Evaluation of the effect of task shifting and use of standardized hypertension treatment and care protocol in adults in Rwanda 2018

RWAGASORE EDSON

College of Medicine and Health Sciences (CMHS)

School of Public Health (SPH)

Department of Biostatistics and Epidemiology

Masters of Science in Field Epidemiology and Laboratory Management

Supervisor: Prof Joseph NTAGANIRA

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DISSERTATION

Evaluation of the effect of task shifting and use of standardized hypertension treatment and care protocol in adults in Rwanda

Submitted

by

Rwagasore Edson
School of Public Health

In Partial Fulfilment of the Requirements
For the Masters Degree in Field Epidemiology
University of Rwanda

DECLARATION

I, Rwagasore Edson declare that this thesis and the work presented in it are my own and has been generated by me as the result of my own original research.

Evaluation of the effect of task shifting and use of standardized hypertension treatment and care protocol in adults in Rwanda

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DEDICATION

This study is wholeheartedly dedicate to my beloved wife, my two children and parents who have the source of my inspiration and strength to deliver this work.

To my brothers, sisters, relatives, mentors, friends, classmates and the NCDs division at RBC who shared their words of advice and encouragement to finish this study.

And lastly I thank the Almighty God for the guidance, strength, power of mind, protection and skills and for giving me and my family health life. All of this, we offer to you.

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Besides my advisor, I would like to thank my mentors Dr Jared Omolo and Peace Kinani for their insightful comments and encouragement, but also for the hard question which incented me to widen my research from various perspectives. Without their precious support it would not be possible to conduct this research.

LIST OF SYMBOLS A ACRONYMS

BP	Blood Pressure
DBP	Diastolic Blood Pressure
LMIC	Low and Middle Income Countries
NCD	Non Communicable Diseases
PEN	Package of essential NCDs
OPD	Outpatient Department
SBP	Systolic Blood Pressure
WHO	World Health Organization

ABSTRACT

Background: Sub-Saharan Africa faces a disproportional shortage of doctors and capacity to manage the rising incidence of chronic illnesses like hypertension. Rwanda has responded to this shortage by initiating nurse-led management of hypertension and by developing hypertension treatment and care protocols to use in primary health care settings. We assessed the effect of task shifting and use of the standardized protocols in Rwanda.

Methods: This retrospective cross sectional study included Patients with hypertension, followed in five non-communicable disease clinics across district hospitals, were grouped into two groups. Group 1 included patients with hypertension followed in nurse-run clinics following task shifting from physicians to nurses (Byumba, Masaka and Gitwe) and group 2 included patients with hypertension who are still followed in physician-run clinics (Kabgayi and Murunda). Both nurse-run clinics and physician-run clinics followed a standardized treatment and care protocol. Clinical data from the two cohorts were abstracted to determine changes in patients' blood pressure after task shifting.

Results: 259 eligible patients were included in the study; 102 were followed in physician-run clinics and 157 patients in nurse-run clinics. Prior to task shifting and use of standardized treatment protocol, the mean SBP across study participants was 159.9 mmHg which significantly reduced by an average of 26.07 mmhg (CI:22.63 -29.5) in one year of follow up after task shifting ($p<0.001$). Additionally, a significant difference mean systolic blood pressure is higher in nurse led clinics of 32.44mmhg (CI 28.23-36.65) compared with difference in systolic blood pressure in physician led clinics of 16.44mmhg(CI 11.05-21.84).

Conclusion: This study showed that task shifting and use of standardized hypertension treatment and care protocol resulted in reduced systolic blood pressure. The findings highlights the need to establish nurse led clinics in setting with limited Medical Doctors and ensure Improved access to hypertension treatment and care.

Keyword: Task shifting, Standardized treatment protocol, Rwanda, Hypertension

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1 CHAPTER ONE: INTRODUCTION

1.1 Background

Hypertension is a global public health issue that contributes to the burden of heart disease, stroke, kidney disease, premature mortality, and disability. Hypertension accounts for 9.4 million deaths worldwide every year(1). In 2000, people with hypertension were estimated at 972 million people with hypertension, with 65 % living in the developing world(2).

Sub-Saharan is facing an epidemiological transition with continuously increased burden of hypertension during the previous decades(3); The transition imposes more constraints towards dealing with the double burden of infectious and non-infectious diseases in an environment characterized by weak health system(4).The WHO STEPS survey in 2013 showed that 15% of the Rwandan population had raised blood pressure with this proportion rising to 40% for those in the 55-64 year age group making hypertension the most common NCD risk factor for this age group(5).

While hypertension can be easily diagnosed and managed with available once daily regimen; An estimated 47% globally with hypertension are undiagnosed and among diagnosed only 35% are on pharmacological treatment(6), and this might be higher in the sub-Saharan region with ineffective health system characterized by disproportional shortage of doctors and capacity to manage the rising incidence of chronic illnesses like hypertension(7).

Only one in seven people with hypertension worldwide have controlled blood pressure (BP)(6) putting large proportion of people with hypertension at risk from preventable complication of hypertension such as stroke and heart diseases at high that would result to mortality (8).

The implementation of integrated non communicable disease management and prevention programs, through a primary health care approach coupled with the use of and compliance to treatment guidelines has proven to improve blood pressure control and reduce complications(9).

With improved access to care in low income countries the control of hypertension would be feasible. A major contributing factor to uncontrolled BP in some areas is the limited access to medications and lack of systems to effectively deliver prevention and treatment(6). However, building on lessons learned from the treatment of HIV/AIDS and tuberculosis in LMICs, as well as successful models of hypertension control, the implementation of integrated non communicable disease management and prevention programs, through a primary health care approach coupled with the use of and compliance to treatment guidelines has proven to improve blood pressure control and reduce complications(9).

The WHO global recommendations and guidelines on task shifting propose the adoption of a task shifting approach as one method of strengthening and expanding the health workforce to rapidly increase access to health services(9) Task shifting involves the rational redistribution of tasks among health workforce teams. Specific tasks are shifted, where appropriate, from health workers with higher qualification to health workers with shorter training and qualifications in order to make more efficient use of the available human resources for health(9).

Several studies have found that provider performance for duties delivered through task shifting model has resulted in improved, quality of care and health outcomes. Control of BP depends on many factors, such as age, clinical features and doses or classes of antihypertensive drugs used for treatment. Rigorous adherence to blood pressure treatment guidelines has been shown to improve blood pressure control and reduce cardiovascular mortality(10)

1.2 Problem statement

Shortage of qualified human resources is of increasing concern in Rwanda where the ratio of health professionals to general population of 0.72/1000 fell short of the recommended WHO 2.3/1000 while the country is facing the double burden of both infectious and non communicable diseases(11).

Based on Rwanda's Health Management Information Systems (HMIS) data over the period of January December 2013 concerning top eight causes of morbidity in district hospitals, 2013, NCDs accounted for at least 51.86% of all District Hospital outpatients' consultation and 22.3% of District Hospital hospitalization(12).

To address the shortage physicians and improve access care of patients living with non communicable diseases in Rwanda, the ministry of health initiated the task shifting model for Non Communicable diseases that utilizes trained nurses to manage hypertension, diabetes, chronic respiratory diseases and other cardiovascular diseases to alleviate both the burden of NCDs and shortage of physicians at primary health care level.

While several approaches have been established to improve the coverage of care for hypertension around the world, many studies support the promising role of nurse-led care for hypertension, which may constitute an acceptable alternative in sub Saharan Africa where an acute shortage of physicians is being experienced(13).

Several studies such as the one conducted in Harare municipal clinics by Basset et al, have tested and assessed nurse-led care model and concluded that nurse-led care approach is feasible, cost effective and could yield good treatment outcome among hypertensive patients(14).

However, these studies were conducted on a very limited number of participants and over a very short study period. One study showed that the method of randomization was at high risk of bias, and were unable to assess whether blood pressure measurements done by practice staff were performed according to the recommended standardized protocol(15).

Our study sought to assess whether task shifting led to a greater proportion of hypertensive patients achieving recommended blood pressure targets as the primary objective and assess if 1

year follow-up according to standardized hypertension treatment protocol is effective at reducing blood pressure as secondary objective in Rwanda.

1.3 Objectives of the study

1.3.1 Main objective

To assess the effect of task shifting and use of standardized hypertension treatment protocol on treatment outcomes among adults attending the NCDs clinics.

1.3.2 Specific objectives

- Describe clinical and demographic characteristics of patients followed in Physician and nurse led clinics before task shifting and after one year period of follow-up.
- Compare the implementation of using a standardized hypertension protocol before and after 12 months intervention.
- Compare the change in systolic and diastolic blood pressure before and after 12 months intervention.

1.4 Research Question

- What are the clinical and demographic characteristics of patients followed in physician and nurse led clinics before and after task shifting?
- Is there any difference in the implementation in using standardized protocol before and after task shifting?
- Is there any difference in systolic and diastolic blood pressure before and after task shifting?

1.5 Justification

Effective approaches to reduce NCDs burden in developing countries include mixture of population wide and individual intervention. Cost effective intervention as recommended by the WHO pen package for primary health care includes early diagnosis, pharmacological and non pharmacological treatment of hypertension, diabetes and cardiovascular diseases and asthma in primary health care level.

In 2015 Rwanda Ministry of health developed an NCD clinic model to address the increase of NCDs and the shortage of health care providers. The model aim to shift tasks from medical doctors to nurses, to provide standardized protocols for the management of hypertension, diabetes, asthma and heart failure, at the primary health care level and enhance the access of care to all in need.

The rollout for this intervention is still ongoing. All the staff of the 43 district hospitals and 91% of 525 health centers are already trained and have started providing care to patients with hypertension through the NCDs clinic model. However since its inception, the effects of task shifting, and the use of standardized hypertension treatment protocols at primary health facilities in Rwanda has not been evaluated.

2 CHAPTER TWO: LITERATURE REVIEW

2.1 Task shifting in management of hypertension in Rwanda

The process of task shifting to manage and follow up patients with hypertension in Rwanda as showed in Figure 1 involved the shift of responsible from physicians to nurses such as medical prescription, routine screening of complication from physicians to nurses. Nurses were equipped with skills after undergoing 4 weeks training and 4 weeks clinical placement for practical skills to manage integrated Non communicable diseases (Hypertension, diabetes, cardiovascular diseases, chronic respiratory diseases).

Before task shifting patients consulted clinics led by physicians for clinical examination, refill of medicines and follow-up examination in the general OPD and used different source of information including open source and the knowledge acquired from the medical school on management of hypertension. By 2018 all 40 district hospital have initiated the NCDs nurse led clinic and all 42 hospitals equipped with protocol handouts of management of Integrated NCD (Hypertension, diabetes, cardiovascular diseases, chronic respiratory diseases) which is aligned to the pen package. Patients were linked for regular follow up in nurse led clinics for regular medical prescription and clinical follow-up by nurses.

Task shifting from physicians to nurses has proved to be an effective approach of scaling up and improving access to HIV care and prevention. The nurse led management has shown to be linked with good compliance protocols, and potentially lower healthcare costs(13);Task shifting when coupled with the uptake of guidelines could evidently reduce the burden of hypertension in poor resources setting primary health care setting(16).

A clinical trial that was conducted in Cameroon showed that task shifting and nurse-led care is a cost effective model that can significantly improve retention rates among patients followed in health facilities(17).The before-after study conducted in rural South Africa showed that trained nurses, with the help of the treatment protocol could achieve hypertension control as high as 68%. Several studies revealed that trained nurses can effectively treat patients according to study protocols(18).

The process evaluation on task shifting conducted in Kenya documented that task shifting was associated with good adherence to protocol for routine screening questions and routine laboratory monitoring and the overall compliance with necessary weight measurements, blood pressure monitoring and laboratory review was high as 90%. and very few referrals back to the clinical officers were reported(19).

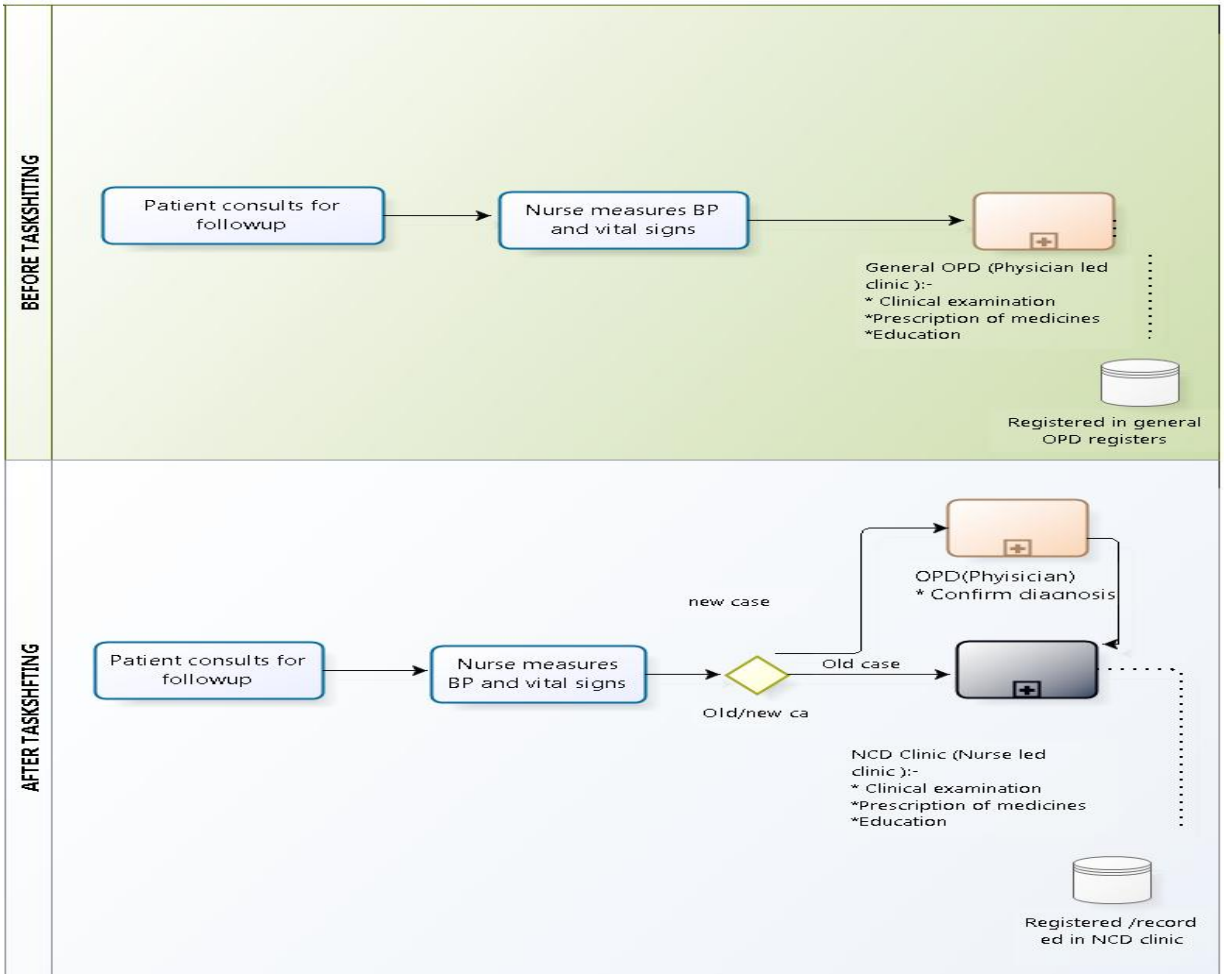

Figure 1. Patient follow-up flow before and after task shifting

2.2 Use of standardized hypertension protocol in Rwanda

To overcome the wide gap between evidence based recommendation in managing hypertension and current evidence based recommendation and current practice, the Rwanda Ministry of health developed national guideline to manage hypertension and other non communicable diseases. The use of standard protocol aims at improving quality of care, reducing clinical variability and simplify the treatment options particularly in primary health care(20).

The national guideline for prevention and management of hypertension in Rwanda showed in (figure 2), was developed in accordance with international standards by recognized team of experts and was validated by technical working team composed of general practitioners and specialists with extensive experience in urban and rural area practices.

Several studies have showed the association between use of standardized guideline and improved blood pressure control over a period of patient's follow-up(16).The implementation of standardized hypertension protocol resulted in increased adherence to appointment visit in the clinic(21).

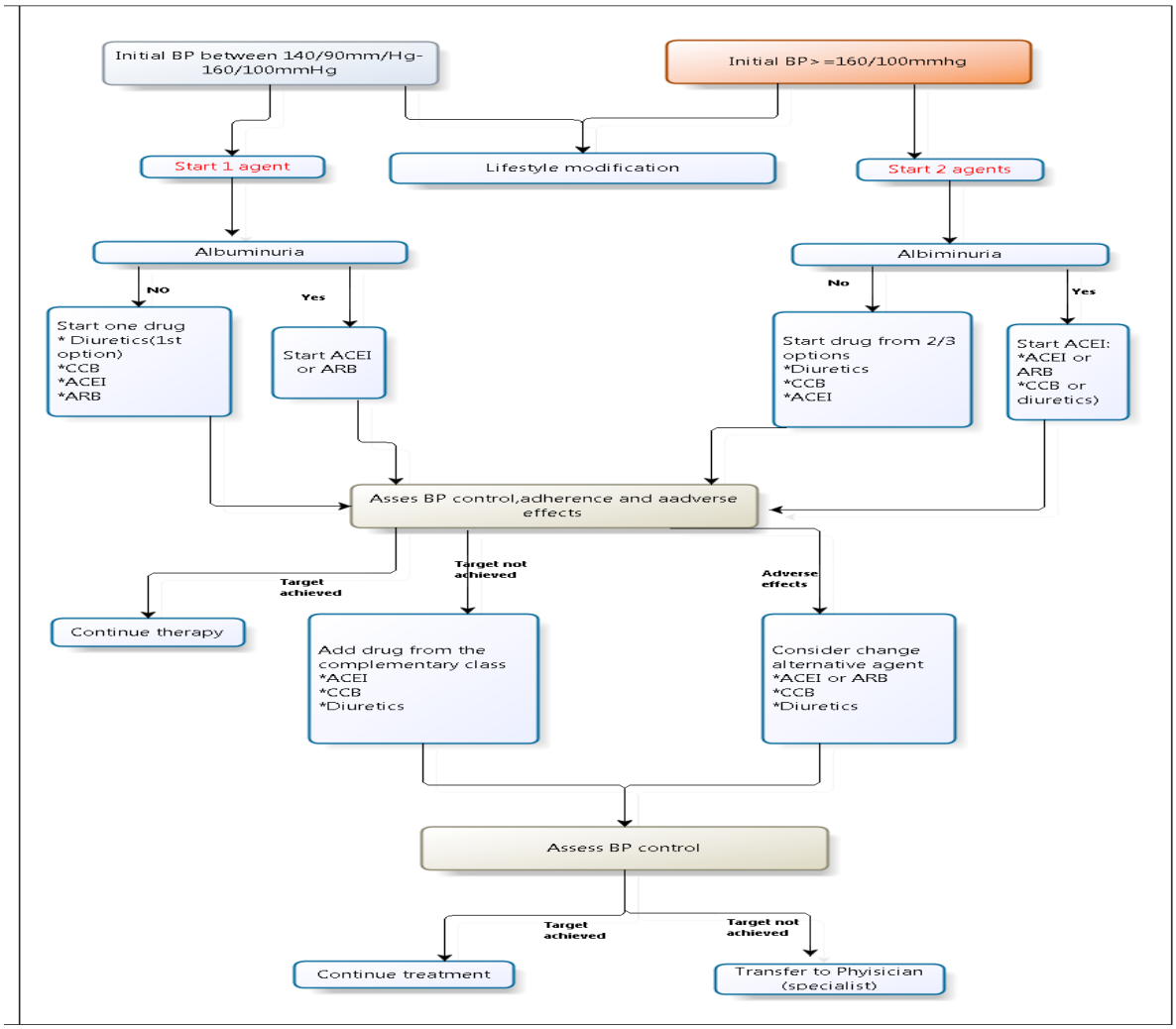

Figure 2: Hypertension management and follow-up guideline in Rwanda

2.3 Conceptual framework

Task shifting from physicians led clinics to nurse led clinics coupled with the use of standardized hypertension guidelines results in improved implementation to treatment protocol by health care providers, improves screening for kidney diseases and improves patients' adherence to clinic appointment(18). Improved compliance to treatment protocol by health care providers in managing hypertension and improved patients' adherence has been linked to the reduction in systolic and diastolic blood pressure(10).

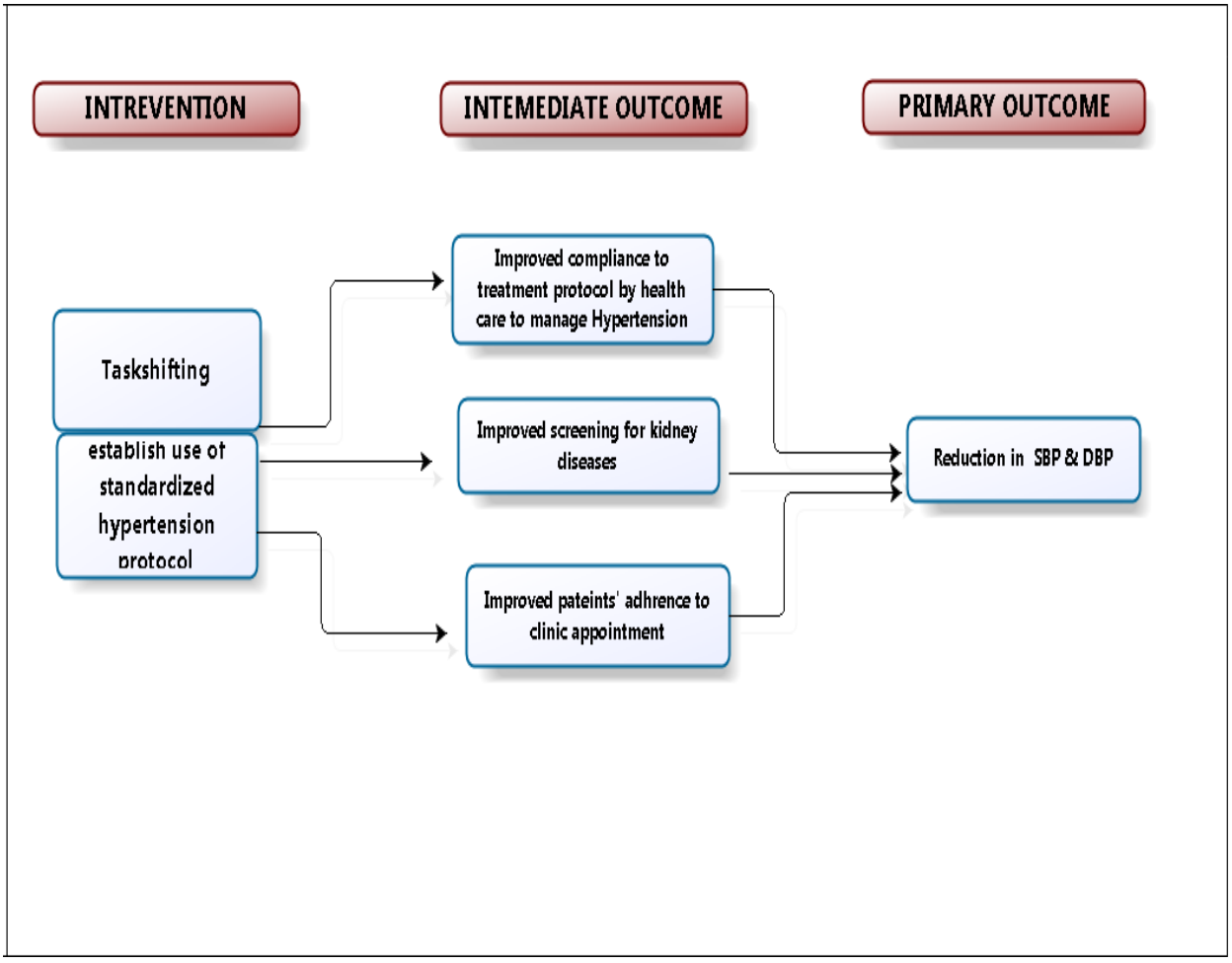

Figure 3. Conceptual framework for evaluating task shifting and use of standardized protocol

3 CHAPTER THREE: METHODS

3.1 Study design and setting

This retrospective cross sectional study involved review of medical records of hypertensive patients that were followed up at health center level and District hospitals. Medical records from the two groups(Nurse led and physician led management) of patients followed at health center level and district hospitals were reviewed to determine the changes in blood pressure after task shifting and use of standardized protocols in managing hypertension including routine screening for hypertension complications and treatment outcomes. This study was conducted on outpatient clinic with medical records of hypertension patients between January 2015 and June 2018. Blood pressure measurement was taken by nurses in both Physician led clinics and nurse led clinics.

3.2 Participants and inclusion criteria

The study population included adults(>15years) patients with hypertension followed in primary health facilities in the catchment area of Kabgayi, Murunda, Masaka, Gitwe and Byumba hospitals who attended NCDs clinic by January 2015 and were on follow up by January 2017.

3.3 Sample size and sampling method.

All eligible 259 participants were included in the study and were sufficient based on the sample size calculated using the formula below for testing a difference in means (t test)

Δ = Difference in means

σ = Estimated SD

For a=0.05 (2-sided tail), Z (1-alpa/2) equals **1.96**

For power=80%, Z beta equals **0.84**

$$n = 2\left[\frac{(z_{1-\alpha/2} + z_{\beta}) \times \sigma}{\Delta}\right]^2$$

$$= 2\left[\frac{(1.96 + 1.28) \times 10}{5}\right]^2 = 83.98 \rightarrow 84 \text{ per group}$$

$$\therefore \text{ 168 total subjects}$$

Three hospitals (Masaka,Gitwe and Byumba) were randomly sampled from 40 district hospitals who had NCDs nurse led clinics. The two hospitals (Kabgayi and Murunda) that have physician led clinics during the study period were included.

3.4 Data collection procedures

Data collection were conducted in primary health facilities of 5 hospitals. Cohort 1 consisted of medical charts of patients followed by physicians in Kabgayi and Murunda hospitals whose clinics were not led by nurses in management of hypertension during the study period. Cohort 2 consisted of medical charts of patients followed in Masaka, Gitwe and Byumba Hospitals which are led by nurses. Data collection was conducted between 31 September 2018 and15 October 2018.

Blood Pressure assessment and review of compliance to the management treatment

In both nurse led clinics and Physician led clinics BP was taken by nurses using digital blood pressure machines and the results were compared to National Hypertension protocol target of <140/90mmHg or <130/80 if diabetes or kidney diseases.

The prescribed and titration of hypertension medication by both physicians and nurses were compared to the National hypertension protocol. The same guideline (figure 2) is available in health facilities and used by both physician and nurses in managing hypertension.

Before the initiation of use of National standard protocol, physicians treated hypertension using the knowledge acquired from medical school and open source information to guide and titrate hypertension treatment.

Review of patients' adherence to the NCD clinic appointments

The national protocols recommends monthly follow up of patient with hypertension where assessment of compliance to treatment are conducted, side effects and complications are assessed and medicines are refilled and titrated if not meeting the protocol target. Patients adherence to the NCDs clinic appointment was assessed against the provided appointment for follow-up.

3.5 Variables

Data collected included demographics and clinical data such as: clinical information and history, BP before and after task shifting, prescribed medication before and after task shifting, adherence to attendance before and after task shifting, medication dosage adjustments, development of complication from hypertension.

Appropriate medication management of hypertension was defined as medical records with management that comply with the available and taught National NCDs guideline including the management of hypertension (Medication).

Appropriate laboratory follow up of patients was defined by medical charts with completed proteinuria results within the previous six months period and creatinine within one year.

Controlled blood pressure was defined by target systolic blood pressure < 140/90 mm Hg in all patients except those with diabetes or renal disease for whom the target was <130/80 mm Hg.

Following variables were collected to respond to the objectives

Describe baseline clinical and demographic characteristics of patients followed in Physician and nurse led clinics before task shifting and after one year period of follow-up.

- Patients gender in nurse led clinics and Physician led clinics
- Baseline systolic blood pressure in nurse led and physician led clinics
- Baseline diastolic blood pressure in nurse led and physician led clinics
- Patient's adherence to clinic appointment in nurse led and physician led clinics

Compare the implementation of using a standardized hypertension protocol before and after 12 months intervention.

- Prescribed medication according to the guideline before and after task shifting
- Right prescribed medication in nurse led clinics and physician led clinics before and after 12 months task shifting
- patients BP Controlled in nurse led and Physician led clinics before and after 12 months of task shifting
- Providers compliance to screen kidney diseases before and after kidney diseases before and after 12 months of task shifting
- Patients adherence to clinic appointment in nurse led and physician led clinics before and after 12 months of task shifting

Compare the change in systolic and diastolic blood pressure before and after 12 months intervention

- Systolic and diastolic BP by gender before and after 12 months of intervention.
- Systolic and diastolic BP by time on treatment before and after 12 months of intervention.
- Systolic and diastolic BP by health care providers before and after 12 months of intervention.
- Systolic blood pressure and diastolic blood pressure among patient with right prescribed medication according to the protocol before and after 12 months of intervention.
- Systolic blood pressure and diastolic blood pressure among patient with good adherence to clinic appointments before and after 12 months of intervention.

3.6 Data Analysis

Data was analysed using Stata Version 13, Descriptive statistics such as frequency distribution, proportion and percentages were calculated. Student's t-test and Z-test were used an appropriate for comparison. 95% CIs was calculated to assess whether the difference in the blood pressure before and after task shifting are statistically significant, $P<0.05$ was considered significant.

3.7 Ethical consideration

This research involved the use of routine collected data from medical files and various precautions were used to guarantee the confidentiality of information collected from medical records. This research obtained approval from the Ethical Committee of the University of Rwanda College of Medicine and Health Sciences.

4 CHAPTER FOUR: RESULTS

Total number of 330 patients enrolled in nurse led clinics and 210 patients enrolled in physician led clinics were assessed for eligibility and following the exclusion total 102 patients in physician led clinics and 157 nurse led clinics were included in the study(Fig.4).

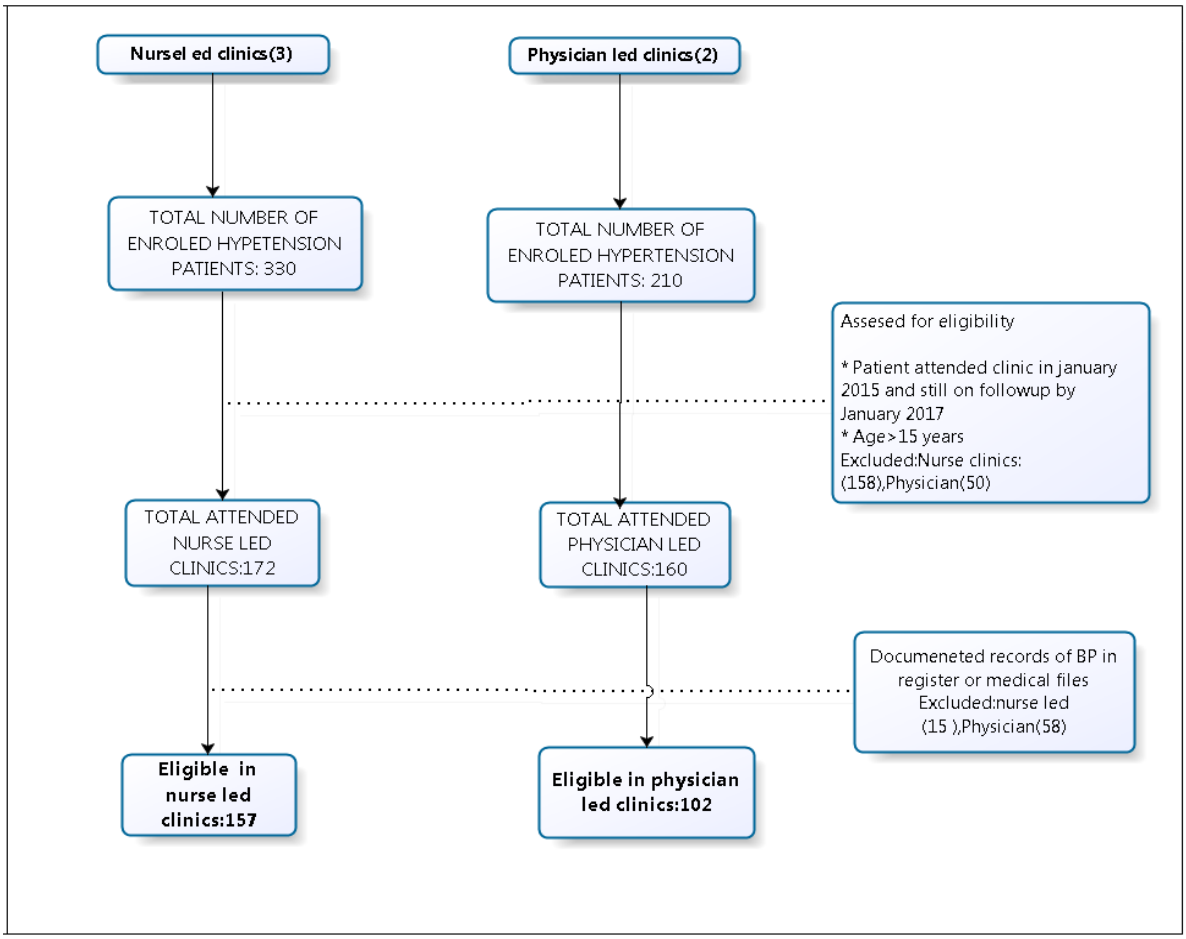

Figure 4. Patient exclusion flow chart: The figure showing the process to obtain the final sample size

4.1 Baseline characteristics of patients in physician and nurse led clinics

Table 1 shows the clinical and social demographic characteristics before and after task shifting and use of hypertension management protocol. The majority were female (81.4%) in physician led clinics and 71.9% in nurse led clinics. The mean base line systolic blood pressure was 157mmhg in physician led clinic and 161.7 in nurse led clinic. The mean baseline diastolic blood pressure was 85.1 in physician led clinics and 93.5 in nurse led clinic.

Table 1. Baseline characteristics of physician and nurse led clinic

	Physician led clinics (n=102)	Nurse led clinics (n=157)
Female	83(81.4%)	113(71.9%)
Baseline record mean SBP(mmHg)	157.2059	161.7338
Baseline record mean DBP(mmHg)	85.1	93.54545
Controlled blood pressure <140/90	20(19.61%)	21(13.38%)
Patient adherence to clinic appointment	101(99.02%)	133(84.71%)

4.2 Implementation of the hypertension protocol and screening for chronic kidney diseases.

Table 2 shows the proportion of patients with medical prescription according to the hypertension protocol increased from 41.7% (ranging from 36% to 48%) before task shifting to 81.9% (ranging from 77% to 88%) after task shifting. With the development and introducing standardized protocol, Patients in Nurse led clinic have a higher proportion 93.68% (ranging 89% to 97%) with prescribed medication in compliance to the management guideline compared to patients followed by physicians 63.7% (ranging 54% to 73%).There was an high increase in proportion of patients screened for kidney diseases in Nurse led clinic from 5.88% to 99.36 compared to those followed by physicians with the decrease from 57.3% to 45.1%. Patients adherence to clinic appointments in nurse led clinics increased slightly from 84.7% (95% CI:78% -89.6%) to 87.18 (95% CI:80% -93.5%).

Table 2. Implementation and effect of using standardizes protocol before and after 12 months intervention

	Taskshifting /use of protocols	%	95CI	After Taskshifting / use of protocols	%	95CI	P value
Prescribed medication							
Not according to the guideline	151	58.3	(0.52-0.64)	47	18.15	(0.14-0.23)	
According to the guideline	108	41.7	(0.36-0.48)	212	81.85	(0.77-0.87)	< 0.001
Medical prescription according to the guideline							
nurse led clinics	45	28.66	(0.22 - 0.36)	147	93.63	(0.89-0.97)	
GP led clinics	63	61.76	(0.52- 0 .71)	65	63.73	(0.54-0.73)	< 0.001
providers' compliance to the screening kidney diseases protocol							
Compliance among nurse led clinics	6	5.88	(0.03 -0.13)	156	99.36	(0.96-0.99)	< 0.001
Compliance among GP led clinics	90	57.32	(0.5-0 .64)	46	45.1	(0.36-0.55)	
patients' Adhrence to attendance in clinics							
Active adherence in Nurse led clinics	133	84.71	(0.78-0.896)	136	87.18	(0.80-0.935)	0.772
Active adherence in GP led clinics	101	99.02	(0.93-0.999)	84	88.42	(0.81-0.916)	
controlled BP							
controlled BP in Nurse led clinics	21	13.38	(0.09-0.2)	124	80.52	(0.73-0.86)	
controlled BP in GP led clinics	20	19.61	(0.13-0.29)	51	50	(0.40-0.6)	< 0.001

4.3 Controlled Blood pressure

Table 2 shows Patient with controlled BP increased from 13.4%(95%CI:9%-20%) before task shifting to 80.5%(95% CI:73%-86%) while controlled patients followed by physicians increased from 19.6% (95% CI:13%-29%) to 50% (95%CI:40%-60%).

4.4 Change in blood pressure in nurse and physician led clinics after 12 months of intervention

Figure 5 shows overall reduction in mean systolic and mean diastolic in both nurse led and physician led clinics after task shifting. The adjusted mean SBP among study participants was averaged to be 159.9 mmHg which reduced by an average of 23.8 mmHg the adjusted mean DBP among study participants was averaged to be 90.18 mmHg which reduced by an average of 11.8 mmHg in one year of follow up after task shifting.

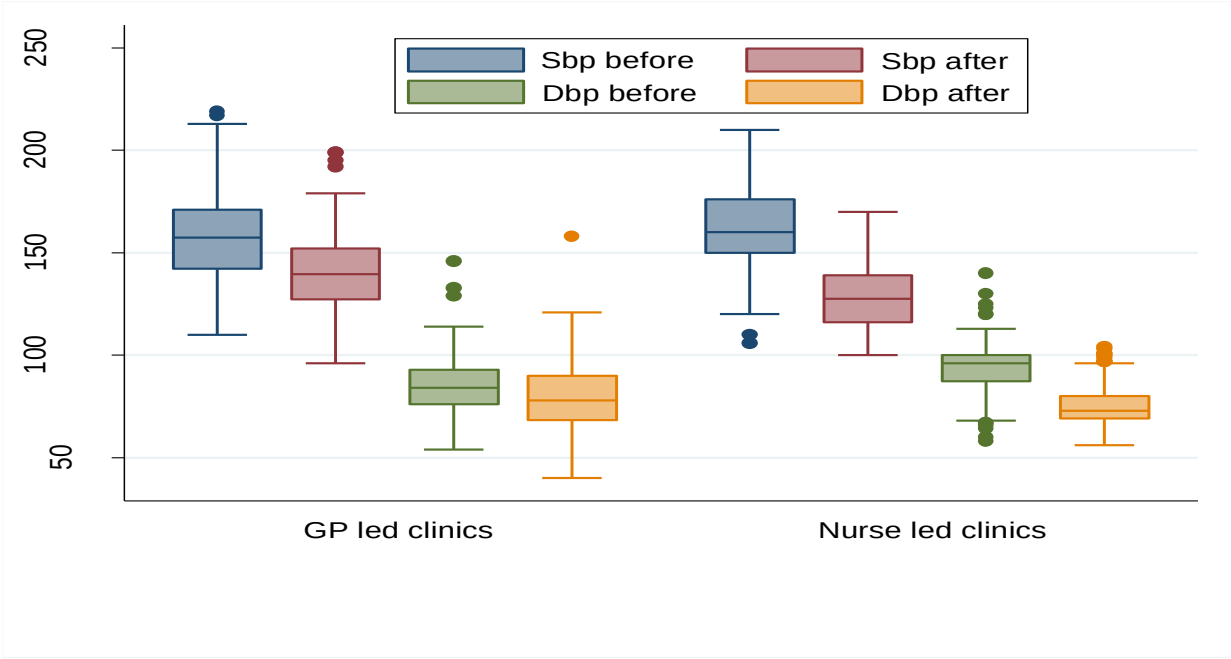

Figure 5. Box plot of mean systolic and diastolic blood pressure before and after task shifting

4.5 Change in systolic blood pressure

Table 3 shows before task shifting, the adjusted mean SBP among study participants was averaged to be 159.9 mmHg which significantly reduced by an average of 26.07 mmhg(CI:22.63 -29.5) in one year of follow up after task shifting (p<0.001). The change of systolic blood pressure before and after tasks shifting is slightly different in male compared to the female population with reduction in the systolic BP of 26.2mmhg (CI 22.5-29.96) among females compared to the reduction systolic BP among Male:25.55mmhg (CI 17.25-33.85) The difference mean systolic blood pressure is higher in nurse led clinics of 32.44mmhg (CI 28.23-36.65) compared with difference in systolic blood pressure in physician led clinics of 16.44mmhg(CI 11.05-21.84).

Table 3. Change in systolic blood pressure before and after 12 months of intervention

	Before Taskshifting /use of protocols(Mean)	After Taskshifting / use of protocols(Mean)	Difference(95CI)		P value
Systolic BP	**159.93**	**133.86**	**-26.07**	**(-29.50 to -22.63)**	**< 0.001**
Gender					
Female	159.89	133.65	-26.232	(-29.96 to -22.50)	< 0.001
Male	160.06	134.52	-25.55	(-33.85 to -17.25)	< 0.001
Patient duration on treatment					
1-5 years	157.66	136.07	-21.5878	(-26.19 to -16.99)	< 0.001
5-10 years	162.91	129.55	-33.3628	(-38.49 to -28.23)	< 0.001
>10 years	165.33	152.83	-12.5	(-37.57 to 12.57)	0.2562
SBP by health care providers					
Physician led clinics	157.21	140.76	-16.44	(-11.05 to -21.84)	< 0.001
Nurse led clinics	161.73	129.29	-32.44	(-28.23 to -36.65)	< 0.001
Health care providers compliance to management protocol					
Compliance to the management protocol	158	134.5	-23.52	(-18.2 to -28.8)	< 0.001
Non compliance to the management protocol	161.4	133.4	-27.9	(-23.39 to -32.46)	< 0.001
Patients adherence to clinic appointment					
Active adherence to attendance	159.24	133.5335	-25.7098	(-28.24 to -23.18)	< 0.001
Poor adherence to attendance	166.27	136.43	-29.8393	(-38.43 to -21.25)	< 0.001

4.6 Change in diastolic blood pressure

Table 4 shows before task shifting, the adjusted mean DBP among study participants was averaged to be 90.18 mmHg which significantly attained the reduction of 13.6(CI:11.6-15.7) in one year of follow up after task shifting (p<0.001).The change of diastolic blood pressure is slight different in male and female population with reduction of diastolic blood pressure after task shifting (Female:13.48mmhg CI 11.2-15.79; Male:14.3 CI 9.7-18.9).The change in diastolic blood pressure is higher in nurse led clinics with the difference in diastolic BP of 18.12mmhg (CI 15.88-20.36) compared with Physician led clinics who attained the difference in diastolic BP of 6.99mmhg (CI 3.43-10.55)

Table 4. Change in diastolic blood pressure before and after 12 months of intervention

	Before Taskshifting /use of protocols(Mean)	After Taskshifting / use of protocols(SD)	Difference(95CI)		P value
Diastolic BP	90.17578	76.49219	-13.6836	(-15.74 to -11.63)	< 0.001
Gender					
Female	89.75	76.27	-13.48	(-15.79 to -11.18)	< 0.001
Male	91.50	77.19	-14.31	(-18.91 to -9.71)	< 0.001
Duration on treatment					
1-5 years	87.79	76.91	-10.88	(-13.78 to -7.97)	< 0.001
5-10 years	93.33	75.27	-18.06	(-20.83 to -15.29)	< 0.001
>10 years	95.33	86.83	-8.5	(-21.55 to 4.55)	0.155
DBP by health care providers					
Physician led clinics	85.1	78.1	-6.99	(-10.55 to -3.43)	< 0.001
Nurse led clinics	93.55	75.43	-18.12	(-20.36 to -15.88)	< 0.001
Healt care providers compliance to management protocol					
Compliance to the management protocol	87.7	75.9	-11.8148	(-14.88 to -8.75)	< 0.001
Non compliance to the management protocol	92	76.9527	-15.0473	(-17.82 to -12.27)	< 0.001
Patients adherence to clinic appointment					
Active adherence to attendance	89.65	76.12	-13.5223	(-15.07 to -11.98)	< 0.001
Poor adherence to attendance	94.45	79.3	-15.14	(-19.66 to -10.62)	< 0.001

5 CHAPTER FIVE: DISCUSSION

This study sought to assess whether task shifting and use of standardized hypertension treatment protocol led to a greater proportion of hypertensive patients achieving recommended blood pressure targets after one year follow-up.

5.1 Primary outcome: Task shifting and blood pressure patterns

The findings from this study revealed that patients followed in nurse led clinics significantly reduced systolic blood pressure after one year of follow up, with the greater change in nurse led clinics than patients followed by physicians. However the reduction in mean Blood Pressure comparing before and after task shifting and use of management guideline was significant in both nurse led and physician led clinics. The results are comparable to the randomized clinical trial conducted by Sally C Dean et al in UK that showed similar findings(15).Our findings clearly supports task shifting in management of hypertension as an approach to improve quality of care in setting with limited number of medical doctors.

5.2 Secondary outcome: Use of standardized hypertension protocol and blood pressure patterns

Guidelines are used to set standards of care for managing patients with high BP and address medication selection, frequency of BP monitoring, and strategies for improving patient medication and recommended lifestyle adherence. Guidelines may also specify decision points for referrals to specialty care(6). The use of standardized protocol in management of hypertension resulted in the change in Blood pressure. The findings of this study clearly indicated that non compliance to the use of standardized protocol as the independent determinant of increased systolic and diastolic blood pressure among patients followed regardless of whether being followed by Nurses or physician. The findings are consistent with the study conducted by Patrick J. O'Connor et al that found association between implementation of hypertension guideline and improved hypertension guideline(21).

5.3 Strength and Limitations

This is the first study conducted in sub-Saharan country that evaluated the effect of task shifting and use of standardized hypertension treatment and care protocol in adults in primary health care level, however this study used medical records and the complexity of the assessment of patients adherence and its effect on the outcome should not be ignored. This study should be followed by randomized clinical trial.

6 CHAPTER SIX: CONCLUSION AND RECOMMENDATIONS

6.1 Conclusion

This study showed that task shifting and use of standardized hypertension treatment and care protocol resulted in reduced systolic blood pressure. The findings highlights the need to establish nurse led clinics in setting with limited Medical Doctors and ensure Improved access to hypertension treatment and care.

6.2 Recommendations

Task shifting from physicians to nurses has showed good results during this study, we recommend to the Ministry of Health:

- To scale up the process of task shifting in all health facilities.
- To have close follow-up and mentorship of nurses to ensure good adherence to the management guideline.
- To conduct after school trainings of all physicians on management of hypertension.

To researchers and students:

- To conduct analytical study to measure the impact of task shifting on management of hypertension in Rwanda.

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