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ARTICLE

The capacity of primary health care centers in Jordan to manage hypertension: areas for improvement

Omar Al-Hadeethi[1] · Mohannad Al Nsour[1] · Yousef Khader[2] · Osama Khaled Alkhlaifat[1] · Hanin Al Jawaldeh[1] · Aseel Hayajneh[1]

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Abstract

The assessment of the capacity of Primary Health Care (PHC) settings for the management of hypertension is essential to identify areas for improving management outcomes. This study aimed to assess the capacity of PHC centers in Jordan to manage hypertension including the assessment of human resources, equipment, and infrastructure. All comprehensive PHC centers located in Irbid and Mafraq governorates in north of Jordan ($n = 23$) were assessed. An assessment tool from HEARTS Technical Package was adapted and used for assessment. All centers have general practitioners and half of the centers ($n = 11$, 47.8%) had at least one family doctor working full time. In only one center, all doctors, nurses, and other health workers were trained on the management of hypertension. All centers, except one, had at least one functional automatic blood pressure measuring devices (BPMDs). Almost two thirds of centers (43.5%) had no measuring tapes. ECG machines were present in all centers except two. One third ($n = 8$, 34.8%) of centers had no functional glucometers. The majority of health centres carry out the laboratory investigations. Educational materials on physical activity, hypertension, and diabetes were seen in four (17.4%) centers only. Necessary medications were always available in the majority of health centers. In conclusion, this assessment revealed many areas for improvement in human resources, equipment, infrastructures, and other resources, such as developing an updated guideline/protocol of hypertension management, training the PHC staff on these guidelines, providing PHC centers with the necessary equipment, and establishing e-registry to improve documentation of data.

Introduction

Hypertension is a major public health problem that increases the risk for coronary heart diseases, cerebrovascular diseases, nephropathy, retinopathy and overall morbidity and mortality [1–3]. The prevalence of hypertension is expected to increase by 7.2% between 2013 and 2030 [4]. Low- and middle-income countries share more than 80% of the global burden of cardiovascular diseases (CVDs) [5].

Jordan noncommunicable diseases (NCDs) profile for the year 2016 revealed that NCDs were responsible for 78% of total deaths. CVDs alone accounted for 37% of total deaths [6]. In Jordan, CVD is the leading cause of deaths in adults [7]. Hypertension was the second leading cause of death after ischemic heart diseases according to the data of Ministry of Health (MoH) in Jordan [8].

The few studies conducted in Jordan showed high prevalence rate of hypertension and low levels of awareness, treatment, and control among hypertensive patients. A recent national survey revealed that the age-standardized prevalence of hypertension was 33.8% among men and 29.4% among women [7]. Of those with hypertension, 57.7% of men and 62.5% of women were aware of having hypertension. More than two thirds of Jordanian patients on antihypertensive medications had uncontrolled hypertension [7]. The most probable reasons for the low rate of hypertension control among Jordanian adults include lack of evidence-based hypertension management practices, ineffective management of hypertension, and inadequate adherence to medications [9].

To improve hypertension management, countries should assess their current situation to determine their needs for trained staff, basic equipment, investigations, counseling

✉ Yousef Khader
yskhader@just.edu.jo

[1] Global Health Development (GHD)/Eastern Mediterranean Public Health Network (EMPHNET), Amman, Jordan

[2] Department of Public Health, Jordan University of Science and Technology, Irbid, Jordan

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services, educational materials, medicines, and registry systems.

Assessing resources of the Primary Health Care (PHC) settings has a great value in different levels. PHC centers in Jordan operate in urban as well as rural areas and range in size from small individual clinics to comprehensive multi-clinic centres. PHC centers in Jordan are classified into comprehensive PHC health centers, PHC centers and health sub-centers. Comprehensive PHC centers provide the widest range of services including maternal and child health services and management of NCDs and serve the largest catchment areas. Private sector in Jordan provide mainly secondary health care services. The capacity assessment of comprehensive PHC centers for management of hypertension establishes a clear representation of how hypertensive patients are managed on a day-to-day basis, spots gaps in hypertensive management pertaining to poor outcome among patients, assists in modifying hypertension management methods systematically according to the outcome indicators [10]. It also resets hypertension control targets aimed by health care providers and evaluates the possibility of supplying health care providers with adequate training and continuous education in respect to up-to-date hypertension management protocols [10]. Therefore, this study aimed to assess the capacity of PHC centers in Jordan to manage hypertension including the assessment of human resources, equipment, and infrastructure.

Methods

Study sites and settings

All comprehensive PHC centers located in Irbid and Mafraq governorates in north of Jordan were assessed in our study. These centers provide PHC services including services for NCDs such as screening, treatment, and follow up. Irbid governorate has the second largest population in Jordan after Amman Governorate, and the highest population density in the country. According to the Jordanian Department of Statistics, the 2019 estimated population of Irbid was 1957000, while estimated population of Mafraq was 608,000. Almost 50% of the population in the two governorates are older than 18 years [11].

Assessment tool

The research team at Eastern Mediterranean Public Health Network has adapted an assessment tool from HEARTS Technical Package. HEARTS Technical Package is six modules and an implementation guide, developed by WHO to provide a strategic approach to improving cardiovascular health in countries [12]. The assessment tool was divided into eight sections. The first section assessed the availability of human resources involved in the management of hypertension and if they are trained on hypertension management. The second section assessed the availability of basic equipment for managing hypertension and the frequency of their maintenance. The third section assessed infrastructure and services, laboratory investigation available, national guidelines of hypertension and diabetes management, counseling services and health education materials. The fourth section assessed the availability of hypertension and diabetes medications. The fifth section assessed the numbers of hypertension patients, visits, and consultations. The sixth section assessed hypertension patients' referral to other health facilities. The seventh section assessed record keeping and health information system used at the PHC center. The eighth section assessed any community activities regarding hypertension management provided at the PHC.

The adapted tool was modified in a way that all assessment sections were focusing on hypertension as compared to the original tool that meant to assess the major NCDs, including CVDs. In addition, and compared to the original tool, potassium and sodium investigation and counseling for adherence to hypertension management were added and the financing and administration section was removed.

Data collection

The ethical approval was obtained from the Institutional Review Board at Jordan University of Science and Technology. An official letter from the MoH was sent to all health directorates and participating centers to facilitate the assessment process. A technical workshop on using the assessment tool was conducted at the MoH for the six research assistants. Research assistants were residents of the Field Epidemiology Training Program, which is a CDC's program that trains a global workforce of field epidemiologists [13].

The baseline facility assessment was conducted, by completing a total number of 23 questionnaires, from February 2, 2020 through February 12, 2020. Each team of three research assistants visited one PHC center per day. The method chosen for gathering the information was an in-person structured interview with the medical staff of the PHC centres. Interviews were conducted with an average of three health workers from each center. The Interviews were conducted in Arabic. The majority of the information was gathered from the person most familiar with all aspects of the PHC center (main respondent). The main respondent was assigned by the head of the center and was usually the head of nurses with a long working history in that center. Guided by that main respondent, data on the availability of medicine and different laboratory investigations were collected from the pharmacist and laboratory technician,

respectively. Average time needed per each interview was an hour and a half.

Data analysis

Data were entered and analyzed using the Statistical Package for Social Sciences software (IBM SPSS version 24). Categorical data were described using percentages and quantitative data were described using means and standard deviation.

Results

Human resources

A total of 23 health centers were visited and assessed. Almost half of the centers ($n = 11$, 47.8%) had at least one family doctor working full time. The rest of centers were covered by part-time family doctors. All, except two, had at least one general practitioner working full time. None of the health centers had a full-time internal medicine specialist. However, seven (30.4%) centers were covered by part-time internal medicine doctors. The vast majority of health centers ($n = 22$, 95.7%) had at least one pharmacist, laboratory technician, and registration/data clerk working full time. Table 1 shows the availability of human resources for managing hypertension or involved in the management of hypertension.

Training on hypertension management

In only one center, all doctors, nurses, and other health workers were trained on the management of hypertension. In four centers, none of the doctors was trained on the management of hypertension. However, in 14 (60.9%) health centers, some of the doctors were trained on the management of hypertension. None of the nurses was trained on hypertension management in 14 (60.9%) centers. Table 2 shows the percentage of health centers with trained health workers on hypertension management.

Table 1 Availability of human resources for managing hypertension in 23 comprehensive health care centers in Jordan.

Number of the human resources for managing hypertension	Full time		Part time	
	Number of centers (n)	%	Number of centers (n)	%
Internal medicine specialist				
0	23	100.0	16	69.6
≥1	0	0.0	7	30.4
Family medicine specialist				
0	16	69.6	9	39.1
≥1	11	47.8	14	60.9
General practitioner				
0	2	8.7	20	87.0
1	2	8.7	2	8.7
2	8	34.8	1	4.3
≥3	11	47.8	0	0.0
Pharmacist				
0	1	4.3	21	91.3
1	4	17.4	1	4.3
2	12	52.2	1	4.3
≥3	6	26.1	0	0.0
Nurse				
0	2	8.7	20	87.0
1	0	0.0	1	4.3
2	2	8.7	1	4.3
≥3	19	82.6	2	8.7
Laboratory technician				
0	1	4.3	21	91.3
1	5	21.7		
2	10	43.5	2	8.7
≥3	7	30.4		
Registration/data clerk				
0	1	4.3		
1	6	26.1		
2	9	39.1		
≥3	7	30.4		

Table 2 The percentage of comprehensive health centers with trained health workers on hypertension management ($n = 23$ centers).

Training on hypertension management	Doctors		Nurses		Other health workers	
	Number of centers (n)	%	Number of centers (n)	%	Number of centers (n)	%
All are trained	1	4.3	1	4.3	1	4.3
Most are trained (more than half)	4	17.4	4	17.4	4	17.4
Some are trained (less than half)	14	60.9	4	17.4	2	8.7
None is trained	4	17.4	14	60.9	16	69.6

Table 3 Availability of basic functional equipment for managing hypertension in the selected health centers.

Number of functional equipment/ devices available	Number of centers (*n*)	%
Mercury BPMDs		
0	10	43.5
1	8	34.8
2	1	4.3
≥3	4	17.4
Automatic BPMDs		
0	1	4.3
1	10	43.5
2	7	30.4
≥3	5	21.7
Measuring tape		
0	15	65.2
1	8	34.8
Height board/stadiometer		
1	14	60.9
2	5	21.7
≥3	4	17.4
Weighing machines		
1	12	52.2
2	6	26.1
≥3	22	21.7
ECG machines		
0	2	8.7
1	17	73.9
2	3	13.0
≥3	1	4.3
Glucometer		
0	8	34.8
1	11	47.8
2	3	13.0
≥3	1	4.3
Stethoscope		
1	1	4.3
2	6	26.1
≥3	16	69.6

Equipment

Table 3 shows the availability of basic functional equipment for managing hypertension in the selected health centers. All health centers had functional blood pressure measuring devices (BPMDs). All centers, except one, had at least one functional automatic BPMDs. Almost half of centers ($n = 10$, 43.5%) had only one mercury BPMDs. Almost two thirds of centers (43.5%) had no measuring tapes. All centers had at least one functional height board/stadiometer and weighing machines. ECG machines were present in all centers except two. One third ($n = 8$, 34.8%) of centers had no functional glucometer. BPMDs were calibrated once a year or more in 20 (87.0%) centres, less than once a year in one center, and not calibrated in two centres. In all centres, equipment was usually repaired and maintained by sending them back to "government store".

Table 4 The percentage of comprehensive health centers that carry out laboratory investigations in relevance to the management of hypertension ($n = 23$ centres).

Laboratory investigations	Number of centers (*n*)	%
Urine dipstick testing-protein	21	91.3
Blood sugar	21	91.3
Urine ketone bodies	20	87.0
HbA1c	20	87.0
Lipid profile	21	91.3
Serum creatinine	18	78.3
Urine microalbuminuria	9	39.1
Potassium	3	13.0
Sodium	3	13.0

Infrastructure/services

The majority of health centres carry out investigations, such as urine dipstick testing—protein, blood sugar, urine ketone bodies, HbA1c, lipid profile, and serum creatinine. Potassium and sodium investigations are carried out in three (13.0%) centers only. Table 4 shows the percentage of the health centers that carry out investigations in relevance to the management of hypertension. Guidelines for management of hypertension and diabetes are seen in only five (21.7%) health centers.

Table 5 shows the availability of services relevant to management of hypertension and health education materials in the selected health centers. Patient counseling and education on smoking, diet, sodium intake, physical activity, self-management of diabetes, self-administration of insulin, and adherence to hypertension medications are implemented in the majority of health centers. Educational materials on smoking were available in two thirds ($n = 14$, 60.9%) of health centers. Educational materials on physical activity, hypertension, and diabetes were seen in four (17.4%) centers only.

Medicines

Table 6 shows the availability of medicines in the selected health facilities. Medications such as ACE inhibitor (enalapril) or angiotensin receptor blockers (ARB), metformin, and aspirin, Beta blocker (atenolol), sulphonylurea

Table 5 Availability of counseling and educational services in the 23 selected comprehensive health centers.

	Number of centers (*n*)	%
Services		
Patient counseling and education on smoking, diet, sodium intake, physical activity	22	95.7
Counseling and education of family members on smoking, diet, sodium intake, physical activity	21	91.3
Cardiovascular risk assessment	17	73.9
Patient counseling for self-management of diabetes	22	95.7
Patient education for self-administration of insulin	19	82.6
Counseling for adherence to hypertension Medications	22	95.7
Educational materials		
Smoking	14	60.9
Diet	9	39.1
Physical activity	4	17.4
Hypertension	4	17.4
Diabetes	6	26.1

Table 6 Availability of medicines in the selected 23 comprehensive health care centers.

Medication	Availability of medicines in the facility			
	Always available (every day during the month)		Sometimes available (some days during the month)	
	Number of centers (*n*)	%	Number of centers (*n*)	%
ACE inhibitor (enalapril) or ARB	23	100.0		
Metformin	22	95.7	1	4.3
Aspirin	21	91.3	2	8.7
Beta blocker (atenolol)	19	82.6	4	17.4
Sulphonylurea (glibenclamide/gliclazide/ Glimipride)	19	82.6	4	17.4
Insulin (injection)	19	82.6	4	17.4
Thiazide	19	82.6	4	17.4
Calcium channel blocker	17	73.9	6	26.1
Statin (lovastatin or simvastatin)	15	65.2	8	34.8

(glibenclamide/gliclazide/glimipride), Insulin (injection), and thiazide were always available in the majority of health centers. Calcium channel blocker (CCB) was always available in 17 (73.9%) health centres and Statin (lovastatin or simvastatin) were always available in 15 (65.2%) health centers.

Service utilization

On average, the number of visits to the health facility for outpatient services 1 month preceding the assessment was 412.6 (SD = 397.7) visit and the number of visits to the health facility for outpatient services 1-day preceding the assessment was 21.7 (SD = 16.0) visit (Table 7). The average number of daily consultations was 22.1 (SD = 17.4). The average number of patients registered for hypertension was 460.4 (SD = 325.7) and registered for diabetes was 453.5 (SD = 504.4).

Patient referral

In more than half of health centres ($n = 13$, 56.5%), patients are referred very frequently to another facility in the event of a hypertensive emergency. Patients are rarely referred to another facility in the event of a hypertensive emergency in five health centers only (21.7%). On average, facilities are 13.3 (7.5) kilometer (range: 1–40 Km) far from the nearest referral facility for a medical emergency. This translates to an average of 16.6 (8.7) minutes driving (range: 3–40 min).

It was reported in five health centers (26.1%) that physicians were unable to refer a patient with acute, severe symptoms or emergency related to hypertension, diabetes or asthma when they wanted to do so. Only 13 (56.5%) health centers have an ambulance. Ambulance is the main mean of transport frequently used to transfer emergency patients in 22 (95.7%) health centers. Public transport is used only in one center. In 12 centers, physicians very frequently refer patients with hypertension for a second opinion/specialist consultation. Physicians in six health centers are rarely referring patients with hypertension to the nearest referral medical

Table 7 The service utilization in the 23 primary health care centers.

Utilization	Minimum	Maximum	Mean	SD
Total number of visits to the health facility for outpatient services last month	14.0	1500.0	412.6	397.7
Total number of visits to the health facility for outpatient services yesterday	1.0	52.0	21.7	16.0
Average number of consultations per day	4.0	80.0	22.1	17.4
Number of patients registered for hypertension	70.0	1427.0	460.4	325.7
Number of patients registered for diabetes	10.0	2500.0	453.5	504.4

institution for additional tests. However, it is more frequent to do that in the other health centers ($n = 17$, 7.9%).

Patient records

A total of 16 (69.6%) of health centers had functional computers, 7 (30.7%) had functional telephones, and 6 (26.1%) had functional internet. Patients in all centers can access the health facility without a need for an appointment. A total of 12 (17.4%) facilities keep a record for all visits and 7 (30.4%) health centers keep a record for certain types of visits or patients. Records are kept as patients' files in 2 (8.6%) centers, registry in 11 (47.8%) centers, paper records in 4 (17.4%) centers, and electronic 3 (13.0%) centers. Patient files are always retrieved and consulted each time they visit the facility in eight (34.8%) centers. In other eight (34.8%) centers, patient files/records are consulted, but only when necessary. Patients' files/records are not consulted in seven (30.4%) health centers. It was reported in 18 (78.3%) health centers that it is easy to identify files/records of all hypertension patients who visit the facility.

Facility records

Five (21.7%) facilities have a stock card or logbooks for medicine and four (17.4%) for consumables, but not used routinely. Stock cards or logbooks are used routinely and currently up to date for medicines in 18 (78.3%) centers and for consumables for 16 (69.6%) centers.

Community links

Community activities, which include campaigns and outreach activities performed by the center's staff to support hypertension management and control services, were performed by 14 (60.9%) health centers.

Discussion

Management of hypertension and diabetes often involves a multidisciplinary team that works collaboratively to provide services that include diagnosis, education, identification of risk factors, prescription of treatments, and follow up. Each team should include the patient, the patient's primary care provider, and other health care professionals, such as nurses, pharmacists, dietitians, social workers, and community health workers. Reviewing chronic diseases' nature shows that providing some of the patient's services could be handled by non-physician team members via protocols or standing orders [14–16]. NCDs require health systems to treat large numbers of patients for long periods of time, hence, a quality community-based health workforce is critical to addressing NCD epidemics [15]. Team-based care is a strategic redistribution of work among members of a multidisciplinary practice team. Team-based care is defined by the National Academy of Medicine as "…the provision of health services to individuals, families, and/or their communities by at least two health providers who work collaboratively with patients and their caregivers—to the extent preferred by each patient—to accomplish shared goals within and across settings to achieve coordinated, high-quality care" [17].

We addressed human resources availability and training capacity in our assessment. The results revealed that almost half of the centers had at least one family doctor working full time. The rest of centers are covered by part-time family doctors. All, except two, had at least one general practitioner working full time. Team-based care is a useful model that can be tailored to meet the needs. In order to follow this model to provide the best hypertension management, expansion of the full-time presence of general physicians is recommended. Expansion of the part-time presence of the internal doctors to cover all centers and raising the capacity of the existing staff on NCDs management are recommended.

This study showed a deficiency in the training of health care providers in the assessed centers. One study in Jordan showed that the practices of recent graduates from medical schools in Jordan were not better than those of older graduates in terms of managing hypertensive patients [18]. Thus, in most cases physicians in Jordan under-treat high blood pressure, which significantly results in poor outcome [18]. The fact that most of the PHC staff are not trained makes training them on the most updated guidelines and protocols of hypertension management a dire need.

With the increasing burden of chronic diseases in low- and middle-income countries, it is important to include essential tools in lists of essential medical products, from national to global, if these diseases are to be managed effectively [19]. A simple essential list of tools for CVD screening and monitoring may include "BPMD" encompassing both mercury and automatic BPMDs, measuring tape, height board/stadiometer, weighing scale, ECG machine, glucometer, and stethoscopes [20]. Our assessment revealed that all health centers had functional BPMDs. All centers, except one, had at least one functional automatic BPMDs. Almost half of centers ($n = 10$, 43.5%) had only one automatic BPMDs.

Lacking weight scales indicate that they do not assess obesity. These tools should be available as they are not expensive. This finding reflects poor practices of not assessing BMI or other body weight indicators. Provision of the automatic BPMDs to PHC centers that are lacking these devices, encouraging them to use automatic over mercury ones, provision of ECG machines to the ones lacking it, and provision of functional glucometer and weighing scales to the ones lacking them are highly recommended.

The baseline facility assessment has additionally assessed the calibration and maintenance of BPMDs.

Fortunately, BPMDs were calibrated once a year or more in 20 (87.0%) centers, less than once a year in one center, and not calibrated in two centers. In all 23 centers visited, BPMDs and other devices are usually repaired and maintained by sending them back to "government stores" which handle equipment according to advised guidelines.

According to Canada's 2018 guidelines for diagnosis, risk assessment, prevention and treatment of hypertension in adults and children, the necessary investigations relevant to hypertensive patients include urine analysis, serum creatinine, sodium, potassium, fasting blood sugar, HbA1c, and lipid profile (total cholesterol, LDL, HDL, and triglycerides) [21]. Having said that, our results demonstrated that all laboratory tests mentioned are provided in the majority of the health centers except for potassium and sodium investigations, which are only available in 13% of health centers. These findings indicate that primary health centers in Irbid and Mafraq governorates provide adequate laboratory investigations for hypertensive patients. Findings of a similar study that was conducted in eight low- and middle-income countries, in 90 randomly selected health centers, revealed that health centers in some countries did not provide basic urine and blood tests, and patients had to be referred to another health facility [22].

Based on our results, only 21.7% of health centers in Irbid and Mafraq governorates use national guidelines for the management of hypertension and diabetes. The poor availability of guidelines and protocols shown in our results is consistent with similar health facility-based studies conducted in Saudi Arabia and Tanzania. Both studies showed that national guidelines are either missing in majority of health facilities, or are not adhered to where available [23, 24]. In fact, health centers play an important role in delivering adequate services and treatment to hypertensive patients. Hence, adherence to guidelines and protocols regarding the treatment of hypertension enhance the quality of life and improves morbidity and mortality among hypertensive patients [25]. Moreover, hypertensive and diabetic patients require effective counseling and health education regarding healthy lifestyle [22, 26].

In the 23 PHC centers most of the medicines for NCDs treatment were available in sufficient quantities in the majority of health centers. CCB is always available in 17 (73.9%) health centers and ARB (Valsartan) and Statin (lovastatin or simvastatin) are always available in 15 (65.2%) health centers. Essential medicines usage highly contributes to the reduction in NCDs burden especially when it is affordable and available all times [27]. A WHO package of essential noncommunicable (PEN) disease interventions is designed to integrate the management of diabetes, cardiovascular and respiratory disease into PHC. Although diagnoses and treatment may sometimes be initiated at a higher level than the PHC, follow-up visits, refill and adjustment of medication occur at PHC centers level. Therefore, the PEN program, which includes a list of recommended medicines that should be available in all PHC facilities, can be of great benefits [28]. According to the HEARTS Technical Package, list of the essential medicines for the management of hypertension, diabetes and increased lipids include thiazide or thiazide-like diuretic, CCB (long acting), angiotensin converting enzyme inhibitor (long acting), ARB, statin, insulin, metformin, glibenclamide, beta blocker, and aspirin [19]. Adaptation of a well-developed protocol of NCDs treatment ensures the selection of essential medicines properly and is a crucial step in promoting rational use by health professionals and consumers [29, 30].

This study showed that only four centers keep a record for all visits. Many PHC centers lacked documentation and many had no records kept for hypertension patients or diabetic patients which made it challenging to get exact or even estimated numbers. Record keeping in general was lacking in all the PHC centers we assessed. This may lead to the lack of proper documentation, fragmentation of services, poor follow-up care, and inadequate health care services.

The study results demonstrated that in hypertensive emergency events, patients are frequently referred to another facility; only 21.7% of health centers manage to control, such cases at the facility itself. In addition, the distance for referral institution in the event of hypertensive emergency ranged from 1 to 40 km from the health facility, which translates to a range of 3–40 min of driving. These

rages are consistent with a study conducted in low- and middle-income countries, where the average distance for referral ranged from 4 to 50 Km and the duration ranged from 15 to 110 min [22]. Furthermore, the study showed that the majority of physicians were able to refer hypertensive emergency cases and approximately half of health centers refer hypertensive patients for a second opinion or consultations. These findings may be explained by the fact that majority of health centers have poorly equipped emergency departments and this lack of properly equipped facilities is a barrier to early intervention and management [31]. In fact, emergency departments are considered potential sites for the screening and referral of hypertensive patients [32]. Education on monitoring and management, referral systems and enhancement of referral systems should be considered for general and family physicians at health centers [33].

In the assessment conducted community activities to support hypertension management and control services provided at PHC facilities are performed by 14 (60.9%) of the health centers. The importance of conducting community activities to support hypertension management and control services are of utmost importance due to the significant number of those diagnosed with hypertension amongst the Jordanian society and the clear discrepancy between the numbers of diagnosed cases and the numbers of those with adequate awareness and control over their diagnosis. Involving communities in the process of education regarding widespread chronic diseases have a significant impact on hypertension awareness and control nationwide. According to WHO reports from the nationally representative Integrated Household Survey, awareness of having hypertension increased from 27% in 2007 to 45% in 2015 [34].

One of the limitations of this study is the dependence on the person most familiar with all aspects of the health center for the data collection might have affected the quality of collected data, particularly for some subjective questions like referral and counseling. Other limitations include limiting the assessment to comprehensive PHC centers and assessing only those in two governorates. Therefore, the findings of this study cannot be generalized to all types of PHC centers.

Conclusion

This assessment revealed many areas for improvement in human resources, equipment, infrastructures, and resources. Expansion of the full-time presence of general physician and expansion of the part-time presence of the internal doctors to cover all centers are recommended. It is very important to train the PHC staff on the most updated guidelines/protocols of hypertension management, provide PHC centers with automatic BPMDs, glucometer and ECG machines, develop an updated guideline/protocol of hypertension management and establish e-registry to improve documentation and accessibility to information. Counseling services and education regarding smoking, diet, sodium intake, physical activity, self-management of diabetes, and adherence to hypertension management may be compiled in one booklet/curriculum to be used by the PHC staff.

Study highlights

What is known about topic

- Jordan has high prevalence rate of hypertension and low levels of awareness, treatment, and control among hypertensive patients.
- The most probable reasons for the low rate of hypertension control among Jordanian adults include the lack of evidence-based hypertension management practices, ineffective management of hypertension, and inadequate adherence to medications.

What this study adds

- Most of the PHC staff in Jordan are not well trained to manage hypertension.
- Many PHC centers are lacking updated hypertension management guidelines and protocols and educational materials on physical activity, hypertension, and diabetes.
- Record keeping in general is lacking in all the PHC centers in Jordan.

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Compliance with ethical standards

Conflict of interest The authors declare that they have no conflict of interest.

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