

**COMPLIANCE TO STANDARD TREATMENT GUIDELINES IN THE MANAGEMENT OF
HYPERTENSION BY HEALTH CARE WORKERS IN POTCHEFSTROOM SUB-DISTRICT
IN NORTH WEST PROVINCE**

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**A research report submitted to the Faculty of Health Sciences, University of the Witwatersrand,
Johannesburg in partial fulfillment of the requirements for the award of a degree of Master of
Medicine in Family Medicine**

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DECLARATION

I, Peter Rapula Siko, Student number 520887;

Hereby declare the following:

I confirm that the work submitted is my own unaided work.

I have followed the required conventions in referencing the thoughts and ideas of others.

I understand that the University of Witwatersrand may take disciplinary action against me, if there is a belief that this is not my own unaided work or that I have failed to acknowledge the source of ideas or words in my writing.

Signed :

Date :

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ACKNOWLEDGEMENT

Highly indebted to Prof C. van Deventer for the support, guidance and patience in my work.

Clerks and nursing assistants in the clinic who helped to select files according to criteria.

Suria Ellis Statistician at the University of the North West (Potchefstroom campus).

Language department of the University of the North West (Potchefstroom campus).

Family for the many hours of sleepless night throughout my training.

Information officer who was willing to assist with information that I require even at a short notice.

ABBREVIATIONS

BP = Blood pressure

DBP = Diastolic Blood Pressure,

DHIS = District Health Information System

EDL = Essential drug lists,

GP = General practitioner,

HCW = Health care worker,

HPT = Hypertension,

JNC = Joint National Committee on Prevention, Detection, Evaluation, and Treatment of High Blood Pressure,

NCD = Non Communicable Disease

NHLBI = National Heart, Lung, and Blood Institute

SADHS = South African Demographic and Health Survey

SBP = Systolic Blood Pressure

SHARE = Supporting Hypertension Awareness and Research Europe-wide survey

STG = Standard treatment guideline

ABSTRACT

INTRODUCTION Hypertension is one of the leading life style diseases and a main contributor of morbidity and mortality in many countries including South Africa. Standard Treatment Guidelines (STGs) are issued in this country to assist health care workers (HCWs) in the diagnosis and management of common conditions across all levels of care. The STGs include an Essential Drug List (EDL) as supported by WHO Bamako Initiatives (1980) for developing countries. Health systems, patient and physician related factors have been identified as the factors preventing blood pressure (BP) control in patients. **OBJECTIVES** Considering the debilitating effects caused by hypertension, the objectives were to find out if HCWs diagnose and manage hypertension correctly in terms of compliance to the guidelines. Guidelines are developed from credible evidence based research and are summarized for ease of use by HCWs. Most of the available studies on adherence to guidelines are self-reported and this research seeks to do a record analysis which is different from previous studies. **METHOD** 21 files of patients diagnosed between April 2009 and March 2011 with 475 documented visits spreading between 2009 and 2014 were purposefully selected from a sample of representative clinics and the hospital in the Potchefstroom sub district. A retrospective cross sectional study was performed using a validated data collection tool. The study included all adults above 18years of age and excluded all patients with co-morbidity at the time of diagnosis. **RESULTS** The total number of 475 entries represented 21 patients. The majority were males (57%), with a mean age of all patients of 52.81years. The mean systolic BP was 138.48mmHg and diastolic BP was 83.10mmHg. Compliance to diagnosis based on the clinical guideline, was 56% and 75% by nurses and doctors respectively with an overall compliance of 58%. Nurses also did not do well in terms of compliance to drug management at 63.5% with an overall compliance of 62.7%. There was an overall poor compliance to non drug management, where there was no record of health education in 55.8% of patients. **CONCLUSIONS** This study highlighted the significance of continuous professional development in terms of emphasis on international standards of diagnosis and non drug management. Drug management conforms to international trends of multiple drugs for better management of HPT. However, the generalization and transferability of results is compromised by the limited number of the sample size in the study. Source documents need to be properly monitored and information verified. Peer review of data and management oversight is encouraged. The use of a standard chronic form assisted in the management of patients by simplifying collection and documentation of clinical information over a 12 month period.

KEYWORDS: Compliance, guidelines, guideline compliance, hypertension, health care workers

CHAPTER 1

Introduction

The World Health Organization (WHO) and the United Nations Children's Fund (UNICEF) introduced the Bamako Initiative (BI) in the late 1980s with the purpose of improving accessibility to essential medicine for the most vulnerable in society to improve their health.¹ The BI came two years after the Alma-Ata declaration on Primary Health Care (1978) which emphasized provision of essential medicines in one of its declaration. South Africa (SA) adopted a National Drug Policy (NDP) in 1996 after the dawn of democracy which incorporates the essential drug list (EDL) concept within the Essential Drugs Programme (EDP).^{2, 3}

The main purpose of this policy was to promote rational drug use, minimise drug costs and standardize supply chain management of essential medicines and the use of drugs through provisions of different editions of Primary Health Care (PHC), hospital adult and paediatric Standard Treatment Guidelines (STGs). It defined Essential medicines as “those that satisfy the priority health needs of the population with it being a national responsibility to identify medicines which are ‘essential’, with selection thereof being dependent on disease prevalence, evidence of efficacy and safety and comparative cost-effectiveness.”^{2, 3} Anti hypertensive drugs that are included in most of the hypertensive guidelines form part of the EDL.

Regrettably 20 years after the BI, the health indicators of most African countries recorded no significant improvement in the health status registered in such countries¹ but according to the South Africa Demographic and Health Survey (SADHS) conducted in 1998 and quoted in 2003 with the launch of the 3rd EDL there was evidence of an availability of 86% of EDL drugs and that 90% of medicines prescribed were on the EDL⁴ signifying a better performance by South Africa. “Essential medicines are intended to be available within the context of functioning health systems at all times in adequate quantities, in the appropriate dosage forms, with assured quality and adequate information, and at a price the individual and the community can afford.”^{2, 5}

According to the Global Burden of disease study (GBD) in 2010, of 52.8 million deaths, 34.5 million (65%) were directly linked to non communicable disease (NCD). There has been an eleven percent increase of disability-adjusted life years worldwide due to NCDs between 1990 (43%) and 2010 (54%).⁶ In South Africa there are currently 30.4% of the adult population with HPT which require the need for a simple approach to assessment and treatment.⁷

Given the disturbing statistics associated with NCDs which include hypertension as the main disease and how several community-based surveys in South Africa have found that diagnosis of hypertension and its treatment are suboptimal ⁴, and the review of the progress since the adoption of the 1980 BI and 1996 NDP, it was decided by the researcher to assess if HCWs in the Potchefstroom sub district North West province comply with the STGs in the diagnosis and management of hypertensive management.

Potchefstroom sub-district is one of the four sub districts in the Dr Kenneth Kaunda district in the North West province with a population of 162 759 (79965 males and 82794 females) which represents 23.38% of people in the district and 4.63% in the province according to the 2011 SA Census. The vast majority of these are Tswana and Afrikaans speaking.⁸ These patients are served by 9 fixed public health facilities (Community Health centers (CHC) =2 and Clinics=7) and two mobile clinics with the headcounts for the period of study shown in table 1.

Health facility	Type/category	Headcounts	Percentage
Boikie Tlhapi	CHC	111600	19
Promosa	CHC	84635	14
Lesego	Clinic	53094	9
Mohadin	Clinic	61615	10
Boskop	Clinic	9034	2
Gateway	Clinic	46083	8
Potchefstroom	Clinic	103628	18
ST	Clinic	57243	10
TC	Clinic	51738	9
TOTAL		578670	100

Table 1: Headcounts for Potchefstroom health facilities for April 2010 to March 2012.

CHAPTER 2

Literature Review

A literature search using MEDLINE from 2000 to 2011 was conducted by combining the terms “guideline”, “compliance”, “guideline compliance” and “hypertension.” Titles and abstracts of English articles were reviewed for inclusion and copies of studies that reported on prescribing patterns either by physicians self reported and/or research articles to guideline recommendations were included. References of the chosen bibliographies were screened for additional citations. Most of the articles that were included used guidelines on the management on hypertension from the Joint National Committee (JNC) to assess compliance.

According to the 2003 SADHS the prevalence of hypertension (HPT) for both males and females was 40% and 51% respectively and remained similar in 1998. The survey have demonstrated that obesity, high salt and alcohol intake are high in hypertensive patients, and that there is a growing need to implement national policy intended at promoting a healthy lifestyle and the national guidelines to guide in the management of HPT in primary health care facilities.⁴

Evidence based medicine is at the forefront of safe medicine practice. Major clinical research work is summarized in the form of guidelines for ease of use by practitioners who are too busy to confirm the most recent information from these trials. Most practitioners are not aware of these guidelines and some are aware of them but fail to follow them by choosing agents inconsistent with the national guideline recommendation.⁹ General practitioners (GPs) accept an elevated BP among their clients contrary to the targets set by international guidelines.

Hypertension (HPT) is diagnosed as elevated systolic and diastolic blood pressure of 140 and 90mmHg respectively on three separate occasions.^{4, 5, 8} The overall prevalence in the global adult population in 2000 was 972 million whereas 1.56 billion are projected to have developed this condition by 2025.⁶

BP across Europe remains poorly controlled with less than 50% of patients achieving control. There are three broad categories of barriers in clinical practice that can prevent patients from attaining BP control, namely the health system, patient related and physician related factors. The latter are clinical inertia, poor communication and lack of awareness/ knowledge of treatment guidelines.⁹

According to published data of Hyman and Pavlik a significant number of physicians were resistant to starting anti hypertensive medication where BP was not elevated above 160/95, which was in sharp contrast to the recommendations of the JNC-V (140/90).¹⁰

Importance of evidence based clinical guidelines.

Current practice of medicine relied heavily on evidence-based medicine. Guidelines highlight current literature and new evidence, and they create an easy step-wise approach to the management of diseases, the target for disease control and the standards of care.¹¹ “It refers to the integration of information from rigorous scientific research into patient management decisions.”¹² Medical guidelines are considered important tools in clinical medicine and their recognition by the attending physicians is complex and demanding.¹⁰ Debates in the treatment of elevated blood pressure and the validity of JNC drug recommendations are based in questions of the quality of evidence clinical trials.¹⁰

The National Heart, Lung and Blood Institute (NHLBI) has administered the National Blood Pressure Education Program (NHBPEP) Coordinating committee over the past three decades, with one important function of issuing guidelines, advice, increase awareness on prevention, treatment and control of hypertension.¹³ Hypertension guidelines originated as far back as 1977 with regular updates.^{10, 13} This has resulted in age-adjusted mortality decline of 70% and by 80% stroke.¹¹

According to the “The Sixth Report on the Joint National Committee on Prevention, Detection, Evaluation, and Treatment of High Blood Pressure (JNC 6),” guidelines are developed based on latest evidence from observational studies and clinical trials.¹⁴

The 1999 World Health Organization-International Society of Hypertension (WHO-ISH) guidelines are based on the collective expert interpretation by the guideline sub-committee of the available evidence from epidemiological studies and from clinical trials.

The value of the above is evident in the following, the 2011 UN political declaration on NCDs to achieve the goal of 25% reduction in premature NCD mortality by 2025 (the 25 by 25 goal) recommends a stepwise approach to clinical management of people at high risk of cardiovascular disease, including changes to health-care delivery such as shifting of tasks to middle-level health workers when appropriate. South Africa has since introduced clinical associates in this category as well as provision of fixed-dose combinations of drugs for the prevention of cardiovascular disease.⁶ Most of the guidelines developed are for nurse driven management of non communicable diseases.

Literature in South Africa shows that EDL / Standard Treatment Guidelines (STG) enabled nurses to control clinical conditions of 68% of patients with HPT, 82% with non insulin dependent diabetes mellitus and 84% with asthma. This management of chronic diseases by nurses removed the burden of 79% of these patients from district hospitals to the clinics and improved patient adherence from 79% to 87%.¹⁵

Awareness and attitude of HCWs to hypertension management guidelines.

The compliance of the physician with guidelines seems to be influenced by knowledge and guideline awareness and by the time span of working in private. Awareness of guidelines dropped significantly between physicians who were in practice for 2 years (33.3%) and those who were in practice for more than 20 years (19.5%)¹⁰ as a demonstration of how significant the duration of practitioners' experience in practice is and their inverse use of evidence based guidelines. It was found that GPs are aware of their HPT guidelines but seem not to be sure that they need to follow them in practice.^{9,10} Forty one percent of doctors in the United States of America (USA) who treat patients with HPT neither heard of the JNC-V guidelines nor were familiar with the contents and some reported limited familiarity with the consensus JNC-V guidelines.¹¹ An even poorer outcome is found in a German study done in December 1999 to March 2000, where only 23.7% of physicians were adequately aware of guidelines.¹⁰

Following the review of most commonly prescribed antihypertensive drug classes Nelson and Knapp made an observation that prescribing patterns were in line with guideline recommendations though most physicians would use first-line drugs inconsistent with the national guideline recommendations, for example they complied with drug classes e.g. diuretics but prescribed a diuretic not recommended by guidelines.¹⁶ The researcher's observation for the above non compliance is that it is more often due to system errors where a recommended drug is out of stock and an alternative needs to be dispensed.

The general belief among GPs in the United States of America (USA) appears to be that slightly elevated BP in the elderly is normal.⁹ In the Supporting Hypertension Awareness and Research Europe-wide survey (SHARE), the majority of physicians (±82%) thought that the 2007 European Society of Hypertension (ESH)-European Society of Cardiologist (ESC) guideline-recommended BP target of less than 140/90mmHg for general hypertensive patients was 'about right' or 'not tight enough' although a minority (19%) were satisfied if the SBP exceeded 140mmHg and 7% were satisfied if the DBP exceeded 90mmHg.⁹

More than one third of physicians in this study were reluctant to initiate treatment in young adults or older adults without diabetes unless the DBP was persistently $\geq 95\text{mmHg}$.⁹

According to the primary care physician survey in the USA, physicians accepted BP that exceeded the goals recommended by the JNC treatment guidelines in their patients.⁹ Overall, physicians said that on average, 52.6% of their patients were attaining ESH-ESC recommended targets and three-quarters (77.4%) of physicians said that it was a challenge to get their patients to achieve these targets in practice.^{9, 10} In SA in Kwazulu-Natal it was shown that when physicians fail to prescribe lifestyle modifications, adequate antihypertensive drug doses, or appropriate drug combinations, inadequate BP control may result.³

Why a choice of hypertension as a condition to assess compliance and not other conditions?

It is easy to diagnose hypertension based on the 1995 World Health Organization (WHO)-International Society of Hypertension (ISH) definition of persistently elevated SBP $> 140\text{mmHg}$ and DBP $> 90\text{mmHg}$ ¹⁷ thereby creating a universally agreed standard. Population surveys have shown that HPT is poorly undiagnosed or inadequately controlled^{3, 16, 17} in around 70-75% of patients worldwide¹⁸ when it's easier to diagnosis and treat than other chronic conditions that require the collection of blood samples or other expensive technical measures.¹⁰

Developed countries have the greatest estimated number of people with HPT¹⁹ with 35 million office visits in the US with HPT as the primary diagnosis.^{11, 13} HPT affects approximately 1 billion individuals worldwide and the prevalence increases with increasing age.^{13, 16} It is a common chronic disease that serves as the measure of the effectiveness of public health education, professional education and health care system in the country.¹¹

According to the Global burden of HPT in 2000, sub-Saharan Africa which included SA, hypertension accounted for 23.9% of the overall prevalence¹⁹ and the 1988 SADHS showed a 20% prevalence then and the 2003 SADHS figures stand at 40% and 51% for men and women respectively.⁴ It is evident that mortality and morbidity from heart diseases are increasing so rapidly^{7, 13} in developing countries that they will rank number 1 and 4 respectively as causes of the global burden of disease by the year 2020,¹⁴ noting that hypertension is the leading cause of cardiovascular diseases and its complications account for the top three causes of death in SA.⁷ The ultimate public health goal of antihypertensive therapy is the reduction of cardiovascular and renal morbidity and mortality.

There is correlation between overweight and obesity which contribute to the increase in BP and related conditions. That there are 122 million people with the above life style risk factors the risk of developing hypertension is inevitable. There is a move towards reducing sodium in the food by 51% in the next coming decade.¹³ Cardiovascular diseases (CVD) account for 30% of global mortality with HPT being the more frequent modifiable risk factor for cardiac and renal disease.¹⁹ The risk of elevated BP is continuous, consistent, independent of other risk factors and directly proportional to heart attack, heart failure, stroke and kidney disease.^{4, 13, 17}

“It is a well documented knowledge that achieving normotensive in hypertensive patients can significantly reduce the risk of cardiovascular morbidity and mortality with more intense BP control providing greater risk reduction.”^{7, 8, 10}

Screening, case finding and early and sufficient management of HPT improves patient prognosis and may contribute to cost containment for health care providers.¹⁰ Current studies (Hypertension Optimal Treatment (HOT), Systolic Hypertension in the Elderly Program (SHEP) and Swedish Trial in Old Patients with Hypertension (STOP-Hypertension) have impressively shown that efficient antihypertensive therapy will decrease the incidence of stroke and cardiac events by up to 51%.¹⁰

“The burden of undiagnosed and sub optimally treated hypertension on the health of people is a major contributor to the prevalence of adult diseases in any population and this can be avoided if early detection and cost-effective management of the condition occurs”.⁴ Complications of uncontrolled hypertension that contribute to this burden of diseases are cerebrovascular, renal and cardiovascular diseases which could predispose to congestive heart failure.^{4, 13, 17}

The management of hypertension provides a barometer to assess physicians’ awareness of medical guidelines and compliance on the background of its prevalence and the significant economic burden of this disease and the numerous guidelines that existed for many years.^{6, 10}

All the above point to the importance and influence of hypertension as a major NCD, its outcomes to individuals if poorly managed and the overall negative global health impact. This all contributed towards the choice of this condition in particular to be studied.

Research focus.

Practical guidelines are important tools for clinical decision making. They are used to reduce practice variation, guide appropriateness and measure the quality of care.¹⁶ Research has shown a large number of primary care physicians underestimate a target BP <140/90 as recommended by the JNC guidelines, thereby not intensifying BP control to achieve a target below 140/90.¹⁰ BP control among European hypertensive patients remain sub-optimal with <50% achieving BP goal.⁸ Many self reported studies have come to the conclusion that physician adherence to hypertension guidelines is low.^{9, 10, 16, 18}

The SHARE survey concluded that clinical inertia is putting patients at increased cardiovascular risk and contributing to the substantial health and economic burden associated with uncontrolled BP. A number of studies indicate that in most populations studied, a moderate proportion of all hypertensive patients are untreated and a large proportion of treated hypertensive patients still have frankly elevated blood pressures, defined most frequently as SBP >160 or DBP >95mmHg.^{9, 10, 11, 16, 18}

In South Africa most of the guidelines are developed for nurse driven management of non communicable diseases and some national data have shown poor adherence by physicians to guidelines.^{16, 20}

Despite the release of 7 treatment guideline on hypertension by the National Heart, Lung, and Blood Institute (NHLBI), treatment goal remains suboptimal at 66% in the USA and where approximately 20 million remain untreated.¹⁵ Doctor patient effective communication lies at the core of the successful management of HPT and failure to establish and maintain it will generally lead to poor adherence to antihypertensive therapy and unsatisfactory control of the raised BP.^{3, 15}

Adherence studies that use medical record data critically assume that documentation in medical records accurately reflect practice.^{9, 10, 11, 16, 20} “Although this assumption is reasonable, the adequacy of physician documentation could vary across physicians and across studies. Indeed, the differing conclusions in these studies might reflect variation in the adequacy of physician documentation as well as actual variation in adherence. Because none of the studies that were reviewed demonstrated a close relation between documentation and practice, their conclusions regarding adherence remain tentative.”¹⁶

Most of the surveys^{9, 10, 12, 16} found were done by self administered questionnaires which may reflect bias. The researcher decided to conduct a chart review to verify self reporting and attempt to identify the real practice situation.

The researcher's hypothesis was that health care workers do not comply with HPT treatment guidelines to achieve BP control and it was decided to conduct research within Potchefstroom primary health care sub-district

CHAPTER 3

Aim

- To assess the degree of compliance of HCWs to STGs in the management of hypertensive patients in Potchefstroom sub-district primary health care (PHC).

Objectives

- To describe the demography of newly diagnosed patients with hypertension at Potchefstroom sub-district for the years 2009 to 2011.
- To assess compliance to STG in terms of hypertension diagnosis; and
- To assess compliance to management (drug and non-drug) of newly-hypertensive patients diagnosed within the study period.

Methodology

Study design: Purposeful retrospective sampling was conducted for the period of April 2009 to March 2011 of newly diagnosed hypertensive patients above 18 years old from nine fixed health facilities.

Study population: All hypertensive patients diagnosed between April 2009 and March 2011 who were above 18 years without co-morbidity of chronic conditions like diabetes mellitus, epilepsy, asthma, tuberculosis and Human Immunodeficiency Virus (HIV) at the time of diagnosis were included. According to the District Health Information System (DHIS) (Annexure A1) for the period of the study, there were 1710 new cases of hypertension and the researcher's initial study sample was set at 150 files representing 10% of the population with 4 clinic visits over a 12 month period.

New HPT cases in Potchefstroom sub-district according to DHIS April 2010 to March 2012

1710 (Annexure A1)



Study target of 10% from 1710 $\approx$ 150 files



New HPT cases according to individual clinic data from DHIS was 1519 (Annexure A2)

This was less than the total in Annexure A1, therefore a discrepancy



Revised study target of 10% from 1519 = 151 $\approx$ 150



Screening of patients who were meeting the criteria for inclusion in the study at all clinics



Retrieving files of selected patients, most of whom did not meet the criteria



21 Files that met the criteria were selected



Compensation was made by including more visits per patient the total visits were 475

Sampling: A screening tool for selection (Annexure B) with emphasis on the period of diagnosis, and exclusion of co morbidities of diabetes, epilepsy, asthma and tuberculosis, patients younger than 18 years, pregnancy and exclusion of the area of diagnosis outside Potchefstroom was developed for the study. It was introduced and discussed with facility health care workers to identify eligible candidates. All the patients who fit the inclusion criteria at each clinic were sampled. The response was encouraging initially but after getting the files most of the patients did not meet the criteria especially with regard to period of diagnosis. A new approach was implemented to get patients' health passport/ clinic health books which could confirm the period of diagnosis. As a result the sample size of initially identified patients dropped significantly. Thus another strategy was to access the local hospital records.

Two boxes of health passports or clinic health books of patients attending Potchefstroom regional hospital as well as the sub district clinics were collected from the admission department and screened for clients that could meet the research criteria and those that met the standards were included in the study. According to the WHO- How to investigate drug use in health facilities, "in drawing a retrospective sample of patient encounters, the basic indicator study calls for a sample of 30 prescribing encounters per health facility, or 100 encounters if prescribing practices in individual facilities are to be compared".²¹ Due to strict inclusion criteria which pre-suppose a relatively low yield of patients, it was decided based on the above WHO report to concentrate on encounters rather than patients for sample size and strength.

Inclusion and exclusion criteria: The study included all adults above 18 years of age who had been diagnosed during the study period and excluded all patients with co-morbidity at the time of diagnosis. Due to the limited number of patients at primary health care, who qualified using the criteria, the files of patients diagnosed at clinics were also accessed at the hospital and included.

Data collection: A clinically orientated data collection tool (Annexure C) was developed in line with the STG in terms of diagnosis, drug and non drug management. This was validated by a statistician at North West University and data was manually retrieved from the patients' clinical records in all health facilities. Variables included in the tools were the demography of the patients (Clinic registration number, research number based on first 2 letters of the clinic, age, gender), BMI, BP levels at diagnosis and follow up, evidence of target organ damage in terms of proteinuria and haematuria as the only available indicators to be assessed, compliance to drug and non drug management and the category of health care worker involved. This information was sourced from the clinic chronic management form.

Diagnosis of HPT is based on three readings hours or days apart and the target BP was 140/90mmHg for patients without co morbidities. The 2008 PHC standard treatment guidelines and essential medicines list was used as the reference for assessing diagnosis and management in this study. Management was classified according to the steps illustrated in Table 1 and in line with international standards.

STEPS	INTERVENTION
Stat	Amlodipine for HPT emergency BP >180/130 or HPT Urgency BP >240/140
1	Life style modification only
2	Life style modification and single anti hypertensive group class
3	Life style modification and two anti hypertensive group classes
4	Life style modification and three anti hypertensive group classes
5	Life style modification and four anti hypertensive group classes

Table 1 Hypertensive management steps.

Ethics

The study received ethical clearance from the Witwatersrand University Human Research Ethics Committee clearance number M130265 22 February 2013 (Annexure D) and the North West Department of Health Policy, Planning, Research, Monitoring and Evaluation (NWPPRME) in July 2013 (Annexure E). In order to maintain patient confidentiality only registration numbers were used. Consent form was not used as there was no direct communication with patients.

CHAPTER 4

Results

All values are expressed as mean and standard deviation ($\pm$ SD) except where stated.

Twenty one (21) files were selected from a representative sample of sub district PHC facilities. The majority of the patients came from health centres comprising 61.90% of the total sample. This represented 50% of the sub-district clinics. Three copies of primary health care books were also traced to the local hospital. See table 2. The researcher would have liked to obtain samples from each of the clinics but given a great amount of logistical challenges experienced only settled for the clinics indicated above.

Table 2 shows the number of encounters per facilities being above 30 which met 80% of WHO standard on how to investigate drug use in health facilities.

FACILITY	FILES	Number of encounter
Boiki Tlhapi CHC	7	132
Promosa CHC	6	170
Lesego clinic	3	74
Mohadin clinic	2	37
Hospital files	3	22

Table 2: Facility prescribing encounters.

The age for the sample ranged between 31 to 85 years with an overall sample average of 52.81 years. See table 3. The sample was composed of 57% male and 42% female patients. See table 4. Age was adjusted at every birthday during follow up visits.

	N	Minimum	Maximum	Mean	Std. Deviation	p Value according to Kruskal-Wallis test:
Age	21	31	85	52.81	15.864	.6105

Table 3. Age

	Frequency	Percentage
Female	9	43
Male	12	57
Total	21	100

Table 4. Gender

BMI ranges from normal to severely obese with a mean average of 28kg/m² which is normal according to what classification. See table 5. It is encouraging to see BMI done as part of patient management considering the direct relationship there is between obesity and cardiovascular risk.²² Regrettably 42% of the BMI's were not calculated due to lack of weight/height or both for sample.

Of the calculated BMI's 23% were obese whereas overweight and normal weights accounted for 14% each.

There was no significant difference between different clinics in terms on height, weight and body mass index using the Krusmal-Wallis test which is used to calculate the p-Value. The non-parametric test is used due to a small sample size as it is difficult to test the assumption of normality due to lack of power. See table 5a and 5b below.

Clinic		N	Minimum	Maximum	Mean	Std. Deviation
Boiki	AVE BMI	5	26	36	31.00	3.606
Tlhapi	AVE Ht	5	149	170	161.00	7.583
	AVE WT	7	72	86	78.14	5.014
Lesego	AVE BMI	2	22	25	23.50	2.121
	AVE Ht	2	161	165	163.00	2.828
	AVE WT	3	51	81	66.33	15.011
Mohadin	AVE BMI	1	25	25	25.00	
	AVE Ht	1	163	163	163.00	
	AVE WT	2	66	67	66.50	.707
Hospital	AVE BMI	1	18	18	18.00	
	AVE Ht	1	172	172	172.00	
	AVE WT	2	55	64	59.50	6.364
Promosa	AVE BMI	3	27	37	33.67	5.774
	AVE Ht	3	151	165	156.33	7.572
	AVE WT	6	65	145	91.50	29.670

Table 5a. Mean BMI at each clinic

Average	N	Minimum	Maximum	Mean	Std. Dev	p Value according to Kruskal-Wallis test: difference between clinics
Weight	20	51	145	77.35	19.850	.0998
Height	12	149	172	161.25	7.073	.5228
BMI	12	18	37	28.83	6.073	.0844

Table 5b. Mean BMI at all clinics

The Krusmal-Wallis test has been used again to calculate the p-Value due to a small sample size as it is difficult to test the assumption of normality due to lack of power hence the lack of significant difference between SBP and DBP at diagnosis at different clinics. See table 6a and 6b below.

Clinic	Variable	Valid N	Minimum	Maximum	Mean	Std. Dev
Boikie	Initial SBP	132	70.0000	200.0000	137.5639	17.73224
Tlhapi	Initial BP	132	44.0000	134.0000	80.5890	13.38759
Lesego	Initial SBP	75	100.0000	180.0000	136.6267	18.68644
	Initial BP	75	49.0000	149.0000	72.5600	15.93589
Mohadin	Initial SBP	39	110.0000	190.0000	146.6923	21.21836
	Initial BP	39	51.0000	118.0000	84.5385	15.26580
Hospital	Initial SBP	24	110.0000	162.0000	136.7917	12.98822
	Initial BP	24	70.0000	101.0000	85.0833	8.38693
Promosa	Initial SBP	168	101.0000	201.0000	138.7321	19.41740
	Initial BP	168	55.0000	128.0000	83.3690	14.03441
Final	Initial SBP	438	70.0000	201.0000	137.5639	18.90417
Data	Initial BP	438	44.0000	149.0000	80.5890	14.58707

Table 6a. Mean BP at each clinic

Average	N	Minimum	Maximum	Mean	Std. Dev	p Value according to Kruskal-Wallis test: difference between clinics
Ave SBP	21	126	154	138.48	8.761	.8034
Ave DBP	21	69	102	83.10	8.665	.6261

Table 6b. Mean BP at all clinics.

The ANOVA has been used in the table 7b below due to the large sample size. In this case the central limit theorem holds that means are normally distributed and shows significant difference between SBP ($p=0.002876$) and DBP ($p=0.000000$) at different clinics.

Clinic	Variable	Valid N	Minimum	Maximum	Mean	Std. Dev
Boikie	Average SBP	7	126.0000	153.0000	136.1429	9.82223
Tlhapi	Average BP	7	75.0000	100.0000	82.1429	8.41484
Lesego	Average SBP	3	126.0000	147.0000	139.3333	11.59023
	Average BP	3	69.0000	102.0000	80.6667	18.50225
Mohadin	Average SBP	2	137.0000	154.0000	145.5000	12.02082
	Average BP	2	82.0000	87.0000	84.5000	3.53553
Hospital	Average SBP	3	132.0000	140.0000	136.6667	4.163
	Average BP	3	81.0000	89.0000	85.3333	4.041
Promosa	Average SBP	6	132.0000	154.0000	139.3333	8.43010
	Average BP	6	77.0000	96.0000	83.8333	7.75672
Average Level	Ave SBP	21	126	154	138.48	8.761
	Ave DBP	21	69	102	83.10	8.665

Table 7a. Mean BP level at follow up at each clinic

Average	N	Minimum	Maximum	Mean	Std. Dev	p Value according to ANOVA: difference between clinic
Ave SBP	438	70.0000	201.0000	137.56639	18.90417	0.002876
Ave DBP	438	44.0000	149.0000	80.59	14.587	0.000000

Table 7b. Mean BP level at follow up at all clinics.

Though not the focus of the study it was found that 62% of the sample had controlled BP (<140/90mmHg) whereas 10% and 28% had moderate and mild HPT respectively. Hypertensive emergency was recorded in 16 visits representing 8 patients where in only one, Amlodipine 10mg stat was given. BP control is invariably related to other patient factors that were not assessed in this study and a qualitative type of study could yield much better reasons for BP control. Table 8 below shows compliance in terms of diagnosis by health care workers and reflects the nature and characteristic of clinics where the majority of patients are seen by nurses (76%). In terms of percentages, doctors are seen to correctly diagnose patients at 75% compared to 56% for nurses but nurses saw many more patients than doctors.

Compliance in terms of diagnosis by health care workers			
HCWs	Encounter per HCW	No(%)	Yes(%)
Unaccounted	1	1(100)	0(0)
DRs	4	1(25)	3(75)
PNs	16	7(44)	9(56)
Total	21	9(42)	12(58)

Table 8. Appropriate diagnosis by health care workers of the patients that they have seen during the period of study.

Compliance to drug management by nurses was ahead of doctors at 63.5% and 56.6% respectively as shown in table 9. The p-value is 0.336 indicating no statistical significant difference between compliance of 3 groups. Step 2 drug management had a total of 105 BP measurement qualifying visits and only 89 (85%) complied whereas step 3 had 212 BP measurement qualifying visits with 141(60%) compliance. Step 4 which relates to the use of three drugs had 62 (48%) compliance and 66(52%) non compliance. It seems as if there is a fine balance between compliance to the guidelines and not adding an additional drug which is defined as physician inertia to compliance. There was a 340 (71%) use of more than one drug in the management of HPT which is in line with international standards of the use of more than one drug for the management of BP.

Compliance to drug management by health care workers			
HCWs	Encounter per HCW	No(%)	Yes(%)
Unaccounted	3	1 (33.3)	2 (66.7)
DRs	45	20 (44.4)	25 (56.6)
PNs	427	136 (31.9)	271 (63.5)
Total	475	157 (33.1)	298 (62.7)

Table 9. Compliance to drug management by health care workers

Life style modification is an important aspect of patient management (Table 10) and studies have shown significant drop in BP according to different life style changes.¹⁰ Very little is said about tobacco use despite causing a staggering mortality rate of about 6 million lives annually and a costs of 1 – 2% of global gross domestic product annually.³

Compliance to non drug management by health care workers									
HCWs	Unaccounted	Diet	Exercise	HE	None	Rx Comp	Smoking	Yes	Total
Unaccounted	0	1	0	0	2	0	0	0	3
DRs	0	2	0	12	27	3	1	0	45
PNs	16	43	4	52	236	70	4	2	427
Total (N)	16	46	4	64	265	73	5	2	475
Total (%)	3.4%	9.7%	.8%	13.5%	55.8%	15.4%	1.1%	.4%	100.0%

Table 10. Compliance to non drug management by health care workers

CHAPTER 5

Discussion

Of the 21 patients selected for the study the majority were men at 57% and females were 43% (Table 3). The general trend regarding gender is that women are usually in the majority like in the two SA population studies done in 1988 and 2003 and this deviation from the usual norm is probably by chance given the small sample size.⁶ It should be emphasized though that identifying men at risk of cardiovascular disease is important as men had a higher prevalence of coronary artery disease (75%) than women (66%) as documented in the 26-year follow up of participants in the Framingham heart study.²²

Table 4 gives the demography of the sample regarding age and BMI. Of the 21 patients 20 were checked for their weight and only 12 checked for the height making assessment of BMI possible in only 57%. The mean BMI was 28 which is classified as obesity. Of the calculated BMI's 23% were obese whereas overweight and normal weights accounted for 14% each. Monitoring of the patients in the sub-district for the period of this study did not include waist circumference and thus could not be included in the assessment of obesity and for the assessment of cardio vascular risk. Noting that some parameters of BMI were not assessed, the use of waist circumference can be the most ideal and easy tool to be considered for future assessment of obesity.

Cardio vascular risk assessment can only be made possible with proper assessment of predictors of risk including BMI. The age group reflects the category that we see in our facilities where young patients are usually referred to hospital due to complicated hypertension though patients below 18 years were excluded from this study.

The mean systolic and diastolic BP at diagnosis and follow up (Table 5 and 6) of this study are higher than the previous two population studies done in South Africa though they cannot be compared given the big difference in sample size. The documented diastolic BP values of subjects in the 2003 survey were much lower than was recorded in 1998 resulting in almost 50% reduction of hypertensive prevalence when compared to 2003 survey.⁵ In the 1998 survey, the cut off point for BP was 160/95 and in 2003 it was 140/90 which explains why BP readings were lower in 2003 than in 1998 and this resulted in an increase of 6 percent of prevalence.

One of the objectives was to check compliance to diagnosis and of the 4 patients that doctors saw 3 were appropriately diagnosed making it 75% correct and nurses appropriately diagnosed 12 out of 16 which makes it 58% (Table 7). It has to be noted that all patients will have been seen and started on treatment by nurses and referred to the doctor for confirmation of the diagnosis.

At diagnosis a total of 9 patients which represents 42% were not diagnosed as hypertensive despite meeting all criteria for hypertensive diagnosis in agreement with the SHARE study that has demonstrated that physicians were hesitant to initiate or take action for elevated BP.⁹ In the eThekweni study done in KZN the mean adherence to hypertensive treatment guidelines in state facilities was 22.05% which had a better sample representation of 2100 prescription than this study.

Much as the above two studies do not compare statistically due to the large differences in their patient numbers, there is a positive trend towards an increase in compliance to diagnostic guidelines by nurses who are the backbone of PHC in both studies

The majority of patients are seen and managed by PNs (271) with 63.5% compliance to drug management and 56% compliance to diagnosis. However the non drug management was not well documented. Professional nurses performed better in the control of BP during the follow up than they did at diagnosis. A safety net is created at diagnosis where newly diagnosed patients are to be seen by doctors to initiate them on chronic medication. This is encouraging as nurses are the people that see majority of chronic patients in the facilities.

It was regrettable that overall 56% of clients were not advised on any form of non drug management and only 10% had documented encounters regarding diet and exercise as these are the major contributors toward obesity which in turn impacts on cardiovascular illness.

The Dietary Approaches to Stop Hypertension (DASH) study has shown a reduction of 8 – 14mmHg whereas weight reduction has dropped BPs by 5 – 20mmHg with a 10kg weight loss.⁷ Emphasis on the above can yield positive results in BP control.¹¹

There were some system errors noted in the study with urine dipstick out of stock and 60% of side room examination (urinalysis) was subsequently not done to rule out renal pathology. Bibliography in this study has shown how HPT cause high mortality and morbidity from cardiac and renal disease and failure to do urinalysis will impair screening of patients for related renal complications. Urinalysis is more convenient and less costly than laboratory investigations.

Unavailability of certain drugs also influenced practice at interim periods. EDL drugs were however mainly prescribed as per EDL guidelines.

Validation of source documents is a major concern. This is illustrated at Boskop clinic which recorded an average of 2 newly diagnosed hypertensive cases per month during the period of study and a sudden spike of 96, 104 and 87 newly diagnosed patients in August 2010, November 2010 and January 2011 respectively (Annexure A2). This is a clinic with a total head count per facility of 2% compared with other health facilities in the sub district (Table 1). The above numbers therefore clearly cannot be correct. The electronic data capturing system, e-tools, only captures the category “HPT new patients” without a consideration for follow up patients and the suspicion is that follow up patients were captured under new patients instead.

This data problem resulted in the overestimation of the research population and sample size. Achievement of the target sample size was attempted using the screening tool where most of the respondents did not meet the study criteria.

The use of stat dose medication in a hypertension emergency in this study was not supported by documentation of associated unstable angina/ chest pain, neurological signs, pulmonary oedema and renal failure, nevertheless the appropriate EDL drug Amlodipine 10mg orally was used for severe BP. Of a number of the patients with HPT emergencies only one patient from Lesego clinic was referred to the next level of care as per the guidelines. Non hospital referral might be as a result of availability of doctors in the facilities which was not assessed in this study.

The average compliance of self reported studies to guidelines was 23.7%.^{9, 11, 20} In this study a considerable higher performance was found.

Limitations

The small sample size of the study is the main limitation in comparison with other studies cited in this research though the number of clinic visits compensated for the shortfall. The sub district information according to the DHIS reflected a significant number of newly diagnosed patients during the study period and there was an expectation for a significant sample size only to identify discrepancies in the quality of source documents.

Patients are encouraged to take their clinical records to the referral hospital but significant records were left/lost at the hospital. This affects continuity of care if old clinical notes are not readily available for HCW.

There were instances of drug stock outs that might have affected drug treatment compliance with HCWs resorting to the only available medication at the time.

The researcher would assessed HCW as being non compliant if reasons for different drug use other than the recommended ones in the guidelines are not used. The other systems error noted in the study was stock out of urine test strips compromising the assessment of complications associated with uncontrolled hypertension.

As this research was done by record analysis, the individual clinical reasons for different drug or drug class use would not have been assessed due to lack of supporting clinical notes.

There was inconsistency in clinical examinations of patients where some parameters are assessed and others e.g. height and weight were not.

CHAPTER 6

Conclusions and recommendations

This study highlighted the significance of keeping abreast with ever changing clinical practices based on new clinically proven evidence through continuous professional development in terms of an emphasis on international standards of diagnosis and non-drug management of hypertension. There are few internationally reputable organizations/ societies discussed in the study dealing exclusively with hypertension as their topic of interest and endorsed by WHO that we need to continuously familiarize ourselves with their latest trends and recommendations in the management of hypertension.

Self reported studies have demonstrated how clinical inertia prevents doctors from acting on elevated BPs despite their awareness of guidelines.

Nurses are the main service providers in PHC and it is encouraging to see the increased level of compliance both in diagnosis and management. Compliance to drug management by nurses was ahead of doctors at 63.5% and 56.6% respectively.

Of clinical significance was the following: of the calculated BMI's, 23% were obese whereas overweight and normal weights accounted for 14% each.

Though not the focus of the study it was found that 62% of the sample had controlled BP (<140/90mmHg) whereas 10% and 28% had moderate and mild HPT respectively. Hypertensive emergency was recorded in 16 visits representing 8 patients.

Source documents need to be properly monitored and information verified. Peer review of data and management oversight is encouraged. Training of staff on the chronic patient records and/or DHIS record is critical for uniformity in terms of data collection. The use of a standardized chronic form improved management of patients by simplifying collection and documentation of clinical information over a 12 month period.

The study did not succeed in achieving an adequate sample size to be able to generalise the results to the sub district under study and other sub districts in the province.

There is an opportunity to do a prospective study where all newly diagnosed patients can be properly followed and assessed for compliance in terms of hypertension diagnosis and management. Qualitative study might also assist in answering the issues that are not documented with regard to health education.

HYPERTENSIVE NEW CASES PUT ON TREATMENT IN A SUB DISTRICT

Annexure A1

Sum of EntryNumber			DataPeriod												
SortOrder	DataElement	Year	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Grand Total
103	Hypertension case put on treatment - new	2010				58	36	49	58	176	67	95	157	32	728
		2011	143	49	37	46	73	42	62	84	95	61	72	38	802
		2012	56	61	63										180

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HYPERTENSIVE NEW CASES PUT ON TREATMENT PER FACILITY

Annexure A2

		Year	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
nw Boskop Health Post															
Hypertension case - new		2010				2	2	3	0	96	4	2	104	4	217
		2011	87	0	0	0	0	2	0	0	1	0	0	0	90
		2012	0	1	0										1
nw Top City Clinic															
Hypertension case - new		2010				4	2	0	3	6	7	2	2	5	31
		2011	6	0	3	2	1	7	2	12	2	7	5	3	50
		2012	1	2	8										11
nw Boiki Thlapi CHC															
Hypertension case - new		2010				4	0	5	5	2	0	2	1	3	22
		2011	1	2	2	2	2	2	4	7	2	4	2	3	33
		2012	6	2	5										13
nw Lesego Clinic															
Hypertension case - new		2010				3	6	6	0	1	0	4	5	0	25
		2011	7	5	2	2	4	0	3	3	2	2	4	2	36
		2012	2	1	0										3
nw Mohadin Clinic															
Hypertension case - new		2010				4	2	2	5	4	0	14	8	6	45
		2011	4	3	2	2	13	4	3	0	8	12	16	7	74
		2012	19	11	13										43
nw Promosa CHC															
Hypertension case - new		2010				7	3	12	14	12	0	5	5	2	60
		2011	3	8	5	1	13	5	13	13	8	3	1	7	80
		2012	8	2	2										12
nw Potchefstroom Clinic															
Hypertension case - new		2010				20	4	6	13	16	33	28	18	8	146
		2011	19	14	11	18	14	11	18	31	21	13	30	3	203
		2012	10	8	6										24
nw Steve Tshwete Clinic															
Hypertension case - new		2010				10	13	1	8	31	4	5	0	4	76
		2011	12	6	5	7	16	7	12	11	7	5	5	7	100
		2012	3	17	18										38
nw Gateway Clinic															
Hypertension case - new		2010				3	4	12	8	0	18	12	10	0	67
		2011	1	0	0	4	3	0	1	0	2	0	1	1	13
		2012	1	0	5										6

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SCREENING QUESTIONS FOR RESEARCH STUDY

POTCH TOWN CLINIC

Were you diagnosed with hypertension between April 2009 and March 2011	Yes	No						
Did you have diabetes/ Epilepsy/ Asthma/ Tuberculosis at time of diagnosis	Yes	No						
Were you younger than 18yrs when you were diagnosed	Yes	No						
Were you pregnant when you were diagnosed	N/A	Yes	No					
Were you diagnosed in one of Potchefstroom clinic?	Yes	No						
If yes which clinic	Boikie	Steve	Top	Mohad	Lesego	Potch	Gateway	Promosa

Any Red Exclude

All Green Register the patient accordingly

DATA COLLECTION TOOL

	Clinic	
Demography	Pseudo name	
	Reg no	
	Sex	
	Age	
	BMI	Weight
		Height
	Visit type	Initial/ follow up visit
	Date of visit	Month or Annual
	Initial BP check	SBP and DBP
	2 nd BP check	SBP and DBP
	3 rd BP check	SBP and DBP
Diagnosis		Appropriate/ Not
	Target BP reached	Yes/ No
Drug management	Amlodipine 10mg	Appropriate/ Not
	Hydrochlorothiazide 12.5mg	Appropriate/ Not
	Hydrochlorothiazide 25mg	Appropriate/ Not
	Perindopril 4mg	Appropriate/ Not
	Enalapril 5mg	Appropriate/ Not
	Enalapril 10mg	Appropriate/ Not
	Enalapril 20mg	Appropriate/ Not
	Nifedipine XL 30mg	Appropriate/ Not
	Amlodipine 10mg	Appropriate/ Not
	Atenolol 50mg	Appropriate/ Not
	Furosemide 40mg	Appropriate/ Not
Drug management step (Table 1)		Appropriate/ Not
	Urine test	Protein
		Blood
		Glucose
Non drug management (Figure 1)	Life style	Appropriate/ Not
	Hospital transfer	Yes or No
	Health care worker	Nurse or Doctor



R14/49 Dr PR Siko

HUMAN RESEARCH ETHICS COMMITTEE (MEDICAL)
CLEARANCE CERTIFICATE NO. M130265

NAME:
(Principal Investigator)

Dr PR Siko

DEPARTMENT:

Family Medicine
 Medical School

PROJECT TITLE:

Compliance to Standard Treatment Guidelines
 by Health Care Workers in the Management of
 Hypertensive Patients in a Period 2009/2011

DATE CONSIDERED:

22/02/2013

DECISION:

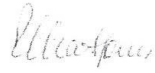
Approved Unconditionally

CONDITIONS:

SUPERVISOR:

Prof C van Deventer

APPROVED BY:


 Professor PE Cleaton-Jones, Chairperson, HREC (Medical)

DATE OF APPROVAL:

17/01/2014

This clearance certificate is valid for 5 years from date of approval. Extension may be applied for.

DECLARATION OF INVESTIGATORS

To be completed in duplicate and **ONE COPY** returned to the Secretary in Room 10004, 10th floor, Senate House, University.
 I/we fully understand the conditions under which I am/we are authorized to carry out the above-mentioned research and I/we undertake to ensure compliance with these conditions. Should any departure be contemplated, from the research protocol as approved, I/we undertake to resubmit the application to the Committee. **I agree to submit a yearly progress report**

Principal Investigator Signature _____

Date _____

PLEASE QUOTE THE PROTOCOL NUMBER IN ALL ENQUIRIES



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POLICY, PLANNING, RESEARCH, MONITORING AND EVALUATION

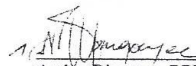
To : Dr P.R Siko
From : Policy, Planning, Research, Monitoring & Evaluation
Subject : Approval Letter-Compliance to standard treatment guidelines by health care workers in the management of hypertensive patients in a period 2009/2011

Purpose

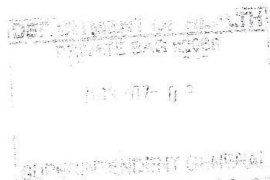
To inform the researcher that permission to undertake the above mentioned study has been granted by the North West Department of Health. The researcher is expected to issue this letter to the districts or health facilities as proof that the Department has granted approval of the study. This is on condition that the normal operations at identified facilities are not affected and that there is an appropriate logic in place to ensure that specimen is collected with ease.

Arrangements in advance with managers at district level or facilities shall be facilitated by the researcher. The department expects to receive the final research report upon completion.

Kindest regards


Acting Director: PPRM&E
Mr. L. Moaisi

05/07/2013
Date



Healthy Living for All

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