A Clinical Audit on Care for Hypertensive Patients in
Alzahraa Health Center, Elgunaid Alhila, Eastern Gezira
Locality, Gezira State, Sudan (2011 - 2012)

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Submitted to University of Gezira in Partial Fulfillment of
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Science

in
Family Medicine
Department of Family and Community Medicine
Faculty of Medicine

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Holy Quran

قرآن كريم

بسم الله الرحمن الرحيم

الرحمن * علم القرآن * خلق الإنسان * علمه البيان * الشمس والقمر

بحسبا * والنجوم والشجرييسجدان

صدق الله العظيم

سورة الرحمن
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| Dr. Mohammed Elmukhtar Mohammed    | Co-supervisor     | ...........

Date: 15/9/2014
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Date of Examination: 15/9/2014
Dedication

To all my family members, my father and my mother and my husband who always give support for me, and to my baby Wateen.

Mona
Acknowledgement

My thankfulness goes to Gezira state Family Medicine Program and it is helpful staff members.

My special appreciations to Dr. Osman Hamid Abdulhamid, assistant professor of Family Medicine, and to Dr. Mohammed Elmukhtar Mohammed, Associated professor of Community Medicine, University of Gezira who did not waver to allocate their knowledge and time for me, and giving their influences in this study. I would like to nonstop my special thanks to the staff of Alzahra Health Center, Aljonaid Alhila for the help and assistance that without them this study could not be realized.

I likewise my appreciations to my colleagues for their continous help in many ways.
A Clinical Audit on Care for Hypertensive Patients in
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Abstract

Hypertension remain serious public health problem, This is a retrospective study about audit on care for hypertensive patients from catchment area attending in Alzahra Health Center, Gezira State, Sudan. Was conducted through use of checklist and review of electronic medical records (EMR) for 60 hypertensive patients which were registered in the period from January 2011 to December 2012 after they had met the inclusion criteria. Electronic medical records (EMR) were reviewed for the criteria which were chosen after review the National Institute of Clinical Excellence (NICE) guidelines and previous similar international studies. The results of the study were: (72.2%) between 40-<60 years, most of them were females (53.3%). registration in EMR and blood pressure taking and recording in all follow up visit recorded for (100%), Follow up visits recorded for (88.9%), Family history of hypertension recorded for(33.4%), History of heart diseases recorded for (23.4%), smoking status recorded for (8.7%), History of Alcohol intake recorded for (1.6%), Exercise recorded for (18.3%), BMI recorded for (15.44%), physical and cardiovascular examination done for(84.2%), lipid profile done for (cholesterol 20.9%, triglyceride 21.1%), blood sugar done for (85.6%), urine analysis for albumin done for (16.7%) for RBCs done for (20%), RFT done for (urea 41%, creatinine 38.9%, electrolytes15.6%), ECG done for (20%) and Fundoscopy done for (5%). The results of this study showed that only registration in EMR and blood pressure taking and recording in all follow up visit match the target standards, while the other criteria either behind or far behind the standards. 8 out of 22 components of the criteria were average achieved, then there was a gap between the guidelines and the clinical practice. Recommendations of study are making unified guidelines or protocol for management of hypertension, training of the staff to update the guidelines, and re-audit after 6 months.
التدقيق السريري لرعاية مرضى ارتفاع ضغط الدم فيما يخص عملية الرعاية في مركز صحي الزهراء، الجديد، خليفة، محلية جزيرة، ولاية الجزيرة، السودان (2011 – 2012)
منى هاشم عوض الكرم المغوارى
ملخص الدراسة
مرض ارتفاع ضغط الدم لا يزال مشكلة صحية عامة خطيرة. هذه دراسة وصفية مقارنة بأثر رجعي عن التدقيق السريري لرعاية مرضى ارتفاع ضغط الدم في المنطقة القابضة والذين يراجعون في مركز صحي الزهراء - ولاية الجزيرة - السودان. أجريت هذه الدراسة عن طريق استخدام قائمة اختبارية وعن طريق مراجعة السجلات الطبية الإلكترونية لعدد 60 مريض تم تسجيلهم في الفترة من يناير 2011 إلى ديسمبر 2012 بعد استيفائهم المعايير المطلوبة. السجلات الطبية الإلكترونية تمثل مراجعتها مع معايير تم اختيارها من المبادئ التوجيهية (نافس) ومن دراسات عالمية سابقة ومشابهة. وكانت نتائج هذه الدراسة كالآتي:
- (72.2%) في الفئة العمرية من 40 إلى أقل من 60 سنة، وأغلب المرضى من النساء (53.3%). التسجيل في السجلات الإلكترونية وقياس ضغط الدم وتسجيله في كل زيارة حققا نسبة (100%). زيارات المتابعة (98.8%), التاريخ الأسرى لمرض ارتفاع ضغط الدم تمت مراجعته وتسجيله لعدد (33.4%).
- تأثر الإصابة بأمراض القلب (23.4%) التدخين (8.7%), معايزة الكحول (6.1%), ممارسة الرياضة (3.18%).
- مؤشر كتلة الجسم حقق نسبة (15.44%), الكشف السريري على القلب (84.2%)
- اختبار الشحوم (كولسترول 20.9%, الثلاثية 21.1%). السكر في الدم (85.6%), تحليل البول للبروتين (16.7%),
- تحليل البول لكريات الدم الحمراء (20%), اختبار وظائف الكلى (بولينا 41%), الكربونات (38.9%.
- العناصر (15.6%), رقم القلب (20%), منظار الشبكية (5%). نتائج هذه الدراسة أظهرت فقط التسجيل في السجلات الإلكترونية وقياس ضغط الدم وتسجيله في كل زيارة كما وجدت النتائج حققا الرقم المستهدف.
أما المعايير الأخرى إذا خلف أو بعيدة من الرقم المستهدف، 8 من 22 عنصر من المعايير أجريت بمعدل يقارب المطلوب.
إذن هناك فجوة بين المبادئ التوجيهية والممارسة السريرية، توصيات هذه الدراسة هي توفير مبادئ توجيهية أو بروتوكول موحد لعلاج مرض ارتفاع ضغط الدم، تدريب العاملين لمواكبة المبادئ التوجيهية، إعادة التدقيق بعد ستة أشهر.
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List of Abbreviations

BMI: Body Mass Index
BP: Blood Pressure
EMR: Electronic Medical Record
FBS: Fasting Blood Sugar
FH: Family History
FM: Family Medicine
HTN: Hypertension
NICE: National Institute of Clinical Excellence
RBS: Random Blood Sugar
Chapter One

Background and Rational

Background:
Hypertension (HTN) or high blood pressure, sometimes called arterial hypertension, is a chronic medical condition in which the blood pressure in the arteries is elevated. Hypertension is one of the most important preventable causes of premature morbidity and mortality in Sudan. Untreated hypertension is usually associated with a progressive rise in blood pressure, lead to vascular and renal damage. The most widely-used definition of hypertension was published by the Joint National Committee\(^1\) based on its recommendations, the classification of blood pressure, which is the average of two or more readings each taken at two or more visits after initial screening for adults aged 18 years or older, is as follows:

* Normal: systolic blood pressure (SBP) is 120 mm Hg, diastolic blood pressure (DBP) is 80 mm Hg.
* Pre-hypertension: SBP is 120-139 mmHg, DBP is 80-89mm Hg.
* Stage 1: SBP is equal to or more than 140-159mm Hg.
* Stage 2: SBP is equal to or more than 160 mm Hg, DBP is equal to or more than 100 mm Hg.

Hypertension is a major risk factor for stroke, myocardial infarction (heart attacks), heart failure, aneurysms of the arteries (e.g. aortic aneurysm), and peripheral arterial disease and is a cause of chronic kidney disease. Even moderate elevation of arterial blood pressure is associated with a shortened life expectancy. Dietary and lifestyle changes can improve blood pressure control and decrease the risk of associated health complications, although drug treatment is often necessary in people for whom lifestyle changes prove ineffective or insufficient.\(^2\) It is not a disease in itself, but is an important risk factor for cardiovascular mortality and morbidity.

It has been proved that good control of blood pressure significantly decreases the morbidity and mortality from stroke and myocardial infarction for hypertensive patients. However, studies have shown that <15% of all hypertensive patients have well controlled blood pressure.\(^3\)
Some 70 million adults in the United States are affected by hypertension. The condition also affects about two million teens and children. According to a report issued by the Centers for Disease Control and Prevention (CDC) in September 2012, over half all Americans with hypertension do not have their high blood pressure under control.[4]

Improvement in the management of HTN has significantly decreased cardiovascular mortality in several developed countries. Well organized care can improve the outcome of the hypertensive patients by early prevention of complications [5]. Because physicians have a direct role in treatment outcomes, physicians’ overestimation about hypertension management can contribute to inadequate blood pressure control. Thus, interventions for improving physicians’ awareness regarding the management of patients with hypertension are needed.

**Clinical audit:**

Defined as part of a specialized quality assurance referring to practitioners themselves reviewing the care they provide. It is quality improvement process that aims to improve patient care and outcomes [6]. Aspects of patient care—including structure, processes and outcomes—are selected and evaluated against explicit criteria and, where necessary, changes are implemented at an individual, team or service level[7]. Effective clinical audit is important for health professionals, health service managers, patients and the public. It can support health professionals in ensuring that their patients are receiving the best possible care [8]. It can also inform health managers about new investments that may be needed to support health professionals in their practice [9].

The key component of clinical audit is that performance is reviewed (or audited) to ensure that what should be done is being done, and if not it provides a framework to enable improvements to be made.

Clinical audits monitor the use of particular interventions or the care received by patients against agreed standards. NICE recommends a clinical audit standard of 100% for all criteria. If this is not achievable in the short term set a more realistic standard. However, 100% should remain the ultimate objective.

Whether or not the audit results meet the clinical audit standard, re-auditing is a key part of the audit cycle. If your first data collection shows room for improvement, re-run it once changes to the service have had time to make an impact. Continue with this process until the results of the audit meet the standards.
**Electronic Health (Medical) Records:**

The Electronic Health Record (EHR) enables information about an individual to be brought together and therefore provides the opportunity for healthcare organizations to improve quality of care and patient safety.

An Electronic Health Record (EHR) is an electronic version of a patient’s medical history that is maintained by the healthcare provider over time and may include all of the key information relevant to that person’s care.

EMR may include a whole range of data in comprehensive or summary form, including patient demographics, medical history, medication and allergies, immunization status, laboratory test results, radiology images, and referral information and discharge information.

The correct use of Electronic Health Records can strengthen the relationship between patients and clinicians, by enabling clinicians to make better decisions and provide better care for patients.

**Rational and justification:**

- Hypertension is common medical condition that increases risk of many serious medical problems, causing high mortality and morbidity.
- Early and regular care is crucial to reducing of end organ damage and death from complications. The incidence of morbidity and mortality significantly decreases when hypertension is diagnosed early and is properly treated.
- To improve the performance and services at the health center must know the current situation in the term of quality of services provided to patients.
- Finding from this study will form a basis for further similar researchers. (audit study about the health care services have not conducted in Alzahra health center, newly introduced family medicine practices.).
Objectives

General:

To audit services provided to hypertensive patients according to NICE guidelines.

Specific:

- To assess quality of records available in EMR for hypertensive patients.
- To evaluate the documentation of hypertensive patients risk factors, socio-demographic factors, history taking and recording.
- To assess services including examination, investigation, management and follow up.
- To produce a plan of action as a result of the first audit to be re-audited in 6-12 months.

Keywords:

Hypertension, Medical audit, Primary Health Care, Cardiovascular diseases, Blood Pressure, Clinical audit, Alzahra Health Center, Aljonaid Alhila, Sudan.
Chapter Two

Literature Review

Hypertension is a worldwide challenge and public health problem of first magnitude, because of its high prevalence in adult population and the concomitant increase in risk of cardiovascular diseases, stroke, peripheral vascular diseases and renal diseases. It is estimated that nearly one billion people are affected by hypertension worldwide, and this figure is predicted to increase 1. To 5 billion by 2025\[^{10}\]. Various studies have been conducted among hypertension and it has been proposed that the prevalence of hypertension range from 3.15 % to 40.0% and have shown that female has a significantly higher prevalence than male\[^{11}\].

In Sudan, the prevalence of hypertension is higher in urban area than in rural ones. It is the 8\(^{th}\) of the 10 leading diseases treated in outpatient clinic and accounts for 3% of diseases from the total of the outpatient, and it is the 9\(^{th}\) of the 10 leading diseases of hospital admissions, accounts 1.8% of the total\[^{12}\].

Recently, various expert committees such as the Joint National Committee in 2003\[^{13}\] and the British Hypertension Society in 2004\[^{14}\] have in the light of new epidemiological and pharmacological data updated for diagnosis of hypertension. Not with standing differences in terminology, there appears to be consensus that a systolic blood pressure > 140 mmHg or diastolic pressure > 90mmHg represents significant cardiovascular risk.

The higher the blood pressure is, the greater is the risk heart diseases, stroke and kidney disease. For individuals 40-70 years of age, each increase of 20 mmHg in systolic blood pressure or 10 mmHg in diastolic blood pressure doubles the risk of cardiovascular diseases\[^{15}\]. Whenever affected individuals seek care from healthcare professionals, efforts should be made to maximize their management in order to increase control of hypertension and minimize risk of target organ damage.

For this reason, achieving adequate pressure control in a high percentage of patients is a priority for any health system. Still, most studies are examining the link between care processes and controlled hypertension ones, and, generally, have been confined to single delivery systems, a limited number of facilities, or a relatively small set of indicators of hypertensive quality.
**Diagnosis:** Hypertension is diagnosed on the basis of a persistent high blood pressure. Traditionally, the National Institute of Clinical Excellence recommends three separate sphygmomanometer measurements at one monthly interval. The American Heart Association (AHA) recommends at least three measurements on at least two separate health care visits. An exception to this is those with very high blood pressure readings especially when there is poor organ function. Initial assessment of the hypertensive people should include a complete history and physical examination.[16]

**Causes:** Though the exact causes of hypertension are usually unknown, there are several factors that have been highly associated with the condition. These include:

- Smoking
- Obesity or being overweight
- Diabetes
- Sedentary lifestyle
- Lack of physical activity
- High levels of salt intake (sodium sensitivity). According to the American Heart Association (AHA), sodium consumption should be limited to 1,500 milligrams per day, and that includes everybody, even healthy people without high blood pressure, diabetes or cardiovascular diseases.
- Insufficient calcium, potassium, and magnesium consumption
- Vitamin D deficiency
- High levels of alcohol consumption
- Stress
- Aging
- Medicines such as birth control pills
- Genetics and a family history of hypertension –
- Chronic kidney disease
- Adrenal and thyroid problems or tumors[17]

**Classifications:** Hypertension is classified as either primary (essential) hypertension or secondary hypertension; about 90–95% of cases are categorized as "primary hypertension" which means high blood pressure with no obvious underlying medical cause. The remaining 5–10% of cases (secondary hypertension) are caused by other conditions that affect the kidneys, arteries, heart or endocrine system.[18]
**Investigations:** investigations are important for assessing target organ damage and following up the patient on drug treatment to assess the effect of the drug on certain organs; these investigations are:

* Lipid profile (Dyslipidemia is more common in untreated hypertensive than normotensive, and lipid levels increase as BP increases).
* Blood glucose.
* Renal function test (is important to assess regarding to: 1) estimating cardiovascular risk, 2) ruling out primary renal disease as a cause of hypertension, 3) establishing a baseline before initiating antihypertensive therapy).
* Urine analysis for proteins and RBCs (RBCs could be a sign of primary glomerulonephritis as the etiology of hypertension)\[19\]

**Management:**

**Lifestyle measures:**

* Maintain normal weight for adults (BMI 20-25).
* Reduce salt intake.
* Limit alcohol consumption.
* Engage in regular aerobic physical exercise (walking) for >30 minutes/day.
* Consume at least five portions/day of fresh fruit and vegetables.
* Reduce the intake of total and saturated fat.

**Thresholds and treatment targets for antihypertensive drug treatment:**

Drug treatment should be started in all patients with sustained systolic blood pressure >160 mmHg or sustained diastolic blood pressure > 100 mmHg despite nonpharmacological measures.

Drug treatment is also indicated in patients with sustained systolic blood pressure 140-159 mmHg or diastolic blood pressure > 90-99 mmHg if target organ damage is present, or there is evidence of established cardiovascular disease or diabetes.

For most patients, a target of < 140 mmHg systolic blood pressure and < 85 mmHg diastolic blood pressure is recommended. For patients with diabetes, renal impairment or established cardiovascular disease, a lower target of < 130/80 mmHg is recommended. \[20\]

**Follow up:** Frequency of follow up depends on the severity of the hypertension, the stability and degree of blood pressure control, patient compliance with drug treatment, and the need for non-pharmacological advice. Initially, frequent visits may be
required to assess baseline blood pressure. When treatment is initiated and blood pressure stabilized three monthly measurements of blood pressure should be sufficient in most cases. In primary health care and in hospital blood pressure clinics nurses have a particularly important role, not only for careful measurement of blood pressure but also in counseling the patients, providing non-pharmacological advice, and assessing the side effects of drugs\textsuperscript{[21]}

**Similar studies:**

- Study done at Al-Manhal Post-Graduate Family Practice Center, which is in Abha city, the capital of Aseer Region, KSA A total of 295 medical records were reviewed and assessed. Two hundred and thirty-one records were assessed for processes and outcomes of HTN care. Weight measurement and physical examination were carried out for 99\% and 97\% of the patients, respectively. For 53\% of the patients, blood was checked for glucose and kidney function and lipid profile was done. More than two-thirds of the patients were overweight and obese while 46\% had diabetes. Less than one half of the patients had good control of HTN.\textsuperscript{[22]}

- In a study conducted in Sultanate Oman to audit the documentation of medical care provided to hypertensive patients and to evaluate the management of hypertension in a primary healthcare center, Family Medicine Staff Clinic, Sultan Qaboos University (SQU) in Oman.\textsuperscript{[23]} An audit of electronic medical records (EMR) was carried out during 2007 and 2008 on a representative sample of 150 patients, selected randomly using a simple randomization method. The mean age of the patients was 54.8 +/- 9.9 years. The majority were Omanis; 53.3\% were female, 46.7\% were male. All patients’ records were reviewed for proper recording in a pre-designed structured form. Re-auditing was done in 2008. McNemar’s test was used to compare data in 2007 with data in 2008. Results: Age, gender, blood pressure recording, renal function tests, and lipid levels were sufficiently recorded (>75\%) in the computer system. Histories of pertinent symptoms and smoking history were poorly recorded (<1\%). Fifty-five percent of the hypertensive patients were sufficiently controlled (BP<140/90). There were significant differences between 2007 and 2008 with respect to documentation and recording of pertinent symptoms (p<0.001) and renal function tests
Conclusion: Conducting an audit of EMR is essential to evaluate clinical performance and to determine what changes should be made to improve quality of care. There was significant improvement in documentation of pertinent symptoms in the second audit.

- Other study was conducted in North West London (2004) by (M. Mashru and A. Lant) to determine whether peer review medical audit in a primary care setting changes clinical behavior in relation to the management of hypertension. The study done by review of medical records in general practice for 740 hypertensive patients managed by 25 different general practitioners. Study conclude that clinical behavior of general practitioners can be changed by peer review but more complex behavioral changes which require the cooperation of the patients and cognitive action by the general practitioners need further investigation \[24\].

- Another study was conducted in Jamaica(2005) by (Asnani M, Brown P, O'Connor D, Lewis T, Win S, Reid M) under the title of “A clinical audit of the quality of care of hypertension in general practice”\[25\].

Clinical audits monitor the use of particular interventions, or the care received by patients, against agreed standards. Any departures from "best practice" can then be examined, and causes can be determined and acted upon. The Ministry of Health (MOH), Jamaica, has recently published standards of care for hypertension. The medical records of a convenience sample of 125 hypertensive patients being managed by five current family medicine residents in their respective primary care practices were audited. Initial results showed limited adherence to the MOH recommended hypertension management guidelines. The same practices were re-audited after an interval of six months, during which time the physicians were sensitized to the results of the preliminary audit. Marked improvements were noted in the second audit. Assessment for co-risk factors for hypertension-related diseases improved: nutritional advice (33% to 74%), smoking and alcohol intake history (40% to 65%) and history taking of physical activity (30% to 47%). Assessment for target organ damage also improved: fundoscopy done (11% to 54%), foot examination done (30% to 58%) and yearly electrolytes done (28% to 62%). There are clear gaps between current practice and standards that exist internationally and locally for management of hypertension. The MOH needs to disseminate and educate general practitioners about the standards of care.
guidelines. This study was done to demonstrate the usefulness of clinical audit in general practice in improving management of hypertension. The criteria used to measure quality of care of hypertension were those set by the Ministry of Health, Jamaica. The only tool employed to 'implement change' was a process of 'sensitization' of the physicians to the results of the preliminary audit. The audit was repeated in six months and differences analyzed.

- A study done in India about association of hypertension with risk factors.[26] the performance of hypertension was 50.5% (M: 49.7%, F: 50.3%). The tobacco, alcohol consumption and overweight/obesity were 88, 54, and 37 per cent respectively. The bivariate analysis has shown association between hypertension and age, education subcategories, alcohol consumption, and overweight/obesity.

The present study was planned, with the objective of estimating the prevalence of hypertension, the association and risk estimates of established risk factors of hypertension, and the awareness levels and compliance with medication advice, within the Nicobaresetribes.

The blood pressure in 340 of 975 (35%) subjects was checked for the first time in their lives. Three hundred and eleven of 975 (32%) subjects perceived themselves to be hypertensive. However, many, [251 of 975 (26%)] assumed themselves to be hypertensive based on the symptoms experienced by them like headache, giddiness, tiredness, and excessive sweating. Of the 311 subjects who perceived themselves to be hypertensive, 180 (59%) were found to be hypertensive.
Chapter Three
Methodology

Study design:
Audit, retrospective health facility based study.

Study Area:
Aljonaid Alhila is rural area in Eastern Gezira locality, Gezira State of Sudan. There is one health centre provides services to individuals, Alzahra Health Center, is covering an area of four villages; Aljonaid Alhila, Daim Elzobair, Albaiera and Tayba.
The total population of the catchment area is about 3,000 inhabitants, most of them are farmers or working for Aljonaid sugar factory, they representing all most all Sudanese tribes and ethnic groups, there is one primary school (girls, boys), one mosque and one club. The nearest health center is 3 kilometers distance, and the nearest local hospital is 8 kilometers from the village.
The health center:
The health center provides the PHC services. The center consist of: Doctor clinic, room for medical assistant, Pharmacy, Laboratory, minor theatre, 1 short stay room (males and females), immunization and 2 big waiting lounges.

Staff of the health center consists of:
One doctor joined to family medicine program, vaccinator, lab technician, pharmacy assistant, 1 nurse, 1 statistician and 1 cleaner.

Study Population:
All patients who are living in the study area and attending the Health Center seeking hypertension medical care services and they were not under the umbrella of Aljonaid Sugar factory insurance.

Inclusion criteria:
Hypertensive patient who were seeking care in health center, and who had at least one visit during the period.

Exclusion criteria:
Patient of hypertension and suffering any other systemic disease, patients not recorded in EMR.
Study duration:
Retrospective study carried out from January 2011 to December 2012, (during the stay of the researcher in the health center).

Study sample and technique:
Total of 60 patients, based on comprehensive sampling, taken from the Electronic Medical Records (EMR).

Data collection:
The data collection was carried out from the patients’ records using a checklist.

Methods of data collection:

Standard and guidelines:

- **Criteria:**

  1. Patients diagnosed as hypertensive must be recorded in the patient register.
  2. The records show that the patient has been reviewed in the past 6 months.
  3. The records show that the hypertension is well controlled, defined as <150/90mmHg in a patient without diabetes. Both systolic and diastolic levels must be obtained.
  4. The records show that data on smoking have been recorded in the past 2 years.
  5. The records show that body mass index (BMI) has been recorded in the past year.
  6. The records show that the lab investigations for All hypertensive patients for Urine stripe test for protein, Urine stripe test for blood, Blood glucose, Serum creatinine, Blood urea, Serum electrolyte, Serum cholesterol, Serum triglyceride and ECG has been recorded in the past year.
Standards:

Table 1: Standards

<table>
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<th>Target</th>
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<tr>
<td>All hypertensive patients should be registered in the EMR</td>
<td>100%</td>
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<td>The interval between follow-up visits should not exceed 6 months</td>
<td>100%</td>
</tr>
<tr>
<td>All patients should have their family history of HTN</td>
<td>90%</td>
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<tr>
<td>All patients should have their FH of heart disease reviewed and recorded</td>
<td>90%</td>
</tr>
<tr>
<td>Smoking status should be recorded</td>
<td>100%</td>
</tr>
<tr>
<td>All patients should advised to quit alcohol intake (if present)</td>
<td>70%</td>
</tr>
<tr>
<td>All patients should have advise about physical activity (exercise) and recorded</td>
<td>70%</td>
</tr>
<tr>
<td>Blood pressure should be taken and recorded in all follow-up visits</td>
<td>100%</td>
</tr>
<tr>
<td>Weight-height-BMI should be measured &amp; recorded every year</td>
<td>100%</td>
</tr>
<tr>
<td>All patients should have their cardiovascular examination</td>
<td>90%</td>
</tr>
<tr>
<td>All hypertensive patients should be examined for Urine stripe test for protein</td>
<td>100%</td>
</tr>
<tr>
<td>All hypertensive patients should be examined for Urine stripe test for blood</td>
<td>100%</td>
</tr>
<tr>
<td>All hypertensive patients should be examined for Blood glucose</td>
<td>90%</td>
</tr>
<tr>
<td>All hypertensive patients should be examined for Serum creatinine</td>
<td>50%</td>
</tr>
<tr>
<td>All hypertensive patients should be examined for Blood urea</td>
<td>50%</td>
</tr>
<tr>
<td>All hypertensive patients should be examined for Serum electrolyte</td>
<td>50%</td>
</tr>
<tr>
<td>All hypertensive patients should be examined for Serum cholesterol</td>
<td>50%</td>
</tr>
<tr>
<td>All hypertensive patients should be examined for Serum triglyceride</td>
<td>50%</td>
</tr>
<tr>
<td>All hypertensive patients should be examined for ECG</td>
<td>50%</td>
</tr>
<tr>
<td>All hypertensive patients should have their annual fundscopy exam</td>
<td>60%</td>
</tr>
</tbody>
</table>
Data processing and analysis:
All data was stored on a personal computer and analyzed using the Microsoft Excel, no patient identification or individual details was published.

Association was done using a chi square test, it measure the association between hypertensive patients who had physical and cardiovascular examination and their age groups, duration of illness and family history of hypertension.

Ethical consideration:

- Consent from health authority.
- Confidentiality.
- No harm to any patient.
- Result will be used to improve services provided to hypertensive patients.
Chapter four

Results

A total of 60(100%) hypertensive patients EMR files which fulfilled the criteria were reviewed for history of risk factors, clinical examination and investigations. The demographic and clinical characteristics are presented also in Tables and figures below:
Figure 1: Age groups of the study population

Most of them are in between 40-<60
Figure 2: sex of the study population  \( N=60 \)

Most of them are females
Table 2: Educational level of the study population

N = 60

<table>
<thead>
<tr>
<th>Educational level</th>
<th>No.</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Illiterate</td>
<td>12</td>
<td>20</td>
</tr>
<tr>
<td>Literate (no differentiation)</td>
<td>48</td>
<td>80</td>
</tr>
<tr>
<td>Total</td>
<td>60</td>
<td>100.0</td>
</tr>
</tbody>
</table>

Most of them are Literate (80%).

Table 3: Occupation of the study population

N = 60

<table>
<thead>
<tr>
<th>Occupation</th>
<th>No.</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Farmer</td>
<td>12</td>
<td>20</td>
</tr>
<tr>
<td>Housewife</td>
<td>13</td>
<td>21.6</td>
</tr>
<tr>
<td>Employee</td>
<td>29</td>
<td>48.4</td>
</tr>
<tr>
<td>Private sector</td>
<td>2</td>
<td>3.3</td>
</tr>
<tr>
<td>Others</td>
<td>4</td>
<td>6.7</td>
</tr>
<tr>
<td>Total</td>
<td>60</td>
<td>100.0</td>
</tr>
</tbody>
</table>

The dominant occupation is employees (48.4%).
Table 4: Marital status of the study population

\[ N = 60 \]

<table>
<thead>
<tr>
<th>Marital status</th>
<th>No.</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Married</td>
<td>31</td>
<td>51.7</td>
</tr>
<tr>
<td>Single</td>
<td>19</td>
<td>31.6</td>
</tr>
<tr>
<td>Divorced</td>
<td>3</td>
<td>5</td>
</tr>
<tr>
<td>Widowed</td>
<td>7</td>
<td>11.7</td>
</tr>
<tr>
<td>Total</td>
<td>60</td>
<td>100.0</td>
</tr>
</tbody>
</table>

Most of them are married (51.7%).

Table 5: Duration of hypertension by years among the study population

\[ N = 60 \]

<table>
<thead>
<tr>
<th>Duration</th>
<th>No.</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt; 5 years</td>
<td>6</td>
<td>10</td>
</tr>
<tr>
<td>5 to 10 years</td>
<td>42</td>
<td>70</td>
</tr>
<tr>
<td>&gt;10 years</td>
<td>12</td>
<td>20</td>
</tr>
<tr>
<td>Total</td>
<td>60</td>
<td>100.0</td>
</tr>
</tbody>
</table>

Most of them are 5 to 10 years (70%).
Table 6: Family history of hypertension among the study population

$N = 60$

<table>
<thead>
<tr>
<th>FH of HTN</th>
<th>No.</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yes</td>
<td>41</td>
<td>68.4</td>
</tr>
<tr>
<td>No</td>
<td>19</td>
<td>31.6</td>
</tr>
<tr>
<td>Total</td>
<td>60</td>
<td>100.0</td>
</tr>
</tbody>
</table>

Most of them have family history of hypertension (68.4%).

None of patients had health insurance
Table 7: Results criteria against standards of participant among the study population

<table>
<thead>
<tr>
<th>Criteria</th>
<th>Achieved</th>
<th>Target</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Documentation about history</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Registration in EMR</td>
<td>100.0</td>
<td>100</td>
</tr>
<tr>
<td>Follow-up visits</td>
<td>88.9</td>
<td>90</td>
</tr>
<tr>
<td>FH of HTN</td>
<td>33.4</td>
<td>90</td>
</tr>
<tr>
<td>History of Heart disease</td>
<td>23.4</td>
<td>90</td>
</tr>
<tr>
<td>History of Smoking</td>
<td>8.7</td>
<td>50</td>
</tr>
<tr>
<td>History of Alcohol intake</td>
<td>1.6</td>
<td>70</td>
</tr>
<tr>
<td>Exercise</td>
<td>18.3</td>
<td>70</td>
</tr>
<tr>
<td><strong>Documentation about Examination</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Weight recorded at every visit</td>
<td>55.56</td>
<td>70</td>
</tr>
<tr>
<td>Height recorded at every visit</td>
<td>15.44</td>
<td>70</td>
</tr>
<tr>
<td>BMI recorded at every visit</td>
<td>15.44</td>
<td>70</td>
</tr>
<tr>
<td>Proper BP measure and recording every visit</td>
<td>100.0</td>
<td>100</td>
</tr>
<tr>
<td>Physical and Cardiovascular examination</td>
<td>84.2</td>
<td>90</td>
</tr>
<tr>
<td>Fundscopy examination</td>
<td>5.0</td>
<td>60</td>
</tr>
<tr>
<td><strong>Documentation about Investigations</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Urine stripe test for protein</td>
<td>16.7</td>
<td>100</td>
</tr>
<tr>
<td>Urine stripe test for blood</td>
<td>20.0</td>
<td>100</td>
</tr>
<tr>
<td>Blood glucose</td>
<td>85.6</td>
<td>90</td>
</tr>
<tr>
<td>Serum creatinine</td>
<td>38.9</td>
<td>50</td>
</tr>
<tr>
<td>Blood urea</td>
<td>41.0</td>
<td>50</td>
</tr>
<tr>
<td>Serum electrolytes</td>
<td>15.6</td>
<td>50</td>
</tr>
<tr>
<td>Serum cholesterol</td>
<td>20.9</td>
<td>50</td>
</tr>
<tr>
<td>Serum triglycerides</td>
<td>21.1</td>
<td>50</td>
</tr>
<tr>
<td>ECG</td>
<td>20.0</td>
<td>50</td>
</tr>
</tbody>
</table>
Association:

To measure the association between hypertensive patients who had physical and cardiovascular examination and their age groups a chi square test was done and the result was statistically significant ($P = 0.0124$). Another chi square test was done and there was a statistically significant relation between hypertensive patients who had physical and cardiovascular examination and duration of illness ($P = 0.0087$).

Also a chi square test was performed between hypertensive patients who had physical and cardiovascular examination and family history of hypertension, the result was not statistically significant ($P = 0.1526$).
Chapter Five
Discussion

The prevalence of hypertension in this study was higher among females, this is not corresponding to the rate of prevalence worldwide which shows higher prevalence in men\textsuperscript{[27]}. But in study done in India \textsuperscript{[28]} was significantly high in females.

The highest incidence was in the age group 40-<60 years, study was done in Eastern Sudan showed that\textsuperscript{[73.6\%]} were aged between (35-64 years)\textsuperscript{[29]}. Another study done in Bolger \textsuperscript{[26]}, showed that 33\% of people above 44 years were hypertensive. The rise of BP with age is said to be ageing process due to atherosclerotic changes in blood vessels especially in those under stress and unknown factors\textsuperscript{[27]}.

Most of hypertensive patients are employees, and this is due to the stress at work as it is risk factor for hypertension\textsuperscript{[30]}.

Education evaluate (80\%) indicate good awareness, and marital status show majority of patients were married (51.7\%).

This audit showed limited adherence to the guidelines. Analysis of data in this audit shows poor documentation of history of risk factors, and documentation of smoking history and alcohol intake, this result is differ from previous study that have examined the quality of care provided to subjects with hypertension in Jamaica\textsuperscript{[25]} because Jamaica, has recently published standards of care for hypertension. The factors which can contribute to these results are: 1) lack of health education, 2) a busy clinic and no time to write in the computer, 3) a new computer system and perhaps the doctors documented the history but forget to save it, and 4) history of smoking and alcohol consumption the patients feel iritate when asked about that due to culture and religious.

For all the 60 patients, recording in the EMR register and blood pressure taking and recording, criteria were done perfectly with a score of (100.0\%), so as the availability of sphygmomanometer and well trained, also that patients socio-demographic data taking and registering was done perfectly, since the EMR system do not accept missing data in this area, this matches the outcome of Oman study by Thuraya Ahmed \textsuperscript{[23]}. 

Physical and cardiovascular examination gain an excellent performance (84.2%) this matches with Al-Manhal study in Abha [22] and chi square test was done to measure the association between hypertensive patients who had physical and cardiovascular examination and their age groups, duration of hypertension and family history of HTN.

Age, sex, blood pressure recording, renal function tests, and lipid levels were sufficiently recorded (>75%) in the computer system in sultanate Oman study [23]. this matches with our study just differ in lipid profile,( no investigation available in the center).

For the above variables, the work was done as it should be, but the same strategy should be held in reserve.

BMI is poorly done (15.44%) this is because the height of patients is not done due to no availability of facilities it either estimated or the patient know his/her height, this matches with study done in India [26].

Follow-up visits, Blood glucose, Serum creatinine and blood urea, were done with a good performance, these findings disagree with Thuraya Ahmed [23], where these investigations were not done properly in Oman. These criteria needs more concentration, even they were well done.

Urine stripe test for protein, Urine stripe test for blood, Serum cholesterol, serum triglyceride, Serum electrolyte, were done poorly, this disagree with the study of Asnani M [25] where this investigations were achieved good performance because the criteria used to measure quality of care of hypertension were set by the Ministry of Health, Jamaica [25]. For these variables, the issue of no availability of requesting laboratory tests (such as lipid profile, Serum creatinine, Blood urea and Serum electrolytes) in primary care clinics, could have impeded the provision of quality care by the investigator, and needs a lot of liveliness and attention.

Fundscoopy exam was also poorly recorded due to no availability of ophthalmoscope and lack of doctor skills which need to be improved, this matches with study done in Jamaica 2007 [25]. ECG was poorly registered, because no availability of ECG machine in the health center, this variables need more attention. These variables are depending on facilities that are not available in the center.

This audit study declares that some of the checked variables are not sufficiently done and need more attention; some are partially good and need more concentration.
Limitations of the study:
One of the limitations of this study is that the sample may not be representative of the whole community so these results cannot be generalized to other clinics in area.
No enough audit done in Sudan and no apparent standards, no control (some of patients treated outside).
Measurement of the impact on each patients was not recorded and hence no associations
EMR in 2013 was not audited although no other family medicine trainee has come to work in the health center.
EMR was recorded by the researcher who was the health provider and as well as the researcher.
Chapter six
Conclusion and Recommendations

Conclusion

Conducting an audit of Electronic Medical Records (EMR) is essential to evaluate clinical performance and to determine what changes should be made to improve quality of care. Eight (8) out of twenty-two (22) components of the criteria of were average achieved the quality of hypertension care in this study was found to be sub-optimal. There was a gap between guidelines and clinical practice, and should ring the bell for the quick adoption of series measured by health provider to effectively address this problem in order to prevent the catastrophic complications of this disease.
Recommendation

1. There should be local hypertension guidelines, no clear guidelines to assess the management and compare it with international similar guidelines.
2. Training of doctors, nutritionists, lab technicians, to update the guidelines.
3. Provision of equipments needed in examination and investigations.
4. Audit should be performed periodically for ongoing improvement, re-audit after 6 months.
# A Clinical Audit Action Plan

**Project title**  
A Clinical Audit on Care of Hypertensive Patients in  
*Alzahraa Health Center, Elgunaid Alhila, Gezira State, Sudan (2011-2012)*

<table>
<thead>
<tr>
<th>Action plan lead</th>
<th>Name: Mona Hashim Awad Elkareem</th>
<th>Title: registrar of family medicine</th>
<th>Alzahraa health center. Contact: 0123827062</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th><strong>Recommendation</strong></th>
<th><strong>Action plan</strong></th>
<th><strong>Action by date</strong></th>
<th><strong>Person responsible</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>1. The medical director will discuss guideline for HTN</td>
<td>Sit with authorities to propose a guideline of HTN and apply they to the all practice</td>
<td>1&lt;sup&gt;st&lt;/sup&gt; of Oct. 2014 7&lt;sup&gt;th&lt;/sup&gt; Oct. 2014</td>
<td>Dr. Mona Hashim Awad</td>
</tr>
<tr>
<td>2. The medical director will training staff on guidelines</td>
<td>Training the staff on the guidelines</td>
<td>2&lt;sup&gt;nd&lt;/sup&gt; Oct. 2014-7&lt;sup&gt;th&lt;/sup&gt; Oct. 2014</td>
<td></td>
</tr>
<tr>
<td>3. Provision of equipment needed for investigation and examination</td>
<td>Sit with authorities to negotiate the need of equipment for investigation and examination</td>
<td>2&lt;sup&gt;nd&lt;/sup&gt; Oct. 2014-4&lt;sup&gt;th&lt;/sup&gt; Oct. 2014</td>
<td></td>
</tr>
<tr>
<td>4. Recycle the audit</td>
<td>Put fix day for recycling</td>
<td>1&lt;sup&gt;st&lt;/sup&gt; January 2015</td>
<td></td>
</tr>
</tbody>
</table>
References:

1 Joint National Committee on Prevention, Detection, Evaluation, and Treatment of high Blood Pressure in its seventh report (JNC VII 2003)
4 http://www.nfaireland.ie/news.html
5 Hypertension fact sheet | Department of Sustainable Development and Healthy Environments | September 2011
10 Hypertension fact sheet | Department of Sustainable Development and Healthy Environments | September 2011.
12 Ahmed ME, Blood pressure in Multiracial urban Sudanese
17 WHO Report 2002 – Preventing Risks, Promoting Healthy Life
26 Indian J Med Res. 2011 March; 133(3): 287-293. PMCID: PMC3103153: Association of Hypertension with Risk Factors:
28 Prashant R., SUNIL S., Pushpa M. Prevalence of Hypertension in a Rural Community of Central India. JAPI. 2012 60:26-29
Appendix 1
Demographic and clinical characteristic of patient with hypertension

<table>
<thead>
<tr>
<th>* Age</th>
<th>&lt;30 ( )</th>
<th>30-45 ( )</th>
<th>46-60 ( )</th>
<th>61-75 ( )</th>
<th>&gt;75 ( )</th>
</tr>
</thead>
<tbody>
<tr>
<td>* Sex</td>
<td>male ( )</td>
<td>female ( )</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>* Duration of hypertension</td>
<td>&gt;10 ( )</td>
<td>&lt;10 ( )</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>* Education</td>
<td>literate ( )</td>
<td>illiterate ( )</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>* Marital status</td>
<td>single ( )</td>
<td>married ( )</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>* Occupation</td>
<td>( )</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Checklist of Audit on Care of Hypertensive Patients’ in Alzahra Health Center, Aljonaid Alhila, Gezira State, Sudan (2011-2012)

<table>
<thead>
<tr>
<th>Criteria</th>
<th>Done</th>
<th>Not done</th>
</tr>
</thead>
<tbody>
<tr>
<td>All hypertensive patients should be registered in the EMR</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Blood pressure should be taken and recorded in all follow-up visits</td>
<td></td>
<td></td>
</tr>
<tr>
<td>All patients should have their physical and cardiovascular examination</td>
<td></td>
<td></td>
</tr>
<tr>
<td>All patients should have their FH of HTN</td>
<td></td>
<td></td>
</tr>
<tr>
<td>The interval between follow-up visits should not exceed 6 months</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Weight-height-BMI should be measured &amp; recorded</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Smoking status should be recorded</td>
<td></td>
<td></td>
</tr>
<tr>
<td>All patients should be advised to quit alcohol intake (if present)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>All patients should have advise about physical activity (exercise) and recorded</td>
<td></td>
<td></td>
</tr>
<tr>
<td>All patients should have their FH of heart disease reviewed and recorded</td>
<td></td>
<td></td>
</tr>
<tr>
<td>All hypertensive patients should be examined for Urine stripe test for protein</td>
<td></td>
<td></td>
</tr>
<tr>
<td>All hypertensive patients should be examined for Urine stripe test for blood</td>
<td></td>
<td></td>
</tr>
<tr>
<td>All hypertensive patients should be examined for Blood glucose</td>
<td></td>
<td></td>
</tr>
<tr>
<td>All hypertensive patients should be examined for Serum creatinine</td>
<td></td>
<td></td>
</tr>
<tr>
<td>All hypertensive patients should be examined for Blood urea</td>
<td></td>
<td></td>
</tr>
<tr>
<td>All hypertensive patients should be examined for Serum electrolyte</td>
<td></td>
<td></td>
</tr>
<tr>
<td>All hypertensive patients should be examined for Serum cholesterol</td>
<td></td>
<td></td>
</tr>
<tr>
<td>All hypertensive patients should be examined for Serum triglyceride</td>
<td></td>
<td></td>
</tr>
<tr>
<td>All hypertensive patients should be examined for ECG</td>
<td></td>
<td></td>
</tr>
<tr>
<td>All hypertensive patients should have their annual fundscope exam</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>