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Gender-Differentiated Comorbidity with Hypertension among Orthopaedic Patients in a Dar es Salaam Hospital: Identifying Missed Opportunities in Nursing Care

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Abstract

Background

Studies on the prevalence of hypertension in Africa show that hypertension has become more prominent among the adult population. Nursing care of hospitalised orthopaedic patients, however, mainly focuses on the presenting condition. The presence of orthopaedic patients with comorbidities like hypertension in the wards, therefore, offers feasible opportunities for more holistic nursing care.

Broad Objective

To investigate gender differences in the prevalence and patterns of hypertension among orthopaedic patients in order to identify care gaps that point towards missed opportunities to benefit patients through holistic nursing care.

Methods

A quantitative cross-sectional survey, stratified by gender, was used to investigate statistically how the prevalence and patterns of comorbidity with hypertension in six public orthopaedic wards varied by gender, age and type of admission (emergency versus cold cases). The data analysis used descriptive statistics, visual displays (boxplots and pie charts), contingency tables, and hypothesis testing for difference between proportions and means.

Results

A majority of male patients were emergency patients and younger in age; a majority of female patients, however, were cold cases and older. Prevalence of hypertension differed significantly between female (44.4%) and male (24.7%) patients. Undiagnosed and uncontrolled hypertensives accounted for 30.0% of female versus 20.4% of male patients. The majority of male hypertensives were undiagnosed; the majority of female hypertensives were diagnosed, but half of them were uncontrolled hypertensives. Only half of all diagnosed patients took medication. Prevalence of undiagnosed or uncontrolled hypertension persisted among re-admitted patients.

Conclusions and Recommendations

Undiagnosed hypertensives, particularly younger and middle-aged male patients; uncontrolled and unmedicated diagnosed hypertensives, both male and female; and hypertensive patients discharged without clear information concerning their condition all are identified areas for improvement in nursing care. This article recommends that nursing care adopt a more proactive rather than reactive approach to hypertension care, to reduce the risk of health crises occurring due to comorbidity, of postponement of surgery due to high BP, and of discharging patients who remain undiagnosed or untreated for hypertension. It is also recommended to create greater awareness among patients at risk of hypertension about their condition.

Keywords: *Comprehensive nursing care, information, comorbidity, hypertension, orthopaedic care, undiagnosed, controlled and uncontrolled hypertension, gender differences, Tanzania.*

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Introduction

In Africa, hypertension has become more prominent among the adult population (1, 2, 3). Moreover, a majority of people with hypertension are undiagnosed or uncontrolled (4). A study in a rural district in Tanzania, for example, showed a high prevalence (29%) of hypertension among adults, of whom most (78.2%) were undiagnosed (5). This greater prominence of hypertension within the population poses challenges for nursing care in hospital settings due to the increased likelihood of comorbidity with hypertension among in-patients, particularly when undiagnosed or uncontrolled. Nursing care in orthopaedic hospital wards in particular takes a specialism approach rather than working holistically. Specialised care is based on the premise of a single disease model of care in which the focus of attention lies on the presenting conditions for admission. But this focus on specialism implies that only cursory attention is given to the care for comorbidities, which can lead to the possibility of something going wrong (a health crisis due to comorbidity or postponement of surgery) as well as the danger of chronic conditions persisting after discharge (6).

This study investigated statistically how the prevalence of comorbidity with hypertension among orthopaedic in-patients, and the extent to which this comorbidity was undiagnosed or uncontrolled, differed by gender. This analysis was then used to identify gaps where nursing care practices at the ward level can be rendered more holistic within existing resource limitation and work pressures.

Methods

Research design

This study used a quantitative cross-sectional survey of orthopaedic adult in-patients (18 years and above) hospitalised at the Muhimbili Orthopaedic and Neurological Institute (MOI), the Tanzania's national referral hospital that caters for trauma and injury patients.

Sampling method

Ward occupancy varies from day to day as a result of new patients being admitted to the ward and others being discharged. Consequently, the prevalence and patterns of hypertension were subjected to this sampling variations from day to day. Sampling was done as follows. Firstly, public wards were each sampled on a different day. Each patient was only sampled once. In each ward, all orthopaedic patients who consented to take part

in the study were included in the sample. Secondly, the sample was stratified by gender because MOI has four public wards for male patients and only two for female patients (each with a maximum of 30 beds). Male patients, therefore, outnumber female patients by a ratio of approximately 2 to 1. Without sample stratification, making comparisons between female and male patients in terms of prevalence and status of hypertension would be hampered by the smaller sample size for female patients. To obtain approximately equal sample sizes for both strata each of the two female wards had to be visited twice, with a sufficient time interval of 5 to 6 weeks in-between to avoid sampling the same patients twice.

Sample size

The minimum sample for each stratum required for testing the difference between two independent proportions of two sub-samples of equal size can be obtained using the following standard formula:

$$n = \frac{f(\alpha,P)\cdot((p_1(1-p_1)+p_2(1-p_2))}{(p_1-p_2)^2}$$

where α = .05 is the significance level; P = .8 the power of the test; $p_1 = 0.4$ the hypothesized proportion for female patients, $p_2 = 0.2$ the hypothesized proportion for male patients; $(p_1 - p_2)$ = 0.2 the hypothesized difference in proportions between female and male patients; and f(α, P) = 7.9 is a function of α and P based on their critical values for a normal distribution (7).

The calculated minimal sample size for each strata equals 79 and, hence, the total minimal sample size was 158. The actual sample size (after data collection) was 183 patients, of which 93 male and 90 female patients.

Data collection

Field work was done by the principal researcher and took place from December 2018 to March 2019. All patients who were present during data collection consented taking part in the study. This study used a structured questionnaire. Pretesting was done during the first month of fieldwork, and minor modifications were made. The pre-test sample was not included in the data used for analysis.

Two successive BP measurements (with an interval of approximately 20 minutes) were taken in the early morning when patients were lying flat on their beds and before they were given their breakfast. All BP measurements were made with the same calibrated sphygmomanometer and stethoscope to provide accurate readings for all patients. Each of these patients was subsequently interviewed in turn to complete the questionnaires.

Data analysis

The following explanatory variables were used to depict patients' characteristics: gender and age; types of admission to the ward: emergency patients versus referrals from the out-patient clinic (cold cases); and whether a patient was a new patient or had been readmitted to the ward.

Two different outcome variables were used to measure the prevalence and patterns of hypertension. The first variable indicated whether a patient had a high BP or not. The average of the two BP measurements was calculated to determine whether a patient had a high BP (8). A patient was identified as having high BP if the average systolic blood pressure (SBP) was greater than or equal to 140 mmHg *or* the average diastolic blood pressure (DBP) greater than or equal to 90 mmHg. (9).

The second variable indicated whether a patient self-reported to have been diagnosed with hypertension prior to being admitted in MOI or had been diagnosed at MOI prior to the study interview. Together these two variables allow a distinction to be made between patients with high BP but no prior diagnosis, patients who were diagnosed and whose BP was normal (controlled hypertensives), and those who were diagnosed but whose BP was high (uncontrolled hypertensives). This study used a further final indicator variable that combined both these two variables to indicate patients who either had a high average BP, or self-reported to have been diagnosed with hypertension or were diagnosed at MOI prior to the interview. Finally, a further outcome variable used in this study was whether a patient was taking BP medication at the time of the interview.

Data analysis used the following exploratory and descriptive statistical methods: contingency tables, tables for comparing proportions and means, boxplots and pie charts. Formal inference included z-tests for the difference in proportions, t-test for difference in means, tests for association (chi-square test) derived from the contingency tables.

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Results

Comorbidity with hypertension was found to be extensive, and sharply patterned by gender, age and type of admission to the orthopaedic wards. We show, first, that type of admission differs by gender and age. We then trace the prevalence and level of hypertension management by these categories. Table 1 gives the summary statistics of patients' characteristics.

Table 1: Descriptive summary statistics of characteristics of patients in a sample stratified by gender

	GENDER OF PATIENT			
	Male		**Female**	
Type of Admission	***Frequencies***	***Column %***	***Frequencies***	***Column %***
Emergency cases	67	***72.0***	*36*	*40.0*
Cold cases	26	*28.0*	*54*	***60.0***
All	93	*100.0*	*90*	*100.0*
Average Age by Type of Admission	***median age***	***mean age***	***median age***	***mean age***
Emergency cases	***34***	*39.6*	***53***	*54.4*
Cold cases	***51***	*50.0*	***56***	*54.0*
All	*40*	*42.4*	*55.5*	*54.2*
New Admittances Versus Readmittances	***Frequencies***	***Column %***	***Frequencies***	***Column %***
New admittances	76	*81.7*	66	*73.3*
Readmittances	17	***18.3***	24	***26.7***
All	93	*100.0*	90	*100.0*
Prevalence of Hypertension	***Frequencies***	***Column %***	***Frequencies***	***Column %***
Normal BP & No prior diagnosis	70	*75.2*	50	*55.6*
High BP or prior diagnosis	23	***24.8***	40	***44.4***
All	93	*100.0*	90	*100.0*

Gender, age compositions, and types of admission of patients

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Table 1 shows that the relative proportions of emergency versus cold cases is strongly associated with gender: a majority of male patients are emergency cases while a majority of female patients are cold cases (test of association: chi-square = chi2(1) = 19.086 p-value = 0.000).

On average, male emergency patients are much younger than all other patients (t-test for age difference: t = 4.887; p-value = 0.000). Figure 1 shows the boxplots of age by type of admission and by gender.

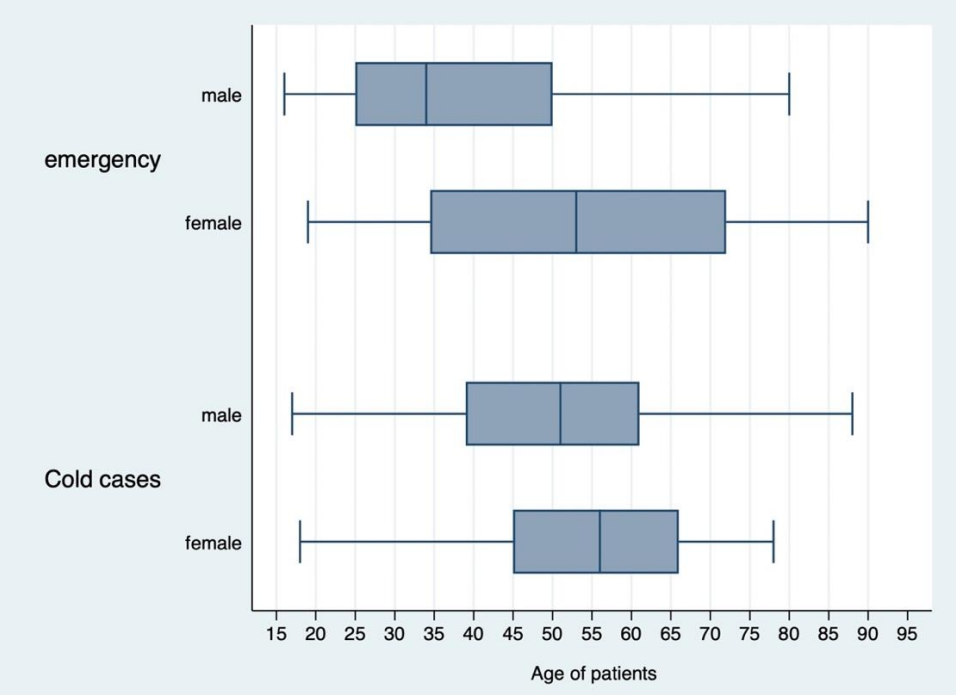

Figure 1. Comparative boxplots of age by type of admission and by gender

Prevalence and patterns of hypertension by gender, age, and types of admission

The prevalence of hypertension is much higher for female than for male patients (Table 1), indicating a significant gender gap of 19.7 percentage points (z-score = 2.8; p-value = 0.0050).

The age distributions of hypertensive patients are consistently higher than for patients without hypertension (Figure 2). A quarter of hypertensive male emergency patients were relatively young with ages ranging from 25 to 46 years old.

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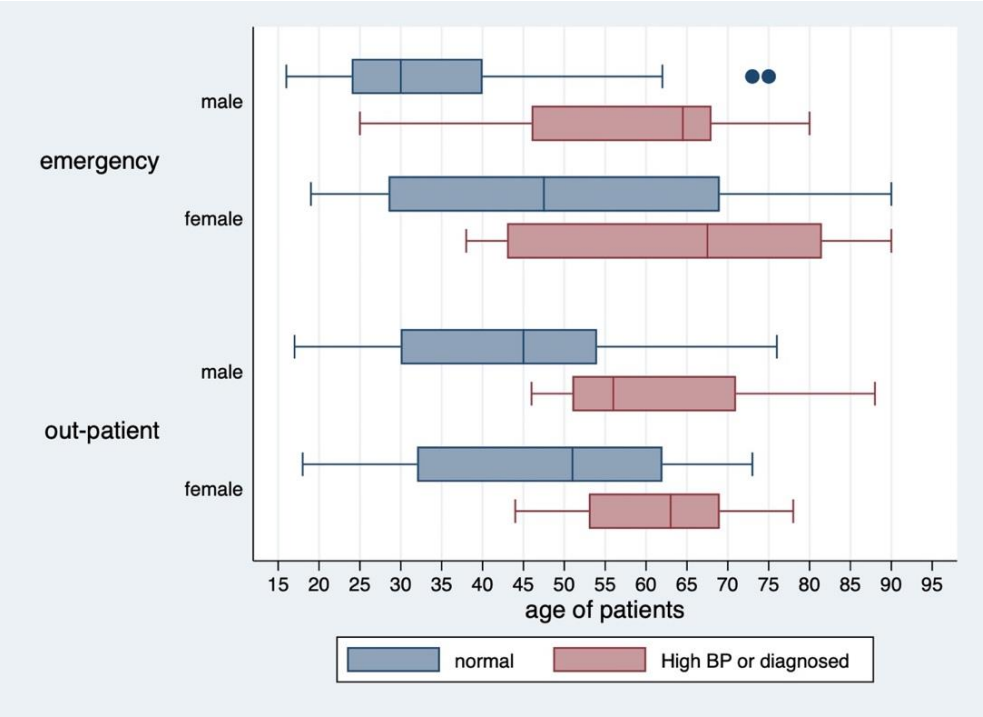

Figure 2. Boxplots of age by sex, type of admission, and prevalence of hypertension

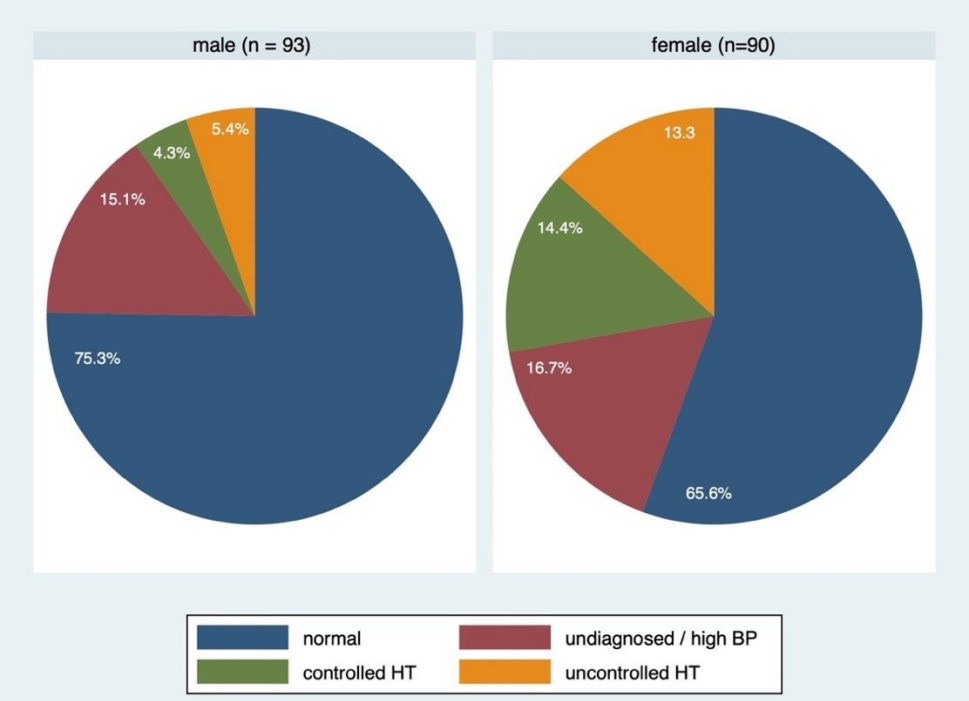

Figure 3. Patterns of comorbidity with hypertension by gender

Patterns of comorbidity with hypertension differ substantially between male and female patients (Figure 3). Undiagnosed and uncontrolled hypertensives together accounted for 20.4% of male and 30.0% of female patients (female-male difference in proportions: z-score = 1.49; p-value = 0.1357). While 63.4% of hypertensive female patients were previously diagnosed, 61.1% of hypertensive male patients had not been previously diagnosed.

Out of the 9 male patients with prior diagnosis, 7 reported to have been diagnosed prior to being admitted at MOI, and 2 were diagnosed at MOI. Out of 25 female patients with prior diagnosis, 19 reported to have been diagnosed prior to being admitted at MOI, and 6 were diagnosed at MOI.

A significant number of diagnosed patients, particularly female patients, were not taking their medication (Table 2).

Table 2: Prevalence of hypertension, diagnosed hypertension, and whether medication was taken

Hypertension, diagnosis, and medication	**male patients** counts (column %)		**female patients** counts (column %)	
High BP or previously diagnosed as hypertensive	23	24.7%	40	44.4%
Previously diagnosed hypertensives	9	9.7%	25	27.8%
Previously diagnosed patients taking medication	7	7.5%	10	11.1%
Total	**93**	**100.0%**	**90**	**100.0%**

Moreover, out of the 17 male and female patients who were taking medication, only 8 were controlled hypertensives.

Prevalence and patterns of hypertension between new admittances and readmittances

Table 1 showed that the proportion of female patients is higher among readmitted as compared with newly-admitted patients (chi-square = 1.8507; p-value = 0.174). Median ages were 37 for male and 58.5 for female newly admitted patients, and 50 for male and 52.5 for female readmitted patients.

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Worryingly, however, the proportions of undiagnosed and uncontrolled patients were similar between newly admitted and readmitted patients (Figure 4).

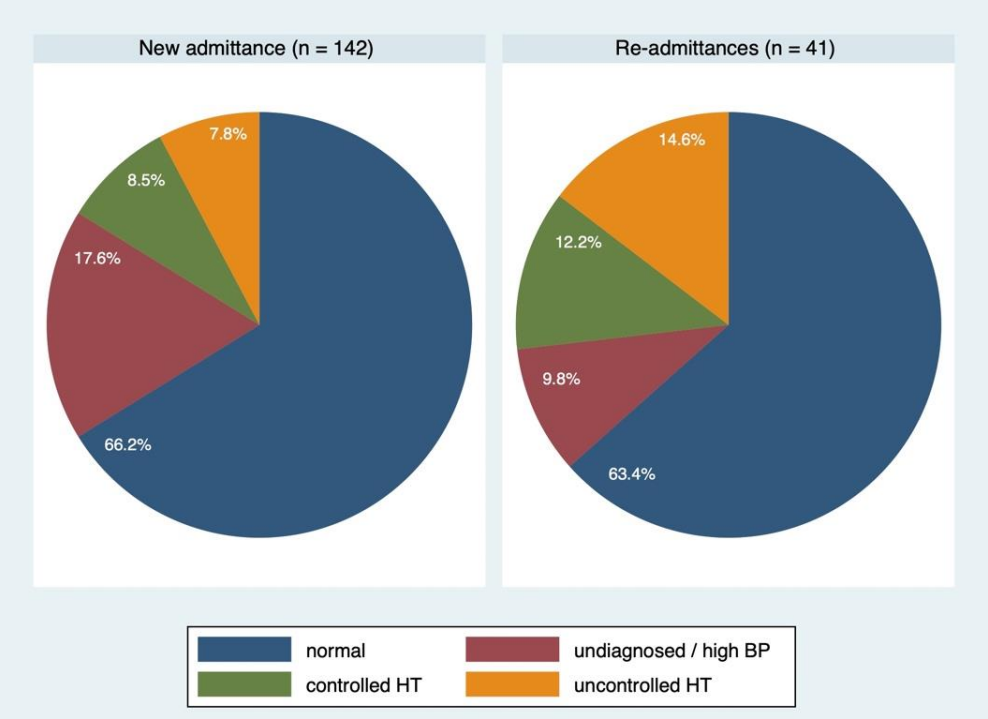

Figure 4. Patterns of hypertension by first admissions/readmissions

The proportion of undiagnosed and uncontrolled patients were, respectively, 25.4% for new admittances versus 24.3% for readmittances.

Discussion

The results show that comorbidity with hypertension was high among orthopaedic in-patients, but, importantly, so was the prevalence of undiagnosed and uncontrolled hypertension. These patterns of comorbidity varied significantly between gender. The differences in age composition between male and female patients is mainly due to the differences in types of admission to the ward. Evidence from Africa shows similar patterns in gender and age composition of orthopaedic patients: male patients outnumber female patients, are younger in age, and, unlike female patients, a majority of them are emergency cases (10, 11). In Tanzania, a possible reason is the high frequency of road accidents, particularly motorcycle accidents involving younger men (12).

These gender differences in the prevalence and patterns of comorbidity with hypertension among in-patients point to existing gaps in nursing care that need to be addressed in moving towards a more holistic approach to nursing care. First, a majority of male patients with hypertension in the wards were undiagnosed. Consequently, in surgical orthopaedic care, a major opportunity arises for early diagnosis to avoid discharging male patients with high BP without any prior diagnosis or referral for further care. This is particularly important in Tanzania because the prevalence of hypertension is higher among men than women, and men tend to get hypertension at a younger age (13, 14). In contrast, a majority of hypertensive women patients were previously diagnosed, probably because they had a higher chance that their blood pressure was checked and diagnosed during antenatal care or when seeking contraceptive services.

Second, our results show that previously diagnosed hypertensive patients – particularly women – do not necessarily adhere to their medication and, when they do, their BP is often poorly controlled. Checking medication adherence and whether medication effectively controls BP points to another missed opportunity in nursing care. This pattern is common in Africa (5, 15, 16). In Tanzania, the proportion of patients not taking antihypertensive drugs was estimated to be 77.1%, and the percentage of patients achieving BP control was only 3.1% (17: p. 4). In SSA medication and treatment adherence was higher among female as compared with male patients (17, 18, 19,). This study, however, shows that medication adherence was lower for female patients.

Finally, measuring BP at the time of discharge and advising patients to seek further medical assistance or treatment offers a final opportunity that needs to be addressed to avoid patients leaving the ward without awareness of their chronic condition. Our results show that prevalence of undiagnosed patients and uncontrolled hypertensives remains high among readmittances, possibly because patients with comorbidities, particularly when uncontrolled, are more likely to be readmitted (19).

To deal with these gaps in nursing care, this study recommends the adoption of a more proactive rather than reactive approach to hypertension care to reduce the risks of health crises due to comorbidity, of postponement of surgery due to high BP, and of discharging patients who remain undiagnosed or untreated for hypertension. This would include measuring BP at admission and asking patients whether they had been diagnosed with

hypertension prior to admission. This would also require nurses to check BP and monitor medication regularly during hospital stay, particularly before and after surgery and before the patient is discharged. This proactive approach will render nurses more aware of how patterns of hypertension differ by gender and allow them to create greater awareness among patients about their comorbidity.

Limitations of the Study

This study was based on a single centre – a national referral hospital dealing with orthopaedic and neurological injuries. However, most orthopaedic wards in Tanzanian hospitals are likely to be characterized by a similar bifurcation of younger male patients and older female patients.

This study features a cross-sectional analysis from which the conclusions are drawn, consisting of a snapshot of the situation in a ward at a point in time. This does not reflect, however, how the experience of orthopaedic patients with comorbidity might change during the duration of their stay at the hospital. To analyse this would require longitudinal data collection and analysis.

Conclusion

This study revealed lost opportunities in dealing with comorbidity with hypertension among in-patients when nursing care is principally focused on the presenting orthopaedic condition. By investigating the gender differences in the prevalence and patterns of hypertension among patients, three areas of concern were identified: the problem of undiagnosed patients with high BP, particularly younger and middle-aged men; the problem of uncontrolled hypertensives, both male and female; and the problem that patients with hypertension are discharged without alerting them about their condition. The article identified some feasible changes that could be made to address these lost opportunities by moving towards a system of a more comprehensive nursing process and practice. It is recommended to conduct longitudinal studies in future and qualitative research with nurses about their experiences and strategies in dealing with hypertension, including medication adherence, and raising patients' awareness about hypertension.

Ethical Consideration and Clearance

Ethical clearance for the study was obtained from the Senate Research and Publication Committee of Muhimbili University of Health and Allied Sciences (MUHAS)- Reference No.

DA. 282/298/01/C. Consent forms in Swahili were provided to all patients in the sample for signing prior to data collection. Participants who gave their consent were able to withdraw from the study at any time during the interview. To secure confidentiality, each questionnaire was given an ID number without mentioning the participants' names.

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Authors contributions

CSF, MW and FSC conceptualized and designed the research and its methodology. CSF collected the data and entered them in Excel. CSF and MW carried out data management and analysis with Stata. CSF, MW, FSC, GGL and DAM wrote, discussed and edited the successive drafts. All authors read and approved the final draft for submission.

Competing interests

All authors declare no conflict of interests. The manuscript has been read and approved by all authors for submission to the Tanzania Medical Journal.

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Abbreviations

MOI	Muhimbili Orthopaedic Institute
SSA	Sub -Saharan African
BP	Blood Pressure
SBP	Systolic Blood Pressure
DBP	Diastolic Blood Pressure

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