Clinical audit on diagnosis and management of hypertension in primary medical care setting in Sri Lanka

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ABSTRACT

Hypertension has been a leading cause of premature deaths worldwide and it is more prominent in low and middle-income countries and rising. Proper diagnosis and management of hypertension can reduce complications and disability. A new protocol to manage hypertension in primary medical care centres was introduced by American Heart Association to reduce the cost of treatment while managing the patients properly. It was introduced in PMCs of Kalutara district in Sri Lanka with the help of the Resolve to save lives organization. This clinical audit was conducted in 3 PMCs with 163 participants to identify lapses before scaling up the project to more PMCs.

It was found that the mean time taken from the first BP measurement to the second measurement in the 140-159/90-99mmHg group (Group A) was 1.07 weeks (SD=2.04 weeks) while the protocol requires measuring the second value between 2 to 4 weeks. Out of basic investigations, FBS and Serum Cholesterol levels were done in 56.4% and 38% of the participants respectively while ECG and UFRs completed in the study were very less. Further, 55.4% (n=87) of the participants aged 80 years or less were managed with 2 drugs according to the protocol while only 20% (n=1) of the patients aged more than 80 years were managed with 1 drug according to the protocol. Only 22 (45.8%) out of 48 participants who required stepping up of drug management was correctly done. Furthermore, the variation between the 3 hospitals in results was, considerable.

The requirement of training for healthcare workers in PMCs to standardise the management was emphasized while the resource allocation for laboratory services for investigations was highlighted after the study.

Keywords: *Clinical audit, Hypertension, diagnosis and management, Primary medical care centres, Kalutara, Sri Lanka*

TITLE

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OBJECTIVE

To evaluate the diagnosis and management of hypertension in the primary care setting with the new protocol of diagnosis and management

I. INTRODUCTION

Hypertension (HTN) is a prevalent condition affecting a significant proportion of the global population, and its management remains a challenge for healthcare providers. It is a leading cause of cardiovascular diseases, such as stroke and heart attack, and it can give rise to severe consequences if not managed appropriately.

HTN is also the leading cause of premature death worldwide according to World Health Organization (WHO), and 1.28 billion people are estimated to have hypertension globally (Luo, et al., 2022) (World Heart Federation, 2023) and is projected to increase to 1.5 billion by 2025 (Kearney, et al., 2005).

It is estimated that about 50% of HTN cases remain undiagnosed, and many of those who are diagnosed do not receive appropriate treatment or management (Dejenie, et al., 2020).

Out of 33 million premature deaths that occurred in 2008 due to chronic non-communicable diseases (NCD), most of which have appeared in Lower and Middle-Income Countries (LMIC) and are increasing (Alwan, et al., 2010). The prevalence of HTN in Sri Lanka is 28.2% according to the traditional definition (SBP>140mmHg and/ or DBP > 90mmHg) at Sri Lanka Health and Aging Study (SLHAS) in 2018-2019 (Rannan-Eliya, et al., 2022).

In primary medical care settings, hypertension is one of the most commonly encountered conditions. Primary care physicians are at the forefront of managing hypertension, with the majority of patients receiving their diagnosis and treatment in this setting.

World Health Organization published a protocol for primary care institutions in 2021. The flow chart adapted from WHO protocol currently piloted in Kalutara district under the "Resolve to Save Lives" project.

Clinical audits are essential tools for evaluating healthcare services' quality and identifying improvement areas. The aim of this clinical audit is to evaluate the diagnosis and management of hypertension in primary medical care settings. This audit will focus on the adherence of primary care medical officers to the National Guideline for Management of Hypertension for Primary Health Care providers and Simple Protocol for Hypertension Management.

The audit involved reviewing medical records of patients diagnosed with hypertension in primary medical care settings over a specified period. The review included the assessment of various aspects of hypertension management, such as blood pressure measurement, lifestyle modifications, and pharmacological interventions. The audit also evaluated the documentation of hypertension management, including the recording of blood pressure readings, the presence of a treatment plan, and patient education.

The findings of this clinical audit provide insight into the quality of hypertension management in primary medical care settings. It identified areas of strength and weakness in the management of hypertension and guides healthcare providers towards developing strategies to improve patient outcomes. Ultimately, this clinical audit aimed to improve the quality of care provided to patients with hypertension in primary medical care settings and reduce the burden of hypertension-related morbidity and mortality.

II. METHODOLOGY

Study setting

The clinical audit was conducted in three Divisional Hospitals in the Kalutara district of Sri Lanka (Bandaragama DH, Halthota DH, Gonaduwa DH). The hospitals were selected as the study setting as they had implemented the new WHO Simple protocol for diagnosing and managing hypertension. The audit aimed to evaluate this new protocol's effectiveness in improving the quality of hypertension care in the primary care setting. The findings of this audit are expected to inform the scaling up of the new protocol in other healthcare facilities in the region and potentially in other settings as well.

Sampling

It was determined that a minimum of 150 samples should be collected, with at least 50 samples collected from each clinic. The sampling method used was purposive, based on the following inclusion criteria:

Patients who have visited the clinic at least one month prior to the date of data collection.

Tool

A pair of distinct data extraction checklists was formulated utilizing the Epicollect5 mobile application in accordance with the updated guideline for diagnosing and managing hypertension in the primary care setting. The efficacy and dependability of this tool were examined using a sample size of ten individuals at DH Bandaragama. Additionally, to maintain the quality of the collected data, the authors of the research conducted the data collection themselves.

Sample size

It was decided to collect data from 50 samples from each hospital.

Statistical Analysis

In the current study, SPSS software version 25 was utilized to analyze the data on clinical audits. Frequency tables were generated to examine the socio-demographic characteristics of the participants. Descriptive statistics such as mean, standard deviation, and frequency distributions were used to summarize the data.

Overall, the use of SPSS software allowed for a comprehensive analysis of the socio-demographic characteristics of the participants and their relationships with the clinical audit outcomes. The findings could inform clinical practice and quality improvement initiatives in healthcare settings.

III. RESULTS

A total number of 163 patients were assessed to evaluate the diagnosis and management of hypertension (n = 163; DH Bandaragama, n = 55; DH Gonaduwa, n = 53; DH Haltota, n = 55).

Table 1: Study population based on the blood pressure levels

Group	BP level	Number	%	Gold standard of repeat BP measurement

A	140-159/90-99mmHg	37	22.7%	With in 2 to 4 weeks to confirm diagnosis
B	160-179/100-109mmHg	73	44.8%	With in 2 weeks to confirm diagnosis
C	>180/110mmHg	53	32.5%	With in one week to confirm diagnosis
	Total	**163**	**100%**	

The study sample was classified into three distinct groups (A, B and C) based on their initial blood pressure readings. Results indicated that a significant proportion of participants, specifically 44.8% of the sample, were allocated to group B, which represents the majority group within the sample.

Table 2: Average period from the first BP measurement to the second measurement

Group	Number	Minimum (weeks)	Maximum (weeks)	Mean (weeks)	SD (weeks)	Gold Standard
A	37	0.00	8.57	1.0734	2.04197	Within 2 to 4 weeks to confirm diagnosis
B	73	0.00	28.00	1.0900	3.59827	Within 2 weeks to confirm diagnosis
C	53	0.00	8.71	0.3747	1.22482	Within one week to confirm diagnosis

Based on the findings, it was observed that hypertension diagnosis was correctly confirmed within the prescribed time period, in accordance with the protocol. However, it was noted that in group A, the mean time interval between the first and second blood pressure reading was 1.0734 weeks, which suggests that the second reading was taken too early, as the protocol recommends a time interval of 2 to 4 weeks. Conversely, in group B, the mean time interval between the first and second reading was 1.09 weeks, indicating that the second reading was taken within the recommended time frame of 2 weeks. Additionally, in group C, the mean time interval between the first and second reading was 0.3747 weeks, suggesting that the second reading was taken within one week of the first reading, as per the protocol's recommendation for confirming the diagnosis in this particular group.

Table 3: Performance of basic investigations

Investigation	Yes/No	Frequency	%
FBS	Yes	92	56.4
	No	71	43.6
ECG	Yes	9	5.5
	No	154	94.5
UFR	Yes	1	0.6
	No	162	99.4
Cholesterol	Yes	62	38.0
	No	101	62.0

The protocol involves performing Fasting Blood Sugar (FBS), Electrocardiogram (ECG), Urine Full Report (UFR), and Cholesterol on all patients. The results indicate that FBS is the most frequently conducted investigation, accounting for 54.6% of all patients. However, UFR was only performed on one patient out of the 163, making it the least conducted investigation at only 0.6%.

Table 4: Distribution of sample according to the performance of basic investigations

Institution	n/%	FBS		ECG		UFR		Cholesterol	
		Yes	No	Yes	No	Yes	No	Yes	No

DH Halthota	n	45	10	0	55	0	55	37	18
	%	81.8%	18.2%	0.0%	100.0%	0.0%	100.0%	67.3%	32.7%
DH Bandaragama	n	17	38	6	49	1	54	8	47
	%	30.9%	69.1%	10.9%	89.1%	1.8%	98.2%	14.5%	85.5%
DH Gonaduwa	n	30	23	3	50	0	53	17	36
	%	56.6%	43.4%	5.7%	94.3%	0.0%	100.0%	32.1%	67.9%
Total	**n**	**92**	**71**	**9**	**154**	**1**	**162**	**62**	**101**
	%	**56.4%**	**43.6%**	**5.5%**	**94.5%**	**0.6%**	**99.4%**	**38.0%**	**62.0%**

Table 4 illustrates the distribution of execution of fundamental investigations among the three divisional hospitals. The results reveal that DH Halthota has done the highest number of Fasting Blood Sugar (FBS) tests accounting for 81.8% of the sample (n=45). DH Bandaragama has done the most number of Echocardiograms (ECG). However, it was only 10.9% (n=6) of the sample and other hospitals have done an even smaller number of ECGs. Only one Urine Full Report (UFR) done for the sample was done in DH Bandaragama. Nevertheless, DH Halthota has done Cholesterol investigations for 67.3% (n=37) of the samples.

Table 5: Population by age

Age category	Frequency	%
80 or less than 80	158	96.9
More than 80	5	3.1
Total	**163**	**100.0**

Table 5 displays the distribution of the population according to age, revealing that the majority (96.9%), were aged 80 years or below. In contrast, only 3.1% of the samples were above the age of 80 years.

Table 6: Start of drugs based on the protocol according to the age

Age	Number/%	Only a single drug	Two Drugs Were Started	Total
80 or less than 80	n	70	87	157
	%	44.6%	55.4%	100.0%
More than 80	n	1	4	5
	%	20.0%	80.0%	100.0%
Total	**n**	**71**	**91**	**162**
	%	**43.8%**	**56.2%**	**100.0%**

Table 6 represents the initiation of drugs based on the established protocol, which suggests starting with two drugs for patients aged 80 or below and with only one drug for patients over the age of 80 years. The results reveal that only 55.4% of patients aged 80 or below were commenced on a two-drug combination as per the protocol. Moreover, among patients above 80 years of age, 80% of them were initiated on a two-drug combination, despite the established protocol suggesting initiation with only one drug.

Table 7 displays the pattern of drug initiation in accordance with the established protocol among patients aged 80 years or below, stratified by hospitals. As per the gold standard, patients aged below 80 years should be initiated with a two-drug combination. The findings reveal that DH Halthota adhered to the protocol most frequently, with a majority of cases (86.3%) being initiated with a

two-drug combination. Conversely, DH Gonaduwa initiated treatment with a single drug most often, accounting for 75% of cases, in contrast to the recommended practice of commencing treatment with a two-drug combination.

Table 7: Start of drugs based on the protocol in patients 80 or less than 80 years of age among the hospitals

Institution	Number/%	Only a single drug	Two Drugs Were Started
DH Bandaragama	n	24	30
	%	44.4%	55.6%
DH Gonaduwa	n	39	13
	%	75.0%	25.0%
DH Halthota	n	7	44
	%	13.7%	86.3%
Total	**n**	**70**	**87**
	%	**44.6%**	**55.4%**

Table 8: Step-up of patients who have uncontrolled blood pressure

Hospital	Number/%	Status of step-up		Total
		Step -Up Done	Step - Up not done	
DH Bandaragama	n	5	9	14
	%	35.7%	64.3%	100.0%
DH Gonaduwa	n	8	14	22
	%	36.4%	63.6%	100.0%
DH Halthota	n	9	3	12
	%	75.0%	25.0%	100.0%
Total	**n**	**22**	**26**	**48**
	%	**45.8%**	**54.2%**	**100.0%**

Table 8 illustrates the step-up of management for patients with uncontrolled blood pressure according to the established protocol. As per the gold standard, blood pressure is rechecked after 4 to 6 weeks, and if it remains uncontrolled, it is recommended to step up the treatment. The results indicate that a total of 48 patients required a step-up according to the protocol. DH Halthota correctly stepped up on the most significant number of patients (75%). In contrast, DH Bandaragama and DH Gonaduwa had lower success rates in stepping up patients, with only 35.7% and 36.4%, respectively, following the protocol.

IV. DISCUSSION

The results of this clinical audit highlight several key findings related to the diagnosis and management of hypertension in three divisional hospitals. The mean time interval between the first and second blood pressure readings was 1.07 weeks (SD=2.04) in the 140-159/90-99mmHg group (Group A) while the protocol says to diagnose Group A within 2 to 4 weeks. The other 2 groups (Group B and C) have the mean time interval between first and second blood pressure readings within the protocol. This suggests the need for further education and training of healthcare professionals regarding the protocol's time frames. A study done in the UK has found 4 out of 6 GP clinics that were audited did not have 100% diagnosis according to protocol (Mashru, 1997). Similarly, an audit done in the Netherlands revealed that HTN was not diagnosed according to the protocol in all cases (de Vries, et al., 2020).

Furthermore, the investigation findings revealed that the Fasting Blood Sugar (FBS) test was the most commonly conducted investigation, while the Urine Full Report (UFR) test was the least conducted investigation. DH Halthota conducted the most FBS and Cholesterol investigations, while DH Bandaragama conducted the most Electrocardiogram (ECG) tests. This indicates the need for more uniformity and standardisation in the execution of fundamental investigations across the three hospitals. Further, other reasons for the diversity of the results have to be investigated and sorted. Similarly, other studies done in the world show less than 100% of investigations for sample patients and the results show a vast variety as well (de Vries, et al., 2020) (Mashru, 1997).

The study population was mainly aged 80 years or below, with only a small percentage of patients above the age of 80. The initiation of drugs according to the established protocol revealed that only 55.4% of patients aged 80 or below were commenced on a two-drug combination, and among patients above 80 years of age, 80% of them were initiated on a two-drug combination. The results indicate that adherence to the protocol in drug initiation varied significantly among the three hospitals, with DH Halthota adhering most frequently and DH Gonaduwa initiating treatment with a single drug most often. Patients who were already on drugs for HTN may have affected the results of this and need to be further studied.

Finally, it revealed that DH Halthota had the highest success rate in stepping up patients with uncontrolled blood pressure according to the established protocol, while DH Bandaragama and DH Gonaduwa had lower success rates. This highlights the need for healthcare professionals to be trained and educated again on the protocol's recommended steps in managing hypertension. A study found in Thailand that 28% of the patients needed intervention to control their blood pressure but not done (Angkurawaranon, et al., 2021). However, this study found varied findings in different hospitals.

Overall, the results of this clinical audit suggest that there is a need for more standardized and uniform practices in the diagnosis and management of hypertension across the three divisional hospitals. To achieve that, there is a need for further training and education of healthcare professionals on the protocol's recommended practices to ensure more effective management of hypertension.

V. CONCLUSION

In conclusion, the clinical audit results presented in this study highlight several key findings related to the diagnosis and management of hypertension in three divisional hospitals. The audit showed that the diagnosis of hypertension was confirmed correctly in accordance with the protocol's recommended time frames. However, healthcare professionals need more education and training regarding the protocol's time frames, as the mean time interval between the first and second blood pressure readings was too early in the 140-159/90-99mmHg group (Group A). Moreover, the study revealed a lack of uniformity and standardisation in the execution of fundamental investigations across the three hospitals, indicating the need for more standardized practices. Additionally, adherence to the protocol in drug initiation varied significantly among the three hospitals, highlighting the need for healthcare professionals to be trained and educated on the protocol's recommended practices to ensure more effective management of hypertension. Overall, these findings suggest that there is a need for more standardized and uniform practices in the diagnosis and management of hypertension across the three divisional hospitals. Further training and education of healthcare professionals on the protocol's recommended practices will improve the quality of care and ensure better management of hypertension.

VI. CONFLICT OF INTEREST

No conflicts of interest are reported by the authors.

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