Primary health care physicians’ knowledge and adherence regarding hypertension management guidelines in southwest of Saudi Arabia

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Abstract
To measure Primary Health Care physicians’ knowledge of and adherence to the Saudi Hypertension Management Guidelines (SHMGs) in Southwest of Saudi Arabia.

This study was a cross-sectional investigation where data was collected via a self-administered questionnaire. The demographics of the physicians, data related to the source of the guidelines for hypertension management, knowledge about the SHMGs and physicians’ adherence to the SHMG were collected. Student’s t test was used to assess the presence of any statistical difference between the level of knowledge and adherence according to the study’s measured variables.

A total of 316 physicians participated in this investigation, representing 66% of all the PHC physicians in the Jazan region. The number of correct answers measuring knowledge about various topics varied between 18% and 94% with a mean overall score of 7.9/16. The number of reported practices adherent to the guidelines varied between 2% and 97%, and the mean overall score was 7.2/11. Receiving hypertension management guidelines from the Directory of Health was statistically associated with a higher level of knowledge (P value < .05). Undergoing clinical training for hypertension management and seeing fewer numbers of patients on a daily basis was associated with a statistically higher level of adherence to the guidelines (P value < .05).

Improper distribution of guidelines, lack of continuous clinical training, negative attitude of physicians toward guidelines and large number of patients seen by physicians are likely to hinder translating guidelines to actual clinical practice.

Abbreviations: HTN = hypertension, MoH = Ministry of Health, PHC = primary health care, SD = standard deviation, SHMGs = Saudi hypertension management guidelines, WHO = World Health Organization.

Keywords: guidelines, hypertension, Jazan, primary health care, Saudi Arabia

1. Introduction
Elevated blood pressure is a major risk factor for cardiovascular diseases. According to the World Health Organization (WHO), raised blood pressure is responsible for 12.8% of deaths globally.[1] In Saudi Arabia, the prevalence of hypertension (HTN) has been reported to reach 17% among adults.[2] In addition to other non-communicable diseases, hypertension is a major contributor for mortality due to cardiovascular diseases among Saudis.[3]

Hypertension is a preventable disease as several non-pharmacological options can aid in lowering blood pressure levels. According to Oza and Garcellano, it is recommended that all hypertension patients adopt lifestyle modifications.[4] These recommendations are related to limiting salt intake, regular exercise and a higher consumption of fruit, vegetables and whole grain products.[4] In a review by Ozemek et al, it was concluded in order to achieve better adherence to lifestyle modifications, frequent contact with exercise, nutritional, and wellness professionals is recommended.[5]

In addition to lifestyle interventions, there are different classes of blood pressure lowering medications available. The choice of medication depends on the blood pressure level, comorbidities and the presence of contraindications associated with particular drugs. The variability in either pharmacological or non-pharmacological treatment options mandates the availability of clinical guidelines enabling the evidence-based management of raised blood pressure. Adherence to hypertension management guidelines is likely to improve the overall control of the blood pressure.[6]

In 2018, the Saudi Hypertension Management Society, with the support of the Saudi Ministry of Health (MoH), published the updated Saudi Hypertension Management Guidelines (SHMGs).[7] The SHMGs provide comprehensive up-to-date evidence concerning several components related to hypertension management with particular emphasis on the epidemiological situation of hypertension and related risk factors in the Saudi population. The SHMG covers several areas pertaining to the prevention, diagnosis, follow up and control of blood pressure among patients with different health conditions.
Evidence concerning the knowledge and adherence of physicians with respect to hypertension management guidelines in Saudi Arabia is currently limited. A study conducted between 2006 and 2007 in the Aseer region in Saudi Arabia measured the adherence of 322 primary health care (PHC) physicians to the Seventh Report of the Joint National Committee on Prevention, Detection, Evaluation, and Treatment of High Blood Pressure (JNC7), where a lack of adherence of PHC physicians to hypertension management guidelines was reported.[8] Nonetheless, the knowledge and adherence of PHC physicians to the SHMGs has currently not been reported in Saudi Arabia. This investigation aims to measure the knowledge of and adherence to the SHMGs by PHC physicians in Jazan and the factors associated with their levels of knowledge and adherence.

2. Methods

This study was a cross-sectional investigation conducted between June and August 2019. It targeted physicians working at PHCs in the Jazan region, southwest of Saudi Arabia and physicians not working at PHCs were excluded. Jazan Hospital Institutional Review Board granted ethical approval to conduct the study (approval reference H-10-Z-068).

The data was collected via a self-administered multiple-choice questionnaire. The questionnaire had four main components: the demographics of the physicians, data related to the source of the guidelines for hypertension management and clinical training, knowledge about the SHMGs and physicians’ adherence to the SHMG. Knowledge and practice questions were adopted from the SHMGs and reviewed by a specialist in family medicine. The questionnaire was piloted on a sample of ten physicians to test time needed to complete the questionnaire, to test its face validity and to assess its comprehensiveness in terms of measuring knowledge and practice. The time needed to complete the questionnaire varied between 5 and 8 minutes. Internal consistency was tested using Cronbach Alpha to assess the reliability of the questionnaire and this provided a reasonable internal reliability of 0.602.

According to Directory of Health in Jazan region, 483 physicians were working at the PHCs in the region at the time. Administrative approval to identify and approach the physicians was sought from the Directory of Health in the Jazan region. The identification of the physicians and how they were approached were conducted in accordance with the regulations of the Directory of Health in Jazan, enabling the online collection of the data. To increase access to non-Arabic speaking and remote rural area physicians, the electronic questionnaire was developed in English. The questionnaires were given anonymously and there were no questions related to the name and location of the PHCs. No sampling frame was utilized as all the targeted population (483 physicians) were approached.

The statistical package for the social sciences (SPSS) (version 25) was used to analyze the data. The socio-demographic variables of the participants were assessed using descriptive statistics, including frequency counts and percentages for categorical variables and means and standard deviations (SDs) for the continuous variables. The normality of the distribution of the continuous variables was assessed. The frequency and percentage of the correct answers or adherence to measured practice were reported.

Several steps were performed to test any associations between the study variables and level of knowledge and adherence. First, a scoring system was developed where each correct answer or adequate practice was given a point while false answers or inadequate practices were given a zero. The totals were then calculated for each physician by measuring the level of knowledge or adherence via summing all the correct answers or adequate practices. Secondly, Student’s t test was used to assess the presence of any statistical difference between the level of knowledge and adherence according to the study’s measured variables. A P value of <.05 was considered statistically significant for the statistical tests applied.

3. Results

A total of 316 physicians participated in this investigation, representing 65% of all the PHC physicians in the Jazan region. Table 1 describes the demographics of the included sample. The mean age of the participants was 38 and 53% of the participant were male physicians. The majority of the respondents were Sudanese (27%) and general practitioners (62%) with a bachelor’s degree in medicine and surgery (64%). On average, the respondents had been in practice for 9 years and saw about 35 patients per day.

The physicians were asked whether they agree that adherence to hypertension management guidelines would produce desired clinical outcomes; 88 physicians (28%) disagreed with this notion. A total 141 physicians (45%) reported they had not attended any training sessions in the past 2 years for hypertension management and 96% of respondents were willing to attend training activities on a regular basis. A total of 251 physicians (79%) reported they had received official guidelines for hypertension management from the Jazan Directory of Health.

Table 2 illustrates the frequency and percentage of correct answers about different topics adopted from the SHMGs and mean score for knowledge. Topics with the highest number of correct answers included the frequency of screening for HTN among adults aged 40 and above, safe HTN management options

| Table 1 | Demographics of 316 PHC physicians in the Jazan region. |
|---------|--------------------------------------------------------|
| Variables | | |
| Age: mean [SD] | 38.17 [9] |
| Gender: n [%] | | |
| Males | 168 [53%] |
| Females | 148 [47%] |
| Nationality: n [%] | | |
| Sudanese | 140 [44%] |
| Saudis | 87 [27%] |
| Egyptian | 34 [11%] |
| Pakistani | 20 [6%] |
| Indian | 16 [5%] |
| Others | 19 [7%] |
| Specialty: n [%] | | |
| General practice | 195 [62%] |
| Family medicine | 121 [38%] |
| Education Level: n [%] | | |
| Bachelor | 203 [64%] |
| High Diploma | 40 [13%] |
| Master | 37 [12%] |
| Board | 33 [10%] |
| Fellowship | 3 [1%] |
| Average number of patients seen daily at clinic: mean [SD] | 35 [21] |
| SD = standard deviation. | |
during pregnancy and follow-up frequency for HTN patients. Questions with the lowest number of correct answers were related to HTN management after surgery, normal blood pressure levels among children and the effect of weight reduction on controlling blood pressure.

Table 3 describes the reported adherence of the responding physicians to the SHMG and the mean score for the adherence. Practices with high adherence levels were related to the management of hypertension during pregnancy and measurement of blood pressure for adult patients attending a clinic. Nonetheless, only seven physicians [2%] reported adherence to the interval for reassessing patients with uncontrolled blood pressure. Similarly, only 18 physicians [6%] were adherent to the SHMG’s recommendation concerning sharing lifestyle advice to limit salt intake.

Table 4 describes the relationships between the demographic factors and the level of knowledge and adherence among the respondents. Age, gender, nationality, specialty, level of education and years of practice showed no statistical association with either the level of knowledge or adherence to practice (P values >.05). However, physicians who reported receiving HTN management guidelines via official channels from the Directory of Health scored higher for the level of knowledge about the SMHGs in comparison to those who did not. However, whether they received any guidelines from the Directory of Health did not

### Table 2
Knowledge of 316 PHC physicians in the Jazan region about the SHMGs.

| Topics                                                                 | Correct Answers: n [%] |
|------------------------------------------------------------------------|------------------------|
| Recommended frequency of screening for HTN among adults aged 40 and    | 291 [92%]              |
| older                                                                   |                        |
| Recommended frequency of screening for HTN among adults aged 18 and     | 203 [64%]              |
| 39 years                                                               |                        |
| Recommended period for avoiding nicotine and caffeine consumption before| 96 [30%]               |
| blood pressure measurement                                             |                        |
| Target BP for hypertensive patients with diabetes                      | 123 [39%]              |
| Target BP for hypertensive patients older than 80 years                | 198 [63%]              |
| Recommended daily sodium intake level among patients with HTN          | 106 [34%]              |
| Effect of weight reduction on controlling blood pressure               | 81 [26%]               |
| Populations with high salt sensitivity                                  | 97 [31%]               |
| Association between BMI and waist circumference and risk of HTN        | 113 [36%]              |
| Safe HTN management options during pregnancy                           | 298 [94%]              |
| Frequency of following up HTN patients                                 | 279 [89%]              |
| HTN management for patients with erectile dysfunction                   | 58 [18%]               |
| Normal blood pressure levels among children                             | 82 [26%]               |
| Safe HTN management options during breastfeeding                       | 216 [68%]              |
| Prevention of pre-eclampsia among high risk women                      | 135 [43%]              |
| Normal blood pressure levels among children                             |                        |
| Mean score for knowledge: 7.9/16 [SD: 2.5]. Minimum score: 3/16.       |                        |
| Maximum score: 16/16                                                   |                        |

SD = standard deviation.

### Table 3
Reported adherence of 316 PHC physicians to the SHMG.

| Practice                                                                 | Adherence Level: n [%] |
|--------------------------------------------------------------------------|------------------------|
| Measurement of blood pressure for adult patients attending a clinic      | 274 [87%]              |
| Patients resting period required before blood pressure measurement       | 91 [29%]               |
| Sharing lifestyle advice to limit salt intake among patients             | 18 [6%]                |
| Prescribing statins for patients with HTN                               | 228 [72%]              |
| Treatment of HTN patients with metabolic syndrome                       | 237 [75%]              |
| Treatment of HTN patients with coronary health diseases                 | 155 [49%]              |
| Treatment of hypertension during pregnancy                              | 307 [97%]              |
| Treatment of hypertension with renal disease                             | 244 [77%]              |
| Interval for reassessing patients with uncontrolled blood pressure       | 7 [2%]                 |
| Laboratory investigations required for newly diagnosed hypertension      | 42 [13%]               |
| Mean score of adherence: 7.2/11 [SD: 1.6]. Minimum score: 1/11, Maximum |                        |
| score: 11/11                                                            |                        |

SD = standard deviation.

### Table 4
Factors associated with the level of knowledge and adherence concerning the SHMGs among 316 PHC physicians in Jazan, Saudi Arabia.

| Variables | Knowledge: Mean [SD] | P value | Practice: Mean [SD] | P value |
|-----------|----------------------|---------|---------------------|---------|
| Age:      |                      |         |                     |         |
| <38 yr    | 8 [2.4]              | .553    | 7.3 [1.6]           | .576    |
| ≥ 38 yr   | 7.8 [2.6]            | .325    | 7.2 [1.7]           |         |
| Gender:   |                      |         |                     |         |
| Males     | 7.8 [2.6]            | .505    | 7.3 [1.7]           | .568    |
| Females   | 8.1 [2.4]            | .149    | 7.2 [1.6]           | .155    |
| Nationality: |                 |         |                     |         |
| Saudis    | 8.2 [2.1]            | .173    | 7.5 [1.7]           | .170    |
| Non-Saudis| 7.8 [2.6]            | .586    | 7.3 [1.7]           | .870    |
| Specialty: |                    |         |                     |         |
| General practice | 8 [2.6] | .586    | 7.3 [1.7]           |         |
| Family medicine | 7.8 [2.3] |         | 7.3 [1.6]           |         |
| Education Level: |                  |         |                     |         |
| Bachelor  | 8.1 [2.5]            | .149    | 7.3 [1.6]           | .155    |
| Postgraduate | 7.6 [2.6] |         | 7.2 [1.6]           |         |
| Years of practice: |            |         |                     |         |
| <3 years  | 8.1 [2.4]            | .291    | 7.3 [1.6]           | .960    |
| ≥ 9 years | 7.8 [2.6]            | .557    | 7.3 [1.7]           | .015    |
| Average number of patients seen daily at clinic: |        |         |                     |         |
| <35       | 8 [2.6]              | .557    | 7.5 [1.6]           | .015    |
| ≥ 35      | 7.8 [2.4]            | .149    | 7 [1.6]             |         |
| Attendance of training sessions for HTN management: |        |         |                     |         |
| Yes       | 8.1 [2.4]            | .325    | 7.5 [1.5]           | .020    |
| No        | 7.8 [2.6]            | .557    | 7.1 [1.8]           |         |
| Receiving HTN management guidelines from Directory of Health: |        |         |                     |         |
| Yes       | 8.1 [2.5]            | .414    | 7.3 [1.6]           | .212    |
| No        | 7.3 [2.4]            | .586    | 7.1 [1.8]           |         |

* Student t test.

SD = standard deviation.
seem to be associated with their adherence level, which may indicate the presence of other factors influencing practice adherence. The number of patients seen by the physicians on a daily basis seemed to influence reported adherence in our sample as those physicians who saw more than 35 patients daily reported lower adherence (P value .015). Additionally, those physicians who reported attending training sessions for hypertension management during the last 2 years were more likely to report higher adherence to guidelines compared to those who did not (P value .02).

4. Discussion
This study measured the level of knowledge and reported adherence of PHC physicians in the Jazan region regarding the SHMGs. The number of correct answers measuring knowledge about various topics within the SHMGs varied between 18% and 94% with a mean overall score of 7.9/16. The number of reported practices adherent to the SHMGs varied between 2% and 97%, and the mean overall score was 7.2/11. Receiving HTN management guidelines from the Directory of Health was statistically associated with a higher level of knowledge. Undergoing clinical training for HTN management and seeing fewer numbers of patients on a daily basis was associated with a statistically higher level of adherence to the SHMGs.

Studies measuring the level of knowledge and adherence to the SHMG in Saudi Arabia are lacking. Nonetheless, a study by Al-Gelban et al measured the adherence of 322 PHC physicians in the Aseer region in Saudi Arabia to JNC7 guidelines between November 2006 and January 2007. In their sample, adherence to HTN guidelines varied between 5.6% and 99% which is similar to the variability of adherence levels reported in our investigation where adherence to SHMGs varied between 2% and 97%. However, no assessment of the influence of demographic variables on the level of adherence was reported in their study.[8]

Several international investigations have been conducted to measure adherence to HTN management guidelines. Arderoy et al conducted a study in the United States of America to evaluate physicians’ adherence to hypertension guidelines by reviewing the medical records of 345 patients. It was reported that adherence levels varied between 4.4% and 100% with modest overall adherence to JNC7 guidelines.[9] Additionally, Arderoy et al reported poor adherence to recommended laboratory investigations such as monitoring of glucose and lipids indicating a cost-saving efforts. This was similar to the findings of our investigation where only 14% of the physicians reported requesting recommended laboratory investigations for newly diagnosed hypertension patients. In a more recent study conducted in South Africa involving a review of the medical records of 490 hypertensive patients treated by 29 doctors reported an overall 52% adherence to hypertension management guidelines.[10] Finally, Spranger et al reviewed the medical records of 249 patients newly diagnosed with hypertension and followed them over 18 months in primary care clinics. 33% of the patients achieved their targeted blood pressure, indicating the difficulty with translating clinical guidelines into actual clinical practice.[11] Our study suggests there is difficulty translating guidelines into clinical practice, as seeing a large number of patients on a daily basis was associated with lower adherence levels.

Michak et al conducted a review of studies measuring adherence to practice guidelines through assessing prescription patterns, reviewing patients’ medical records and patients’ and physicians’ surveys in studies published between 1980 and 2004. The authors concluded that there is wide variability in the reported levels of physicians’ adherence to hypertension guidelines and more emphasis is put on pharmacological therapy to measure the level of adherence.[12] It is worth noting that, although our investigation was based on surveys of physicians only, it was able to detect a lack of knowledge and practice inadequacies pertaining to SHMGs.

There are several areas of strengths and weaknesses noted in the current study. The major strengths were related to targeting PHC physicians and detecting gaps in their level of knowledge and adherence regarding the SHMG. The study was able to identify issues that might influence the level of knowledge and practice adequacy of PHC physicians in Jazan region. These issues are related to not receiving the guidelines, not receiving continuous clinical training and congestion in the health services due to large number of patients.

The major limitations of this study were mainly related to the subjective nature of the measurement tool as reported practices might differ from actual practice. Nonetheless, it is possible to argue that the practice measurement tool was able to detect several practices with very low adherence to the guidelines. Finally, although the data collection tool was administered anonymously and the questionnaires were sent electronically, some physicians might have hesitated about participating due to a lack of interest in adhering to the guidelines and the fear of exposing this state of affairs to their employer. Nonetheless, this can only be assessed using objective assessment methods.

In conclusion, a lack of knowledge about specific HTN management guidelines and inadequately reported practices were detected among PHC physicians in the Jazan region. Based on the findings of this study, sharing the guidelines with all PHC physicians, offering continuous clinical training, encouraging physicians to adhere to the guidelines and reducing the number of patients seen by physicians are likely to enhance their overall knowledge and adherence. Although this study is limited to PHC physicians in Jazan region, the findings can be generalized to physicians working in similar settings in other region in Saudi Arabia.

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