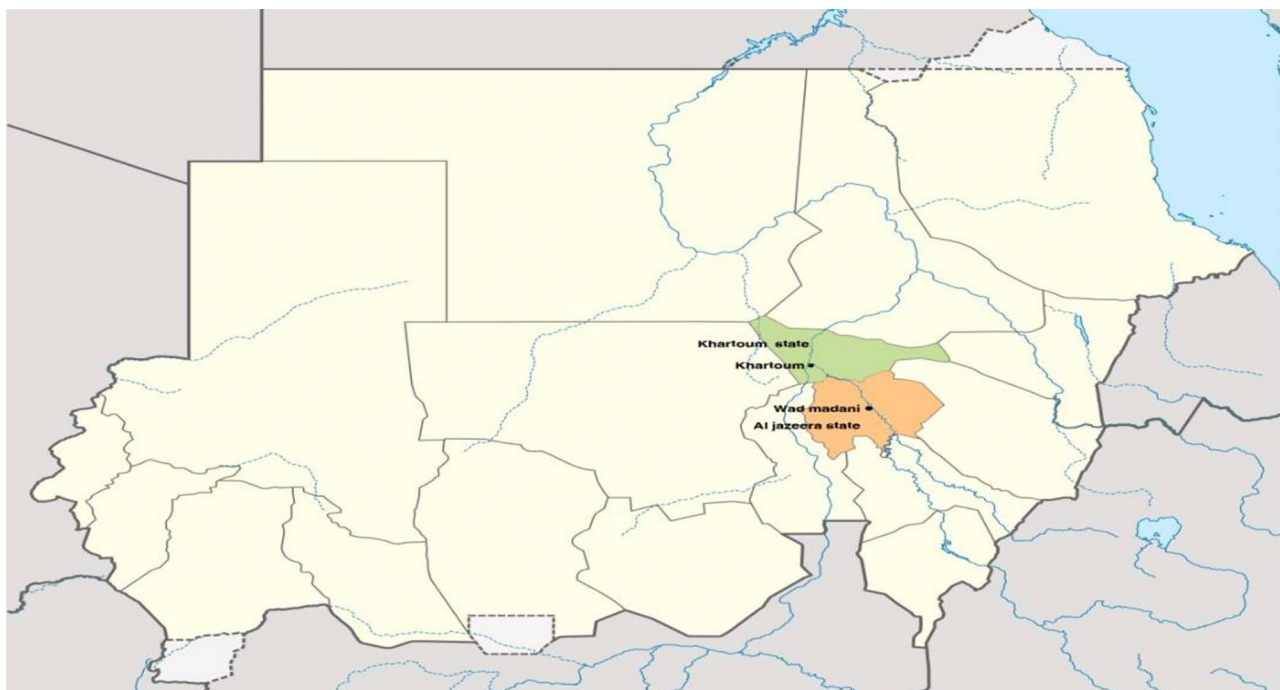
information about guidelines awareness, adherence and implementation.

Data was collected in English, via semi-structured face-to-face interviews and via telephone interviews. Telephone interviews were used to contact target respondents working in remote healthcare centers that were difficult to reach during the data collection period due to lockdown and other political issues in Sudan. Data were analyzed and interpreted by the corresponding authors.

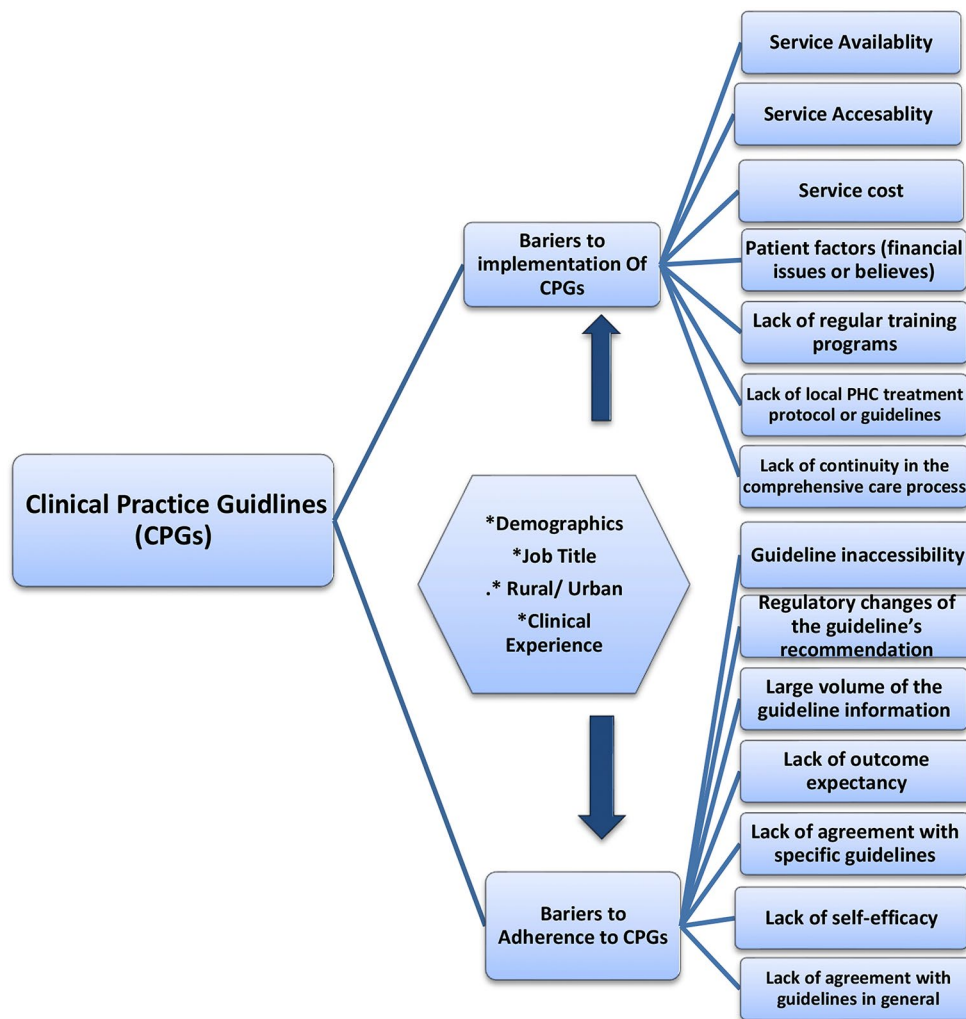
Ethical approval was obtained from the Sudan Federal Ministry of Health (FMOH) National Ethical Committee and permission from PHC authorities. Written consent was taken from all participants with assurance of confidentiality and all rights. Confidentiality and privacy have been maintained during data collection, analysis and reporting Figure 2.

### Statistical analysis

The statistical package for social sciences (SPSS 23) was used to summarize the data numerically (mean, standard deviation, median) and graphically (frequency tables). Associations between categorical variables were determined through the Chi-squared ( $\chi^2$ ) tests. A binary logistic regression analysis was performed to determine the relationship between implementation of CPG and its associated factors. All statistical tests were considered significant when  $p$ -value < 0.05. The Cronbach Alpha test was used to measure the reliability of the respondent's answers to the self-administrated questionnaire. The answers of the respondents tested through Cronbach's



**Fig. 1** Sudan map showing Khartoum and Gezira states location



**Fig. 2** Conceptual framework describes factors affecting clinical guidelines adherence and implementation

alpha were under the true of value of reliability (ranging from 0.70 to 0.95) with a value of alpha of 0.741, which reflect high consistency and reliability of the questionnaire.

**Results**

Females constituted the vast majority of the surveyed doctors (316, 84.7%). Most of the respondent doctors were registrars (298, 79.9%), while those with clinical experience ranging from 1 to 5 amounted to (317, 85.0%). Most of the PHC centers (313, 83.9%) were located in urban areas. The majority of the surveyed doctors (301, 80.7%) were stationed in Khartoum state, while the rest were in Gezira state, as displayed by Table 1.

Investigation into CPG implementation revealed that most of the practicing family medicine doctors (367, 98.4%) were following the guidelines in their practice. Of those, (283, 77.1) were regularly following the updated editions of the guidelines. The national (Sudanese) and

the international guidelines were followed by (241, 65.7%) of the respondents. More than half of the practicing family medicine doctors (256, 68.6%) reported that they have received regular training programs from the Ministry of health, as displayed in Table 2.

Despite the high adherence and implementation rate of the guidelines, a variety of barriers were expressed by the respondents. Doctors rated guideline inaccessibility (235, 63.0%) as the most frequent barrier. Sudanese guidelines were an example to guideline inaccessibility as stated by the surveyed doctors. Regulatory changes of the guideline’s recommendation (215, 57.6%), large volume of the guideline information (186, 49.9%) and lack of outcome expectancy (150, 40.2%), lack of agreement with specific guidelines (149, 39.9%), lack of self-efficacy (120, 32.2%) and lack of agreement with guidelines in general (81, 21.7%) were also barriers to adherence to the guidelines, as displayed in Table 3.

**Table 1** Demographic characteristic of the practicing family medicine doctors, (n = 373)

Variables	Frequency	Percent (%)
<b>Residence</b>		
Khartoum state	301	80.7
Gezira State	72	19.3
<b>Gender</b>		
Male	57	15.3
Female	316	84.7
<b>Job title</b>		
Registrar	298	79.9
Consultant/Physician	75	20.1
<b>Clinical experience</b>		
1–5 years	317	85.0
6–10 years	51	13.7
11–15 years	3	0.8
More Than 16 years	2	0.5
<b>PHC location</b>		
Rural	60	16.1
Urban	313	83.9

**Table 2** Distribution of the respondents according to their implementation of the clinical practice guidelines

Variables	Frequency	Percent (%)
<b>Implementation of the existing clinical guidelines in clinical practice, (n = 373).</b>		
Yes	367	98.4
No	6	1.6
<b>Type of the Followed guidelines, (n = 367).</b>		
International guidelines	67	18.3
Local Sudanese guidelines	59	16.0
Both	241	65.7
<b>Following the updated editions of the guidelines, (n = 367).</b>		
Yes	283	77.1
No	84	22.9
<b>Regular training programs from the Ministry of Health, (n = 373).</b>		
Yes	256	68.6
No	117	31.4

**Table 3** Barriers to adherence to the clinical practice guidelines, (n = 373)

Barriers	Frequency	Percent (%)
Guideline inaccessibility	235	63.0
Regulatory changes of the guideline's recommendation	215	57.6
Large volume of the guideline information	186	49.9
Lack of outcome expectancy	150	40.2
Lack of agreement with specific guidelines	149	39.9
Lack of self-efficacy	120	32.2
Lack of agreement with guidelines in general	81	21.7

**Table 5** Distribution of the respondents according to their perception toward the clinical practice guidelines, (n = 373)

Variables	Frequency	Percent (%)
<b>Practice in Sudan doesn't allow implementation of the clinical practice guidelines.</b>		
Yes	277	74.3
No	96	25.7
<b>The post-graduation training programs improve clinical practice.</b>		
Yes	340	91.2
No	33	8.8
<b>Adherence to the guidelines improves the clinical practice.</b>		
Yes	365	97.9
No	8	2.1
<b>Preferred guidelines:</b>		
Local (Sudanese) guidelines	165	44.20
International guidelines	208	55.80

**Table 4** Barriers to implementation of the clinical practice guidelines, (n = 373)

Barriers	Frequency	Percent (%)
Services unavailability and inaccessibility	325	87.1
Health insurance factors (services not covered by insurance)	313	83.9
Patient factors (financial issues or believes)	303	81.2
Service cost	298	79.9
Lack of regular training programs	298	79.9
Lack of local PHC treatment protocol or guidelines	288	77.2
Lack of continuity in the comprehensive care process	235	63.0
Lack of time	213	57.1

Regarding barriers to implementation of clinical practice guidelines, services unavailability and inaccessibility, health insurance factors (services not covered by the health insurance) and patient factors were the most frequent barriers to guideline implementation, amounting to (325, 87.1%), (313, 83.9%) and (303, 81.2%) respectively, Table (5). Service cost (298, 79.9%), lack of regular training programs (298, 79.9%), lack of local PHC treatment protocol or guidelines (288, 77.2%), lack of continuity in the comprehensive care process (235, 63.0%) and lack of time (213, 57.1%) were also reported as barriers to guideline implementation, as displayed in Table 4.

Investigation regarding respondents' perception of clinical practice in Sudan revealed that; most of the respondents (277, 74.3%) noted that practice in Sudan doesn't allow implementation of the guidelines. Moreover, most of the doctors consider training programs (340, 91.2%) and guidelines adherence (365, 97.9%) improve clinical practice. More than half of the practicing family medicine doctors (208, 55.8%) reported that they prefer to follow the international guidelines rather than the local Sudanese guidelines, Table 5.

Residence of the respondents, job title, experience and PHC significant association when tested in cross tabulation with the CPG implementation, *p value*=0.099, 0.257, 0.563 and 0.654, respectively, Table 6.

Guideline implementation revealed significant association when tested in cross tabulation with following the updated editions of the guidelines and the type of the followed guideline, *p value*=0.000 and 0.000, respectively, Table 6. Training programs revealed no significant association when tested in cross tabulation with the guideline implementation, *p value*=0.280, as displayed in Table 6.

A binary logistic regression analysis was conducted to assess the relationship between guideline implementation and the respondents' residence, job title and training programs. The reliability of the model was 99.0%. The model perfectly predicted guideline implementation.

Receiving training programs which contributed to the model by 1.130 was statistically significant with a *p-value* of 0.000. The training programs affect the guideline implementation positively by 3.095 times, (95% CI: 1.877–5.103). Respondents' opinion regarding the benefit of the training programs in improving the clinical practice which was contributed to the model by 0.222 was not statistically significant with a *p-value* of 0.349. It is predicted to affect the guideline implementation positively by 1.249 times. Residence and job title were not statically significant with a *p-value* of respectively 0.436 and 0.075. Residence affects the guideline implementation by 0.963 times, (95% CI: 0.875–1.059) and job title by 0.535 times, (95% CI: 0.269–1.064), as displayed by Table 7.

A binary logistic regression analysis was conducted to assess the effect of the barriers on the guideline implementation. The reliability of the model was 76.0%. Patient factors, services unavailability, lack of local PHC treatment protocol and health insurance factors were all not significant with a *p-value* of 0.348, 0.997, 0.611 and 0.300. Patient factors affect guideline implementation by 2.324 times (95% CI: 0.399–13.531). Lack of local PHC treatment protocol affects guideline implementation by 1.604 times (95% CI: 0.260–9.897). Health insurance factors affect guideline implementation by 2.661times (95% CI: 0.418–16.946), as displayed by Table 8.

**Table 6** Association between demographic characteristics of the participants and implementation of the clinical practice guidelines, (n = 373)

Variables	Guideline implementation		P-value
	Yes	No	
<b>Residence:</b>			
Khartoum state	295	6	0.099
Gezira state	72	0	
<b>Job titles:</b>			
Registrar	292	6	0.257
Consultant/Physician	75	0	
<b>Clinical experience:</b>			
0–5 Years	313	4	0.563
6–10Years	49	2	
11–15 Years	3	0	
More Than 16 Years	2	0	
<b>PHC location:</b>			
Rural	59	1	0.654
Urban	308	5	
<b>Follow the updated editions of the guidelines:</b>			
Yes	283	0	0.000
No	81	3	
<b>Type of the followed guidelines:</b>			
International guidelines	67	0	0.000
Local Sudanese guidelines	59	0	
Both of them	240	1	
<b>Training programs:</b>			
Yes	253	3	0.280
No	114	3	

**Discussion**

Most of the surveyed family medicine doctors (79.9%) were in Khartoum state. Family medicine doctors are centralized in Khartoum state because of the availability of the family medicine training programs in many institutions. Furthermore, the presence of new and renewed PHC centers in Khartoum state facilitates the training and the clinical rotation and offers job vacancies to the family doctors. The same situation in Gezira state, presence of the family medicine training program in Al Gezira University, beside the economic factors and distribution of the PHC center resulted in centralization of family medicine doctors in Wad Medani locality.

**Table 7** Logistic regression model predicting guideline implementation based on the respondent's residence, job title and training programs, (n = 373)

Variables in the equation	B	S.E	Wald	df	p-value	Odds Ratio	95% C.I. for OR	
							Lower	Upper
Residence	0.038	0.049	0.606	1	0.436	0.963	0.875	1.059
Job title	0.625	0.351	3.175	1	0.075	0.535	0.269	1.064
Training programs	1.130	0.255	19.603	1	0.000	3.095	1.877	5.103
Training programs improve clinical practice	0.222	0.237	0.876	1	0.349	1.249	0.784	1.988
Constant	1.380	0.225	37.682	1	0.000	0.252		

**Table 8** Logistic regression model predicting guideline implementation based on the barriers, ( $n=373$ )

Variables in the equation	B	S.E	Wald	df	p-value	Odds Ratio	95% C.I. for OR	
							Lower	Upper
Patient factors	0.843	0.899	0.881	1	0.348	2.324	0.399	13.531
Services unavailability	-17.718	5631.819	0.000	1	0.997	0.000	0.000	.
Lack of local PHC treatment protocol	0.473	0.928	0.259	1	0.611	1.604	0.260	9.897
Health insurance factors	0.979	0.945	1.074	1	0.300	2.661	0.418	16.946
Constant	-4.510	0.601	56.295	1	0.000	0.011		

These disparities in the workforce distribution are agreed to be one of the major threats confronting Sudanese health sector today [17]. Insufficient numbers and types of qualified health workers in remote and rural areas impedes access to health-care services for a significant percentage of the population, slows progress towards attaining the sustainable development goals and challenges the aspirations of achieving health for all [18].

One of the most striking findings that most of the surveyed practicing family medicine doctors are females (84.7%). This may have implications that need to be addressed in view of the growing feminization of the Sudanese family doctors, most of them have 5 years or less experience in practicing family medicine, (317, 85.0%), followed by (51, 13.7%). Only (20.1%) of them are consultants and physicians, which reflect high brain drain of most of well experienced qualified family doctors, and its consistent with the evidences that migration among Sudanese doctors is traditionally been physician-led and male dominated [19]. However new emerging trend of increased feminization in the migration pattern of Sudanese doctors was documented [20]. This out-flux of family doctors due to poor remuneration and inadequate living and working conditions, especially in rural areas, reduces the remaining workforce's capacity and morale Eventually, this deteriorates health service delivery effectiveness for the entire population [21, 22].

Results of the study revealed that most of the doctors (98.4%) implement the guidelines in their practice and (68.6%) of them received training programs. Family medicine training in Sudan and regular training programs to the practicing family medicine doctors are thought to be the cause behind the high implementation rate of the guidelines. A previous study in Sudan reported low adherence rate of the guidelines and recommended training programs as a solution [1]. Another study in Estonia reported high implementation rate of the clinical practice guidelines (79%) [23].

Most of the surveyed doctors (74.3%) reported that practice in Sudan doesn't allow implementation of the clinical practice guidelines. This result was consistent with Hwaida et al. results [8]. Some setting in Sudan and the economic status impedes guideline implementation. Absence of important investigations or being so far from the health center is a reason for the practicing doctor to

waive this first line investigation. Furthermore, even in presence of all the essential services, doctors are limited due to the patients' financial issues and the health insurance. Patients tend to request the cheapest drug of investigation that they can afford or that is covered by their health insurance. Same barriers were reported in previous studies [1, 23–25]. In 2019 a study in Sudan reported guideline inaccessibility, patient factors and volume of the guidelines as most frequent barriers [1]. Another study reported lack of time, lack of medical resources and guideline inaccessibility were the most frequent barriers [23].

Inaccessibility of local Sudanese guidelines was the main driver that made most of the surveyed doctors (55.8%) prefer the international guidelines. Furthermore, they reported that local guidelines are appropriate for Sudanese patients if they are available, regularly updated, and adapted to the Sudanese health system (41.6%). These results were consistent with Elsadig et al. results [8].

The MOH tends to issue local treatment protocols to be followed by the practicing doctors especially for the endemic diseases [26, 27]. Local Sudanese guidelines was issued by many societies e.g. the Sudanese hypertension guidelines which was issued by the Sudanese hypertension society in 2014 [28].

The practicing doctors tend to follow the known and well published international guidelines, like Joint National Committee (JNC) on Detection, Evaluation, and Treatment of High Blood Pressure [29], National Institute for Health and Care Excellence (NICE) [30]. The use of local Sudanese guidelines is limited because they are not well published. Furthermore, absence of regulations from the Sudan ministry of health which enforce the use of the local guidelines might be the reason behind the reason of non-use of the local Sudanese guidelines.

## Conclusion

The study reported high adherence of family physicians to CPGs (98.4%). International guidelines are preferred as they are well published and regularly updated. The political and financial constrains in Sudan jeopardize the sustainability of the training programs. Barriers-tailored interventions are needed to address the most encountered barriers such as services unavailability and

inaccessibility, health insurance limited coverage and patient factors. Efforts should be directed to encourage the development of guidelines through a rigorous approach that involves a multidisciplinary team representing various stakeholders including and working with explicit harmony. These approaches must be accompanied by the development of barriers tailored interventions to implement the guidelines. A comprehensive strategy to disseminate the national guidelines is crucial. Policymakers should establish a national system to collect, disseminate, and implement guidelines, strengthen the management of conflict of interest, and provide quality assurance and control.

### Study limitations

The quantitative data was collected with the use of pre-coded questionnaires. Doctors reported their status of guideline implementation. The design of a self-reporting system might limit the validity of the study.

### Abbreviations

AAU	Alzaiem Alazhari university
AICs	Agency for Italian Cooperation
CPG	Clinical Practice Guidelines
FMOH	Federal Ministry of Health
FMOF	Federal Ministry of Finance
GDP	Gross Domestic Products
JNC	Joint National Committee
PHC	Primary Health Care
PHI	Public Health Institute
MRI	Magnetic Resonance Imaging
MD	Medical Doctorate
MOH	Ministry of Health
NICE	National Institute for Care and Health Excellence
NGOs	Non-Governmental Organizations
SMOH	State Ministry of Health
SMSB	Sudan Medical Specialization Board
UMST	University of Medical Sciences and Technology
WHO	World Health Organization

### Supplementary Information

The online version contains supplementary material available at <https://doi.org/10.1186/s12875-024-02542-x>.

Supplementary Material 1

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### Author contributions

Hiba Salah: Designed and implemented the study protocol, study tool, participated in the data collection, conducted the data analysis, wrote the final research draft and participated in drafting the manuscript. Sahar Bajouri: Reviewed and edited the study protocol and study tool. Supervised the field implementation of the research and supervised all data management processes. Participated in writing and editing the final research draft and manuscript. Hind Salah: Participated in proof reading and editing of the final

manuscript. All authors approved the final version of the manuscript prior to submission.

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### Data availability

The datasets used and/or analyzed during the current study are available from the corresponding author on reasonable request.

### Declarations

#### Ethics approval and consent to participate

Ethical clearance and approval for conducting this research was obtained from the Federal Ministry of health (FMOH) authorized ethical committee. Permission was obtained from the directors of the primary health centers. Written informed consent was taken from all participants with assurance with confidentiality and all rights. The purpose of the study was addressed briefly. Confidentiality and privacy have been maintained during data collection, analysis and reporting.

#### Consent to publish

Not applicable.

#### Competing interests

The authors declare no competing interests.

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