Silent Killer, Silent Health Care: A Case Study of the Need for Nurse-led Hypertension Management

Celestina Fivawo

REPOA
P.O. Box 33223, Dar es Salaam, Tanzania
157 Mgombani Street, Regent Estate
Tel: +255 (0) 22 2700083 / 2772556
Fax: +255 (0) 22 2775738
Email: repoa@repoa.or.tz

Website: www.repoa.or.tz

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157 Mgombani Street, Regent Estate
Tel: +255 (0) 22 2700083 / 2772556
Fax: +255 (0) 22 2775738
Email: repoa@repoa.or.tz
Website: www.repoa.or.tz

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Acronyms

CVD	Cardiovascular disease
DBP	Diastolic blood pressure
ISH	Isolated systolic blood pressure
LMIC	Lower- and middle-income countries
MUHAS	Muhimbili University of Health and Allied Sciences
NHS	National Health Service (UK)
SBP	Systolic blood pressure
WHO	World Health Organization

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Abstract

It is still a widely held belief that low- and middle-income countries like Tanzania should focus on tackling infectious disease. However, this view ignores the rapid upsurge in chronic disease and associated disabilities and death. In reality, therefore, low-income countries like Tanzania have to learn to cope simultaneously with both old and new public health challenges. This is particularly important for the prevention of hypertension, a chronic disease referred to as the 'silent killer', since it afflicts people without necessarily showing any symptoms.

This working paper employs a case study of the management of hypertensive patients at the Muhimbili Diabetic Centre in May–June 2013 to demonstrate both the opportunity and the need to move to effective nurse-led hypertension management and prevention. The centre at Muhimbili was selected because diabetic patients are very likely to have hypertension. The study focuses on patients who were hypertensive on first arrival at the clinic and finds that hypertension among these patients was poorly controlled. Evidence from the study also reveals that a large majority of these patients were diagnosed with hypertension only on arrival at the hospital level. Finally, while it is often assumed that hypertension is an illness of the elderly, a majority of these patients had been diagnosed while of working age and of child-rearing age.

What implications can be drawn from this study to guide improvements in the management and prevention of hypertension in Tanzania? In this clinic, nurses collected excellent records of weight, height, and blood pressure on each visit. However, at present the nurses do not use this information to monitor and evaluate the progression of hypertension in their patients. It follows that there is an opportunity to delegate the task of managing hypertension to nurses. Achieving this will require new protocols for nurses and changes in supportive management. Beyond the clinic setting, the study suggests that improved screening, monitoring, and hypertension prevention requires a shift to nurse management of this chronic disease at the primary care level.

1 Introduction

In recent decades the incidence of chronic disease has become increasingly important in Africa. In the past, the prevalence of infectious diseases constituted the main problem for health care in Africa, and this disease burden continues up to today. However, more recently, the continent has witnessed demographic and health transitions characterized by more people living in urban areas, shifts to a more unhealthy diet, and a reduction in physical movement. This has led to a growing chronic disease epidemic and, hence, a mixed pattern of disease occurrence with the coexistence of both infectious and chronic disease. Hypertension, considered to be rare in the past, is now acknowledged to be growing rapidly, particularly in urban areas. Awareness of the dangers of this epidemic has not kept up with this change in pattern.

Hypertension, also known as high or raised blood pressure, contributes (as Section 2 shows) to the burden of heart disease, stroke, and kidney failure, in addition to premature mortality and disability. Hypertension is a 'silent invisible killer', which rarely causes symptoms in the early stages and, hence, many people with hypertension go undiagnosed in the absence of screening. Experience in higher-income countries has shown that early detection coupled with prevention can play an important role in slowing down or reversing the spread of the disease and in restraining its effect on mortality and morbidity. For this reason, hypertension disproportionately affects populations in low- and middle-income countries where health systems are weak and mainly focused on dealing with infectious disease. In these countries screening for hypertension is often not done at the primary level. Those who are diagnosed may not have access to treatment and may not be able to effectively control their illness over a long period of time.

Chronic diseases require constant monitoring rather than brief interventions. Measuring blood pressure, weight, and height of patients is a routine task regularly undertaken by nurses. This working paper discusses a case study of the management of hypertensive patients at the Muhimbili Diabetic Centre in May–June 2013. The centre at Muhimbili was selected because diabetic patients are very likely to be hypertensive. The study focuses on patients who were hypertensive on first arrival at the clinic. The study explores the role that nurse-led management could play in screening for early detection of the disease and in creating awareness about hypertension to prevent the rapid spread of this epidemic disease, particularly in urban contexts like Dar es Salaam.

This paper thus argues that nurses could play a key role in managing blood pressure of clients, in giving advice about dietary habits, level of physical activity, and the importance of low alcohol consumption, and in encouraging regular health check-ups before patients become chronically ill. However, nurses do not yet play this role.

2 Hypertension in the African Context

Globally, 26.4% (between 26.0–26.8% at a 95% confidence interval) of the adult population had hypertension in year 2000: 26.6% of men and 26.1% of women. By 2025, 29.2% are projected to have this condition: 29.0% of men and 29.5% of women. This means that prevalence among women is similar to that among men and will be rising somewhat faster in the coming years. Hypertension, therefore, is an important public health challenge worldwide. Prevention, detection, treatment, and control of this condition should receive high priority (Kearney *et al*., 2005).

According to a WHO report (WHO, 2013), cardiovascular disease accounts for approximately 17 million deaths a year, nearly one third of total worldwide deaths. Of these, complications of hypertension account for 9.4 million deaths worldwide every year. Hypertension is responsible for at least 45% of deaths due to heart disease and 51% of deaths due to stroke. In 2008, worldwide, approximately 40% of adults aged 25 and above had been diagnosed with hypertension; the number of people with the condition rose from 600 million in 1980 to 1 billion in 2008. The increasing prevalence of hypertension is attributed to population growth, ageing, and behavioural risk factors, such as unhealthy diet, harmful use of alcohol, lack of physical activity, excess weight, and exposure to persistent stress. Health workers can raise the awareness of hypertension in different population groups. Activities can range from blood pressure measurement campaigns to health education programmes in the workplace to information dialogue with policy makers on how living conditions and unhealthy behaviour influence blood pressure levels.

With respect to low- and middle-income countries, WHO (2005) further argued:

> Many people believe that low and middle-income countries should control infectious disease before they tackle chronic disease. In reality low and middle income countries are at the centre of both old and new public health challenges. While they continue to deal with the problem of infectious diseases, there are many cases experiencing a rapid upsurge in chronic disease risk factors and deaths, especially in urban settings. These risk levels foretell a devastating future burden of chronic diseases in these countries. (WHO 2005: p. 9)

Moreover, Hendriks *et al.* (2012) show that hypertension is the most frequently observed cardiovascular disease risk factor in both urban and rural communities in multiple regions in Sub-Saharan Africa. Prevalence of hypertension is higher in urban than in rural settings, but both have increased over time. More specifically, they argue:

> The rapid changes towards a more Western lifestyle that are taking place in low middle income countries (LMIC) is likely to contribute to an increase in the prevalence of hypertension in the coming years, in both rural and urban areas. Whereas mean systolic blood pressure is decreasing since 1980 in high income countries, trends in blood pressure show an increase in systolic blood pressure in many SSA regions and mean systolic blood pressures in SSA are amongst the highest in the world. In addition, people of black African origin have been identified as having a higher risk of target organ damage compared to Caucasians for a given blood pressure and the onset of CVD in LMIC countries occurs at an earlier age compared to high-income countries. (Hendriks, ME *et al*., 2012: pp. 7–8)

Nevertheless, as Hendriks *et al*. (2012) further argue, in Africa the level of awareness about hypertension is low and lack of treatment and control is alarming due to poor access to care. Urgent

measures are needed to prevent an emerging epidemic of cardiovascular diseases. In Tanzania, in particular, awareness about the dangers of hypertension remains low, and comprehensive forms of screening hardly exist. Consequently, the problem only manifests itself when major symptoms develop or when the disease causes serious related illnesses like heart attacks, strokes, heart failure, or kidney diseases. Experience in other countries, however, shows that early detection coupled with prevention and early treatment can play an important role in slowing down or reversing the spread of the disease and thus reducing its devastating effects on mortality and morbidity.

Indeed, the development of high blood pressure and its complications depends to a large extent on the prevailing social conditions within which people live and work and on their associated behavioural risk factors such as unhealthy diet, tobacco use, physical inactivity and the harmful use of alcohol (WHO (2013: p. 18). In recent decades, these social conditions have been rapidly changing in Africa under the impulse of processes of globalisation and urbanisation and associated in changes in education and in housing. That changes in these social determinants can be very important is demonstrated in an interesting case study on Cuba. Franco *et al.* (2013) found that, during the deepest period of the economic crisis in Cuba, lasting from 1991 to 1995, food was scarce and access to gas was greatly reduced, virtually eliminating motorized transport and causing the industrial and agricultural sectors to shift to manual intensive labour.

This combination of food shortages and unavoidable increases in physical activity put the entire population in a negative energy balance, resulting in a population-wide weight loss of 4–5 kg per person. The Cuban economy started recovering in 1996 with a sustained growth phase from 2000 onwards. Since 1996, physical activity has slightly declined. By 2002, energy intake had increased above pre-crisis levels. As a result of the above trends, by 2011, the Cuban population had regained enough weight to almost triple the obesity rates of 1995. This U-shaped, population-wide pattern in body weight is historically unique because of several factors: The initial weight loss occurred in a population that had been well nourished previously, lasted for five years, and affected people at all initial levels of body mass index. What is interesting about this experience, however, is that "rapid declines in diabetes and heart disease accompanied the average population-wide loss of 5.5 kg in weight, driven by economic crisis in the mid-1990s" (p. 2).

Medical resources cannot readily be reallocated to the care of hypertension because the health systems in Africa currently deal primarily with infectious diseases and often ignore the high and increasing prevalence of chronic diseases, including hypertension. The growing incidence of non-communicable diseases will lead to greater dependency and mounting costs of care for patients and their families unless public health efforts prevent these conditions from intensifying.

Skilled and trained health workers at all levels of care, dispensaries and health centres in particular, are essential for the success of hypertension control programmes. A case study of Kawe Ward in Dar es Salaam by Kida (2009: pp. 99–113: especially, Table 4.7 p. 100), for example, showed that the poorer and middle strata of the urban population rely more on dispensaries and health centres (66% of poorer households and 63% of middle-level households) and to a lesser extent on public hospitals (27% of poorer households and 21% of middle-level households) when seeking health care, while the better off rely mainly on private hospitals (68% of better-off households). Ensuring that dispensaries and health care centres screen for hypertension is, therefore, important for widening management of chronic disease, particular for the poorer and middle strata of the urban population.

The ratio of medical doctors to population is very low in Africa. In this respect, Bischoff *et al.* (2009) argues:

> A survey conducted in 2005 in the WHO African region showed that there were 621,164 nurses and 150,459 doctors and a group of 666,314 "other" health workers that included managers, administrators, dentists, laboratory workers and others. As in other world regions, nurses are by far the most numerous group of health workers, counting at least four times the amount of doctors …
>
> There is thus a great and urgent need to produce more health workers able to cope with the chronic conditions epidemic. While under the buzzword of task shifting, the involvement of community health workers has been advocated, there will always be an urgent need to produce more nurses. Nurses will have to take on supervision tasks, not the least because task shifting implies also the shifting of doctors' tasks to nurses. (2009: pp. 2264–5) …
>
> The essence of the chronic care model is the interaction between an informed, activated patient and a prepared proactive practice team. Indeed, such a team is nearly always needed to enable patients to become adequately informed and activated. Many of the positive outcomes seen in planned care visits with nurses may be due to better communication with patients. Nurses appear to be particularly apt as team players and are able to establish a – perhaps more – beneficial interaction with patients (than doctors). (2009: 2263)

Similarly, Lekoubou *et al.* (2010) argue that nurse-led management of care can extend the reach of awareness raising, management, control, and treatment of hypertension. Nurse-led management can also achieve higher levels of patient satisfaction and better quality of life as compared to physician-led care alone. Generally, nurses are the ones who primarily undertake the general physical examination, including measuring weight, height, and blood pressure, of patients in many hospitals, before patients are seen by a physician. Nevertheless, in nurse-led management, nurses also manage the process of early detection, monitoring, and control of the disease.

3 Methodology

3.1. Study design and setting

The study was designed to elicit the following information from patients diagnosed with hypertension: When and where they were diagnosed with hypertension? Did they receive medication and advice on lifestyle changes? If so, who gave them advice? What was the current status of their condition?

The setting for the research was the Muhimbili diabetes clinic for outpatients. All patients, therefore, suffered from diabetes, a chronic disease that often goes hand in hand with hypertension. The patients visit the clinic at regular intervals (3 to 6 months), unless they are admitted to the wards. The clinic keeps patient files, which are updated at every visit.

The clinic is held twice a week on Mondays and Thursdays. On Monday the clinic is for children below the age of 18. On Thursday the clinic is for adults. Thursday is the day on which data were collected.

Data collection for this study was designed to use two sources of information:

- *First,* information on the first visit to the clinic was collected from the files for each of the patients sampled. This information concerned the date of first visit, height, weight, and measurements of systolic and diastolic blood pressure for each patient on their first visit.

- *Second*, the remainder of the information was obtained by the researcher through face-to-face interviews with each patient. At the same time, the researcher would also take the measurements of systolic and diastolic blood pressure and record the weight of each patient.

This overall design allowed the researcher to collect data from files that go back in the history of patients to their first visit to the clinic. Other data going back in time were collected using the *recall* method in the interviews. This concerned information on when and where they were first diagnosed, whether they received medication and advice on lifestyle, and who gave this advice.

Instruments used were the patients' questionnaire, patients' files, weighing scales (available at clinic), and sphygmomanometer and stethoscope to measure blood pressure. The questionnaire consisted of 15 close-ended questions to collect variables for quantitative analysis.

The researcher also carried out a few in-depth qualitative interviews of selected patients. Finally, during non-clinic days, the researcher also visited the wards to get an impression of the type of patients admitted on the clinic's referral.

3.2 Measuring blood pressure

Hypertension (high blood pressure) is described as repeatedly elevated blood pressure exceeding 140 over 90 mmHg – that is, a systolic pressure above 140 with a diastolic pressure above 90. The usual unit of measurement for blood pressure is mmHg: millimetres of mercury. Hypertension matters because it is an important risk factor for strokes and cardiovascular diseases. Early diagnosis of hypertension is particularly important since a person can be hypertensive without having any noticeable symptoms. This is why hypertension is often referred to as the *silent killer*. Its presence often reveals itself only after the damage is done.

In the past, high diastolic blood pressure (DBP) was assumed to be the most relevant hemodynamic parameter as a predictor of prognosis in hypertensive patients. Accordingly, most clinical studies particularly addressed DBP, and critical values were put forward as goals for treatment. Since then, however, a radical change in thinking, based upon epidemiological studies, has led to the recognition that elevated systolic blood pressure (SBP) is a risk factor at least as important as high DBP. Certain studies even indicate that SBP is a stronger predictor of prognosis than DBP, in particular with respect to risk of stroke.

Pulse pressure (PP) is measured as the difference between systolic blood pressure and diastolic blood pressure: PP = SBP – DBP. People with normal SBP and DPB, like 120/80mmHg or 110/70mmHg, have a pulse pressure of 40mmHg. Pulse pressure is high when the systolic blood pressure is much more elevated than the diastolic blood pressure. Pulse pressure is also an important risk factor in its own right. For this and other reasons, the term 'isolated systolic hypertension' (ISH) is used to depict a condition with elevated SBP and normal (or low) DBP. This condition is found especially in elderly hypertensive patients, since SBP is known to rise with advancing age, whereas DBP usually levels off and then tends to decrease among the elderly. Consequently, the pulse pressure will increase in such patients. It appears that elevated pulse pressure is an even better predictor of cerebro- and cardiovascular events in elderly hypertensive patients than a high SBP. Indeed, ISH is the most common type of hypertension among persons over 60 years of age (van Zwieten *et al.,* 2001: p. 1095). Table 1 gives a classification of different types of hypertension.

Table 1: A classification of hypertension

Classification	Systolic Blood Pressure SBP (mmHg)	Diastolic Blood Pressure DBP (mmHg)
Normal	90 - 139	60 - 89
Hypertension	≥ 140	≥ 90
Isolated systolic hypertension	≥ 140	< 90

The preferable method for measuring hypertension is by taking several readings of a patient's blood pressure at short intervals of time, rather than relying on a single measurement. At the Muhimbili Centre, the records on file only feature a single measurement for each patient at the time of the first visit and for each of the subsequent visits, which are generally three to six months apart.

On clinic days, the work pace is extremely busy, and the speed of processing patients is invariably fast. Also, during interviews it was not possible for the researcher to take more than a single measure for each patient because of the hurry with which patients were taken through the congested clinic. The measurements done by the researcher were also entered in patients' files. In other words, during the time of research, the researcher was effectively delegated the task of taking the blood pressure measures for the clinic as well as for her own research.

For purpose of this study, therefore, a patient is said to be hypertensive if SBP ≥ 140 and/or DBP ≥ 90 based on a single set of measurements entered in the patient's file.

3.3 Definition of population, sampling procedure, and sample size

The sample population of the study was defined as patients at the clinic who were diagnosed with hypertension at the date of their first visit. All these patients also suffered from diabetes, but this study focused only on the diabetics with hypertension.

The researcher visited the clinic on Wednesday to look at the files of all patients with appointments for Thursday. Those who were hypertensive at first visit were shortlisted for subsequent interviewing on Thursday. On Wednesday, the researcher recorded in the questionnaires the date of first visit, the patient's height, weight, and BP measurements on the date of first visit. On Thursday, the researcher completed the interviews with patients selected the day before and also with those patients who came without prior appointment.

For those patients who came without prior appointment, the researcher checked their files after completing the interviews to obtain the information on their first visit. If they were hypertensive at first visit, these patients were included in the sample. If not, they were dropped from the sample. Some patients did not come for their appointments. For these, no data were available from questionnaires. Other patients came for the first time and thus did not have a file yet. The researcher interviewed them and also checked their blood pressure. If they were hypertensive, they were included in the sample. If not, they were dropped from the sample.

The target was to collect a sample of 100 patients. Prior to undertaking fieldwork, it was not possible to do a trial data collection to get an idea of the extent of variation in the key variables to be collected in the study. The target sample size was based on the following reasoning: Most of the analysis involves the estimation of and comparison between single means and proportions. For a single mean, the minimum sample size is the ratio of the estimate of the squared standard deviation of the variable to the square of required size of the standard error. Alternatively, for a single proportion, the minimum sample size is the ratio of the variance of the proportion over the required size of the standard error (Kirkwood and Sterne, 2003: p. 421.) For example, obtaining a standard error of 0.04 for a proportion equal to, say, 0.2 requires a minimum sample size of 100. Reducing the standard error further requires progressively much larger sample sizes: A standard error of 0.02, for example, would require a sample size of 283. The choice of the sample size, therefore, was based on a compromise between obtaining reasonably precise results and the time limits imposed on fieldwork.

Data collection was done during the last week of May and the first two weeks of June 2013. In total, data were collected for 129 patients from the records on their first visit to the clinic. Only 92 patients were interviewed, because some patients did not come to their appointments. However, these 92 questionnaires with full information (from files and from interviews) included a number of patients who arrived without prior appointment, some of whom were not hypertensive at their first visit to the clinic: 10 in total. These 10 questionnaires were dropped from the sample.

The final sample, therefore, consisted of 82 patients. Of these 82 questionnaires, there were:

- 69 patients with a date of first visit before date of interview;
- 13 newcomers: their date of interview = their date of first visit.

The total sample made it possible to analyse data on patients according to their date of interview. The subsample of 69 patients made it possible to make comparisons of changes in weight and in BP measurements between the date of first visit and the date of interview.

3.4. Ethical considerations

Clearance was obtained from the Dean of the School of Nursing. Permission for conducting the research was sought from Muhas and from the Diabetes clinic. Patients were informed of the nature of the research, and privacy of individuals was respected. All patients interviewed gave consent for the interview. The ethical justification for this research was to improve the process of screening, monitoring, and managing hypertension, both at the clinical and at earlier stages.

3.5 Methods of data analysis

The data were first entered in an Excel file. Subsequent data management and analysis was done using the statistical software package *Stata*.

The methods of data analysis included descriptive statistics, confidence intervals and significance tests, and limited use of qualitative data based on interviews with patients, doctors, and nurses.

3.6. Limitations of the study

Muhimbili has no clinic that specifically deals with hypertension. This is the reason why research was done at the diabetic clinic. Data on hypertension were limited to a single measure only: on first visit listed in the files (since only one set of measurements appears in the files per visit) and at the time of interview (because time was not available to allow the patient to rest for a while and retake the measurements). It follows that the definition used for hypertension in this research paper can be seen only as an indicator that the patient is *potentially* hypertensive, but does not constitute a firm diagnosis. However, patients' files show that hypertension medicine is often prescribed for patients without evidence that multiple readings were made.

To limit the study's scope, the researcher did not collect data on glucose levels along with measurements on hypertension. This makes it impossible to check whether glucose levels improved between date of first visit and date of interview.

4 Findings

4.1 Hypertension as a working-age disease

The median age of patients at the time of interview was 59 years, while the mean age was slightly above 57. Table 2 gives the age distribution of the patients in the sample.

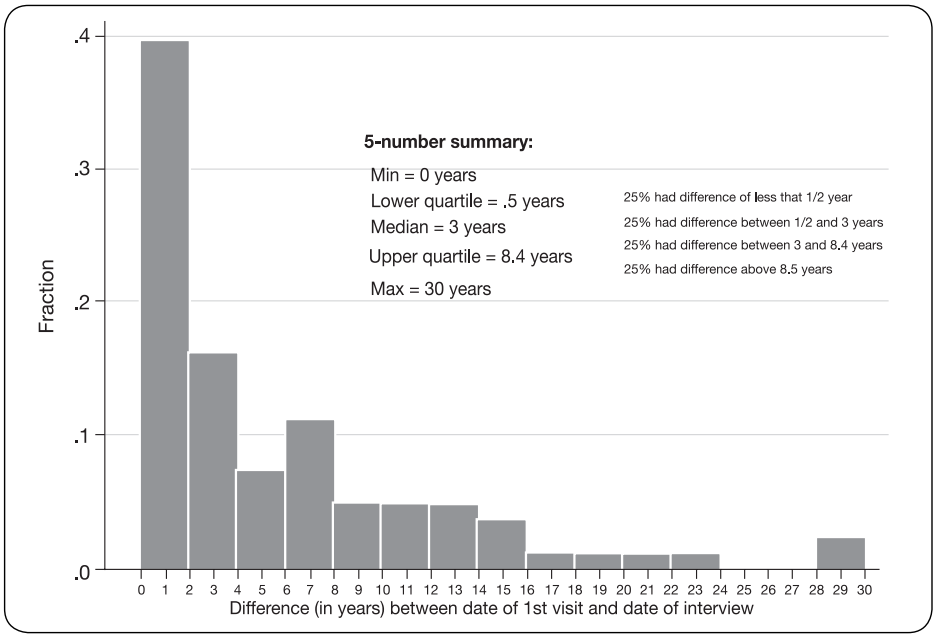
Table 2: Age distribution

Age cohort	Frequency	Percentages	Cumulative percentages
Below 30	3	3.7	3.7
30 to below 40	3	3.7	7.3
40 to below 50	16	19.5	26.8
50 to below 60	20	24.4	51.2
60 to below 70	23	28.1	79.3
70 and above	17	20.7	100.00
Total	82	100.00	

The data suggest that, on average, patients as they appear in the waiting room tend to be at the upper end of the adult age distribution: about half were aged 60 years or above and about three quarters were 50 years or above. However, this should not lead us to conclude that hypertension is a disease that mainly afflicts people of older age. The reason is that hypertension is a chronic disease and, hence, once patients are diagnosed with hypertension they require treatment over prolonged periods of time, if not the remainder of their lifetime.

To illustrate this point, Figure 1 shows the distribution of the number of years patients have been coming to the Muhimbili Diabetes Centre. All patients in the sample were hypertensive when they first came to the clinic. Note, however, that they may have been diagnosed with hypertension even before coming to the Muhimbili Centre and, hence, this distribution only shows a lower limit of the number of years since a patient was diagnosed with hypertension. Moreover, many of these patients may have been hypertensive for quite some time before being diagnosed at all, given the absence of comprehensive screening for hypertension in Tanzania.

Figure 1: Difference (in years) between date at first visit and date of interview



We can therefore calculate the age of these patients when they first came to the clinic. The age at first visit (in years) was computed as follows:

$$\text{age at first visit} = \text{age} - \frac{(\text{number of days between interview and 1st visit})}{365.25}$$

Note: A normal year has 365 days; a leap year has 366 days.
Hence, on average, a year = 365.25 days.

Figure 2 compares the boxplot of the age distribution at time of interview with that of the age distribution at time of first visit.

Figure 2: Comparative boxplots: Age distributions at time of interview (left) and at time of first visit (right).

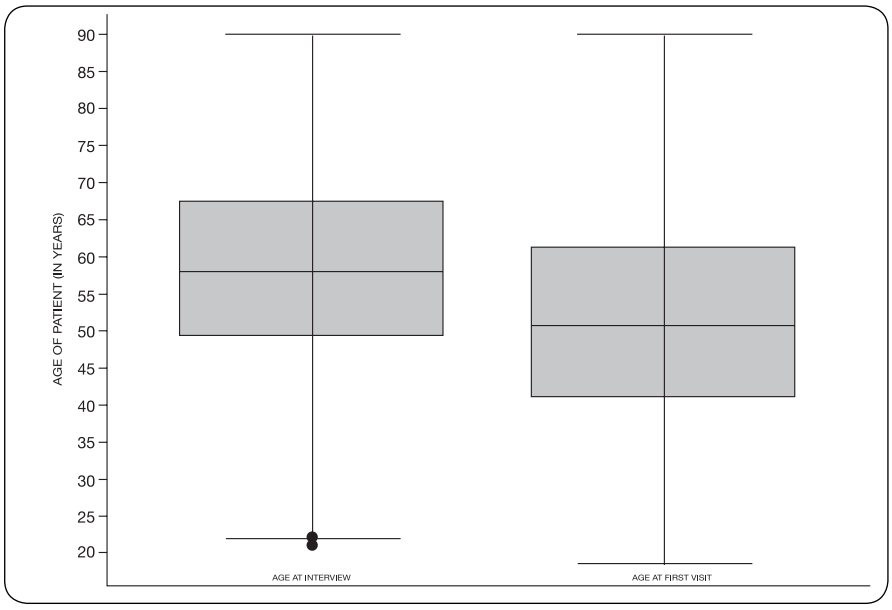


Table 3 gives the means, standard deviations, and main order statistics – the three quartiles, minimum, and maximum values – of both age distributions.

Table 3: Age distribution at time of interview (left) versus age distribution at time of first visit (right)

Statistics	Age at interview	Age at first visit
Minimum	21.0	18.5
Lower quartile	49.0	41.0
Median	59.0	51.0
Upper quartile	67.0	61.4
Maximum	90.0	90.0
Mean	57.3	51.6
Standard deviation	14.1	14.9

The age distribution at first visit shows that many of these patients were much younger when first diagnosed with hypertension at the Muhimbili Diabetes Centre. The median and mean ages at first visit are roughly the same: The median is 51 years old, while the mean is 51.6. Moreover, 25% of patients were below the age of 41. Some of these were very young (minimum age was 18 years). The middle 50% of ages were between 41 and 61, of which 25% of patients were between 41 and 51 years and 25% between 51 and 61 years. Finally, only 25% were above 61 when they first visited the clinic.

As noted above, however, many of these patients may have been hypertensive – diagnosed or not – well before coming to the Muhimbili Diabetes Centre for the first time. Hence, the age distribution at first visit shows the upper limit of the age at which patients were hypertensive. Many were probably even younger when they first developed hypertension.

The implication of this finding is that hypertension is a disease that afflicts people of working age and, hence, is not only a disease of the elderly.

Table 4: Gender composition of patients

Sex	Frequency	Per cent	Cumulative per cent
Male	25	30.5	30.5
Female	57	69.5	100.0
Total	82	100.0	

This table shows a considerably higher number of women than men in the sample. Nonetheless, it is useful to test whether this sample could have been drawn from a population with roughly equal proportions of men and women: specifically, whether the proportion of men in the population could have been 0.5. However, this null-hypothesis, that the sample derives from a population of patients of which 50% are male, is rejected with p-value of 0.0004 (≤ 0.05).

This does not necessarily imply that hypertension is a disease that afflicts more women than men. Indeed, as the nurse in charge of the clinic explained, at first visit there are roughly an equal number of men and women, but men tend to drop out after a few visits while women continue to come. She also said that this explains why there are more men in the wards than women. The reason is that men drop out and only return when their condition has worsened, thus ending up in clinical wards rather than at the outpatient clinic. In other words, men drop out sooner and wait too long before coming back. A doctor at the centre further commented: “This is obvious. Women have families to take care of and worry more about their health. Men drop out as soon as they feel a bit better”.

This study used the level of education as a rough proxy for the socioeconomic status of the patients. The reason for collecting data on education – rather than income (on which is notoriously difficult to obtain good data) – was that in Africa it is often asserted that hypertension tends to be a disease of affluence. Table 5 shows the level of education of the patients.

Table 5: Level of education

Level of education	Frequency	Per cent	Cumulative per cent
None	7	8.5	8.5
Primary	46	56.1	64.6
O level	25	30.5	95.1
A level	1	1.2	96.3
Higher	3	3.7	100.0
Total	82	100.0	

The modal category is primary education, followed by those with O-level education. Only a few, less than 5%, have A-levels or higher education. This finding, therefore, throws doubt on the commonly held view that hypertension is a disease of affluence.

4.2 Lack of diagnosis at primary level?

During interviews, patients were asked about the year in which they first were diagnosed with hypertension. Table 6 compares the year of first diagnosis (as given by patients) with the year in which they came to the clinic for the first visit (taken from the patients' files).

Table 6: Year of first diagnosis with hypertension versus year of first visit to Muhimbili Diabetes Clinic

When diagnosed?	Frequency	Per cent	Cumulative per cent
Year diagnosis < year first visit	34	42.0	42.0
Year diagnosis = year first visit	33	40.7	82.7
Year diagnosis > year first visit	14	17.3	100.0
Total	81	100.0	

Only 42% said that they were diagnosed with hypertension before the year in which they first came to the clinic. However, about 17% replied that the year they were diagnosed with hypertension was after the year they first came to the clinic. Yet all patients in the sample were hypertensive at the time of their first visit. Given that these data are based on recall by patients, it is of course possible that some patients remembered the year incorrectly. But it is also possible that they were not told they had hypertension at the first visit. Indeed, during the interviews, several patients told the researcher that they only knew that they had hypertension after the researcher told them.

Patients were also asked at which type of health facility they were first diagnosed with hypertension. Table 7 shows the results.

Table 7: Type of health facility where patient was first diagnosed with hypertension

Where first diagnosed?	Frequency	Per cent	Cumulative per cent
Muhimbili diabetic clinic	42	51.2	51.2
Public/Private hospitals	31	37.8	89.0
Dispensary/HC/District hospital	9	11.0	100.0
Total	82	100.0	

The table shows that slightly more than half of the patients were first diagnosed with hypertension at the Muhimbili Diabetes Centre. This means that they were never diagnosed with hypertension before coming to the clinic because of diabetes. Hence, it is only because these patients were referred to the clinic for their diabetes that they also came to know that they were hypertensive. Moreover, most of the remaining patients were first diagnosed with hypertension at a hospital – public or private (other than at the diabetes clinic). Only 11% of the patients said that they were first diagnosed with hypertension at primary care level: a dispensary, a health centre, or a district hospital.

4.3 Poorly controlled hypertension

Table 8 compares the means of SBP and DBP on the date of interview and at the date of first visit, and tests whether they differ. For hypertensive patients, one would expect both means to decrease after treatment: That is, one would expect the mean of SBP (respectively, DBP) to be smaller at the date of interview than at the date of first visit.

Table 8: Mean comparisons of systolic and diastolic blood pressure at first visit and at interview

Date of measurement of blood pressure	SBP			DBP		
	Mean	Standard error	Sample size	Mean	Standard error	Sample size
Date of interview	166.3	3.636	69	91.7	1.826	69
Date of first visit	158.4	2.283		96.0	1.338	
Difference	7.9	3.973		-4.4	2.157	
Paired t-test: $H_{0:}\ BP_{interview} = BP_{first\ visit}$ $H_{a:}\ BP_{interview} \neq BP_{first\ visit}$	t = 1.9988 p-value = 0.0496 *Null-hypothesis is rejected*			t = -2.0290 p-value = 0.0464 *Null-hypothesis is rejected*		

Note: Test is restricted to sample of patients with date of first visit ≠ date of interview

The table illustrates that:

- The mean DBP at time of interview (= nearly 92 mmHg) is indeed *lower* than the mean DBP at the time of first visit (= 96 mmHg): The difference is -4.4 mmHg.

- Surprisingly, the mean SBP at interview (= 166 mmHg) was *higher* than the mean SBP at first visit (= 158 mmHg): The difference is nearly 8 mmHg.

Furthermore, given that the mean of SBP increased and the mean of DBP decreased between both visits, it also follows that mean pulse pressure (the difference between systolic blood pressure and diastolic blood pressure) increased markedly between date of first visit and date of interview.

As explained earlier, normal blood pressure, such as 120/80mmHg or 110/70mmHg, has a pulse pressure of 40mmHg. As Table 6 shows, the mean pulse pressures at date of interview and at time of first visit are both much higher than 40mmHg: 74.6 mmHg (= 166.3 mmHg – 91.7 mmHg) and 62.4 mmHg (= 158.4 mmHg – 96.0 mmHg), respectively. On average, therefore, the pulse pressure increased by 12.3 mmHg. A paired t-test further shows that the probability value is $0.0002 < 0.05$, and hence, the null-hypothesis is rejected. The difference in mean pulse pressure is statistically significant.

Turning now to the incidence of hypertension among patients in the sample, Table 9 gives a cross-tabulation of high SBP against high DBP at time of interview.

Table 9: Prevalence of high SBP versus high DBP at date of interview

Systolic BP ≥ 140 mmHg	Diastolic BP ≥ 90 mmHg		Total
	No	Yes	
No	9	5	14
	13.0%	7.3%	20.3%
Yes	21	34	55
	30.4%	49.3%	79.7%
Total	29	39	69
	43.5%	57.4%	100%

Note: Sample is restricted to patients with date of first visit ≠ date of interview

This table shows that 87% (= 100% – 13%) of these patients were hypertensive at the time of interview. Since all patients were hypertensive at the time of first visit, it follows that the reduction in the incidence of hypertension as a result of treatment at the clinic was rather small, since only 13% of patients were controlled hypertensives at time of interview (the 95% confidence interval of this proportion is between 5% and 21% of the patients.) The implication is that hypertension is poorly controlled as a result of treatment at the Muhimbili Diabetes Centre.

Another interesting feature of this table is the high incidence of patients with isolated systolic hypertension (a condition in which the systolic blood pressure is higher than normal, while the diastolic blood pressure is normal or low). Indeed, at the time of interview, 30.4% of these patients had elevated systolic blood pressure and normal diastolic blood pressure. Table 10 below shows that the comparable percentage was 13% at the time of first visit.

Table 10: Prevalence of high SBP versus high DBP at date of first visit

Systolic BP ≥ 140 mmHg	Diastolic ≥ 90 mmHg		Total
	No	Yes	
No	0	5	5
	0.0	*7.3*	*7.3*
Yes	9	55	64
	13.0	*79.7*	*92.8*
Total	9	60	69
	13.0	*87.0*	*100.00*

Notes: Sample is restricted to patients with date of first visit ≠ date of interview

What these results show, therefore, is that the incidence of isolated systolic hypertension more than doubled, from 13% at first visit to 30.4% at time of interview. Furthermore, using McNemar's test for equality of correlated proportions, this difference is statistically significant with a probability value of 0.0227 < 0.05. The 95% confidence interval of the odds ratio is 1.19 (lower limit) and 7.56 (upper limit), which does not include 1 (= even odds).

4.4 Good data poorly used

Observing the practice of nurses during fieldwork, the researcher noted that at Muhimbili Diabetes Centre nurses have a good practice in keeping detailed records on patients with hypertension: The information on patients' weight, height, and blood pressure is routinely collected during successive visits to the clinic. It was also found, however, that in regular clinical summary reports, the nurse in charge mainly summarised the records on diabetes, but seldom the records on hypertension. But the main problem is that while nurses recorded all the data on patients' files, they did not use this information to monitor and evaluate the progression of hypertension of their patients.

An example may illustrate this point. The control of chronic disease requires patients to take regular medication over prolonged periods of time. During interviews, patients were asked whether or not they were taking medication at the time of interview. Table 11 shows the cross-tabulation of the answer with the incidence of hypertension at time of interview.

Table 11: Hypertensive at interview versus whether on medication at interview?

Hypertensive at interview?	On medication now?		
	No	Yes	Total
No	6	3	9
	66.7%	33.3%	100.0%
Yes	35	38	73
	48.0%	52.1%	100.0%
Total	41	41	82
	50.0%	50.0%	100.0%

Surprisingly, the table shows that 48% of those who were hypertensive were not taking medication at the time of interview. This result does not mean that patients were not prescribed medication. Some patients may have ceased taking their medication. One reason is that, as several patients told the researcher, they could not afford to buy hypertension drugs and, hence, stopped taking them. As a doctor further explained, patients receive medication for diabetes free of charge, but not for hypertension. But it is also the case that the pace at which patients are processed during clinic days leaves nurses little or no time to check, monitor, and manage patients' compliance with medical prescriptions. Hence, much of the problem of patients not taking their medication goes unnoticed.

Nonetheless, there is one important instance where nursing care is proactive: the issue of giving advice to patients on changes in lifestyle. Indeed, the assistant nurse at the diabetes centre routinely provides advice on lifestyle at the time of first visit to the clinic. Although there appears to be little or no follow-up on this advice during subsequent visits, there is some evidence, however, that this advice proves useful. This concerns the issue of weight of patients. Table 12 below compares the mean weight of patients at time of interview and at the date of first visit. What it shows is that, on average, patients lost weight: about 4.4 kg/patient.

Table 12: Comparison of mean weight of patients at time of interview and at date of first visit

Date of measurement	Weight of patients		
	Mean	Standard error	Sample size
Date of interview	71.8	1.92	69
Date of first visit	76.4	2.24	
Difference	-4.4	1.30	
Paired t-test:	t = - 3.53		
H_0 weight$_{inteview}$ = weight$_{first\ visit}$	p-value = 0.0009		
H_a weight$_{inteview}$ ≠ weight$_{first\ visit}$	H_0 is rejected		

Note: Test is restricted to sample of patients with date of first visit ≠ date of interview

Of course, this weight loss cannot just be attributed to changes in lifestyle, since other factors like, for example, illness may also have played a role.

When asked, however, who had given advice on lifestyle, an interesting anomaly appears in the data. Table 13 lists the patients' answers when asked who had given them advice on lifestyle changes at the time of first diagnosis.

Table 13: Who had given advice on lifestyle at time of first diagnosis?

Who advised?	Frequency	Per cent	Cumulative per cent
Doctor	36	43.9	43.9
Nurse	14	17.1	61.0
Doctor and Nurse	6	7.3	68.3
Family/Friends	6	7.3	75.6
None	20	24.4	100.0
Total	82	100.0	

What the table shows is that the role of nurses in giving advice appears to be relatively minor, at least from the perspective of patients. This stands at odds with the fact that at Muhimbili Diabetes Centre it is the (male) assistant nurse who gives advice on lifestyle changes. It is, of course, the case that not all patients were first diagnosed with hypertension at the Muhimbili Diabetes Centre, but, as was shown in Table 7, this only applied to slightly less than half the patients in the sample. Yet, as the researcher observed during fieldwork, several patients appeared to think that the assistant nurse was a doctor, which itself is an indication of how the role of nurses is perceived by patients.

5 Discussion and Policy Implications

Lack of awareness about hypertension, coupled with poor infrastructure and lack of adequate protocols for early detection, monitoring, and management of the disease, means that patients often only receive medical care – for heart failure or a stroke, in particular – when disaster has struck. As a chronic disease, hypertension requires constant management and monitoring for prolonged periods of time, which is quite different from protocols designed to respond to acute infectious diseases.

This may explain why primary-level care appears to be so ineffective in dealing with hypertension, notwithstanding the fact that it is at this level that comprehensive screening of the disease and awareness creation should take place. This study shows that few patients were first diagnosed with hypertension at dispensaries, health centres, or even district hospitals. Moreover, contrary to widespread belief, this study reveals that hypertension is not only a disease of the elderly, nor is it a disease of affluence. These beliefs, therefore, stand in the way of effective interventions to create broader awareness of the dangers of hypertension, particularly at work places. Broad-based prevention, monitoring, and education on hypertension and its dangers are, therefore, imperative to reaching the population at risk. Yet, it presently appears that screening for hypertension is not emphasized at the primary level. Many nurses work at the primary level of health care, but there is little evidence that they play any significant role in screening, monitoring, and managing hypertension.

Measuring hypertension and monitoring patients' weights are done by nurses. But present management routines do not appear to train and encourage nurses to use this information as a tool for early detection and prevention of chronic diseases and for checking the progress of patients with hypertension. Nurses are in a better position to carry out the tasks of screening for hypertension and, through constant interactions with patients, to monitor and manage their hypertension. Prevention is better than cure, and early detection can improve the lives of the population because hypertension is more preventable in its early stages.

However, affecting such changes would require major structural interventions in terms of changing existing protocols in the availability of basic equipment (sphygmomanometer and stethoscope), in time and task allocations, and in additional training of medical personnel. As Bischoff *et al.* (2009) argue, nurses could play a major role in the screening for early detection and prevention of hypertension before it develops further, for example, through the introduction of a system of planned-care visits, particularly at the lower level health care facility. In this respect, Tanzania could learn from the valuable experiences of nurse-led management of hypertension practised in South Africa and Cameroon.

But, as this study further shows, even at the referral level of the Muhimbili Diabetes Centre, effective hypertension control is lacking. A majority of the patients remains hypertensive even after years of repeated visits to the centre. Changing this would require changes in the centre's protocols for dealing with hypertension. Including data on hypertension in the regular monthly and annual reports would be one step towards making the problem more visible. Furthermore, at present, taking separate measurements of blood pressure is only done in successive visits, three to six months apart. Closer monitoring by taking repeated measurements of blood pressure at shorter intervals in time would improve hypertension control. But this would require spreading clinic days more evenly across the week to allow nurses to pay more attention to each patient, which, in turn, requires delegating the tasks of monitoring and managing hypertension to nurses to improve care of hypertension at the clinic.

As this study shows, there is a serious gender imbalance among the patients at the clinic, despite the fact that the prevalence of hypertension is similar for men and women (Kearney *et al*., 2005). If the reason for this disparity is that men drop out as soon as they feel better, the question is what to do to prevent them from dropping out? This could be one of the roles nurses play by giving regular education to all patients, men in particular, about the dangers and later complications of the disease: serious illnesses like heart attack, stroke, and heart failure or kidney diseases.

This study also shows that the incidence of *isolated systolic hypertension* is high and tends to increase between the dates of first visit and of interview. As van Zwieten (2001) argues, aging is an important determinant in explaining this rise in incidence of isolated systolic hypertension. As Hendriks *et al.* (2012) note, however, a high average systolic blood pressure is a common problem in Africa. This poses a serious danger of high pulse pressure, which is a serious risk factor for strokes in particular, to which the protocols in the centre need to respond.

Finally, while some diabetes treatment is provided free of charge at the Muhimbili Diabetes Centre, this is not the case for hypertension. This study has shown, however, that many patients do not take the prescribed medication to control hypertension, mainly because they cannot afford it. This study also reveals that hypertension is not a disease of affluence in Tanzania. This poses problems of affordability of care that go beyond what the centre can do in improving its protocols for care of patients. This is particularly important since chronic disease requires patients to take medication regularly for prolonged periods of time.

Conclusion

This study presented a case study of nursing practices in dealing with hypertension at the Muhimbili Diabetes Centre. In this clinic, nurses collected excellent records of patients' weight, height, and blood pressure on each visit. However, at present the nurses do not use this information to monitor and evaluate the progression of their patients' hypertension. It follows that there is an opportunity to delegate the task of managing hypertension to nurses. Achieving this will require new protocols for nurses and supportive management changes. Beyond the clinic setting, the study suggests that improved hypertension screening, monitoring, and prevention requires a shift to nurse management of this chronic disease at the primary care level.

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